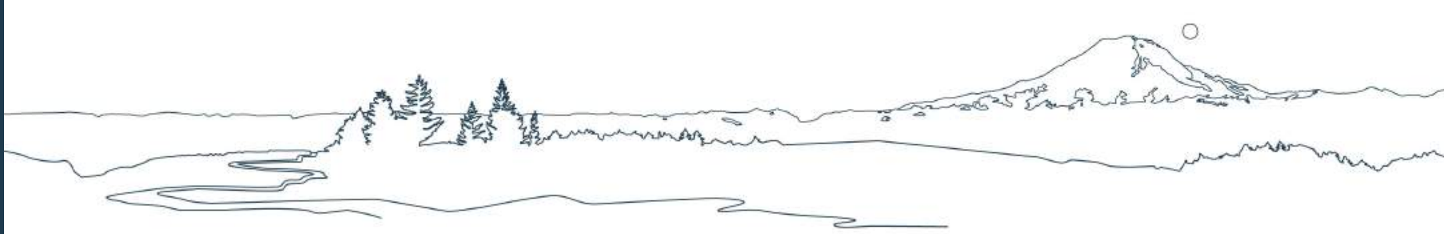
Engineering Design Report

Ultra Custom Care Cleaners Site

Prepared for
City of Bothell

July 2023



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Engineering Design Report

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City of Bothell
under the supervision of:

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Date: 07/14/2023

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List of Abbreviations

Abbreviation	Definition
AO	Agreed Order
AOC	Area of concern
ARAR	Applicable or Relevant and Appropriate Requirement
BDI Plus	Bio-Dechlor Inoculum
bgs	Below ground surface
BMP	Best management practice
CAP	Cleanup Action Plan
CD	Consent Decree
CID	Contained-in determination
City	City of Bothell

Abbreviation	Definition
cm/day	Centimeters per day
COC	Contaminants of concern
CSCSL	Confirmed and Suspected Contaminated Sites List
CSGP	Construction Stormwater General Permit
CUL	Cleanup level
CVOC	Chlorinated volatile organic compound
DCE	*Cis-1,2-dichloroethene*
DO	Dissolved oxygen
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EIM	Environmental Information Management
Engineer	Engineer of Record
GRO	Gasoline-range organics
GSR	Green and sustainable remediation
HASP	Health and Safety Plan
IC	Institutional Control
IDP	Inadvertent Discovery Plan
IM	Interim measure
LTCMP	Long-term compliance monitoring plan
µg/L	Micrograms per liter
µg/m^2/day	Micrograms per square meter per day
mg/kg	Milligrams per kilogram
MIP	Membrane interface probe
MNA	Monitored Natural Attenuation
MOA	Memorandum of Agreement
MTCA	Model Toxics Control Act
ORP	Oxidation-reduction potential
OSHA	Occupational Health and Safety Act
PCE	Tetrachloroethene
PDIWP	Pre-Design Investigation Work Plan

Abbreviation	Definition
PFM	Passive flux meter
PID	Photoionization detector
POC	Point of compliance
Protocol	Contaminated Soil and Groundwater Protocol
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
REL	Remediation levels
RI/FS	Remedial Investigation/Feasibility Study
ROW	Right-of-way
SAP/QAPP	Sampling and Analysis Plan/Quality Assurance Project Plan
Site	Ultra Custom Care Cleaners Site
S-mZVI	Sulfidated micro ZVI
SPECP	Spill Prevention and Emergency Countermeasure Plan
Speedy Glass	Speedy Auto Glass
TCE	Trichloroethene
UIC	Underground Injection Control
WAC	Washington Administrative Code
ZVI	Zero-valent iron

1.0 Introduction

This Engineering Design Report (EDR) was prepared per the requirements of Washington Administrative Code (WAC) 173-340-400(4)(a) and describes the engineering concepts and design criteria for the cleanup action selected by the Washington State Department of Ecology (Ecology) for the Ultra Custom Care Cleaners Site (Site) located in the downtown corridor of Bothell, Washington, as detailed in the Cleanup Action Plan (CAP; Ecology 2022a) for the Site. The Site is included on Ecology's Confirmed and Suspected Contaminated Sites List (CSCSL) under Facility Site ID 379891 and Cleanup Site ID 3172. The Site location is shown on Figure 1.1.

1.1 SITE REGULATORY OVERVIEW

The Site includes the location of several former dry cleaning facilities and adjacent downgradient properties where contamination resulting from releases of dry cleaning solvents has come to lie.

The City of Bothell (City) entered into an Agreed Order (AO) with Ecology on April 18, 2013, to perform a cleanup at the Site (Ecology 2013). A Remedial Investigation/Feasibility Study (RI/FS) and CAP were prepared for the Site in accordance with the AO in April 2018 (HWA 2018).

The City subsequently entered into a Consent Decree (CD) with Ecology on February 10, 2023, (Ecology 2023), to implement the cleanup action specified in the CAP. This EDR was developed in accordance with the requirements in the CD and incorporates data collected under an Ecology-approved Pre-Design Investigation Work Plan (PDIWP; Floyd|Snider 2022a), which was also prepared in accordance with the CD.

1.2 PURPOSE AND OBJECTIVES

The purpose of the EDR is to satisfy Model Toxics Control Act (MTCA) requirements and provide the engineering design for cleanup action that will be used as the basis for developing the plans and specifications for the remedial construction phase of this project, as well as to provide sufficient detail to implement the post-construction activities.

The objectives of the cleanup action are to comply with applicable sections of the WAC; the MTCA (Chapter 70.105D Revised Code of Washington); and applicable state, federal, and local requirements.

1.3 ROLES AND RESPONSIBILITIES

This section defines roles and responsibilities for implementation of the cleanup, consistent with WAC 173-340-400(4)(a)(iii). The City is the owner and operator of the Site and is identified in the CD as the responsible party for implementation of the cleanup action. The City will direct the implementation of the cleanup action and obtain access to perform work on private properties where elements of the cleanup action will be constructed. The City will additionally perform post-construction operation, maintenance, and monitoring of the cleanup action.

Ecology will provide regulatory review and approval of this EDR, the cleanup action, and applicable post-construction operation, maintenance, and monitoring plans. Ecology may additionally conduct Site inspections.

The Engineer of Record (Engineer), a professional engineer registered in the state of Washington, is responsible for the preparation of this EDR and, on behalf of the City, will provide quality control oversight and monitoring during cleanup action implementation.

1.4 REPORT ORGANIZATION

The remainder of this EDR is organized as follows:

- **Section 2.0**. Presents a description of the Site and a brief summary of Site conditions and cleanup goals.
- **Section 3.0**. Describes data collection performed in accordance with the PDIWP and presents PDI results. Appendix A, which presents sample collection logs and laboratory reports for PDI data collection, supports this section.
- **Section 4.0**. Presents the basis of design for the remedial action, incorporating Site data and data on the cleanup action components. Appendix B, which presents manufacturer-specific design basis for chemical products that will be applied to promote remediation, supports this section.
- **Section 5.0.** Describes the required construction activities at the Site. This includes permitting, Site preparation, excavation, injection of in situ groundwater treatment barriers, environmental media handling and disposal, decontamination procedures, and health and safety procedures. Appendix C, which presents permits and approvals obtained by the City for cleanup action construction, Appendix D, which presents a Spill Prevention and Emergency Countermeasure Plan (SPECP), and Appendix E, which provides a site-specific Health and Safety Plan (HASP), support this section.
- **Section 6.0**. Describes the monitoring that will be conducted as part of the remedial construction, including confirmational sampling. Appendix F, which presents a Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP), supports this section.
- **Section 7.0**. Describes the required operation, monitoring and maintenance that will be performed immediately after construction of the cleanup action. Appendix G, which presents documentation of Institutional Controls (ICs) implemented by the City to achieve the objectives of the cleanup action, supports this section.
- **Section 8.0**. Presents a discussion of the reporting that will be completed as part of the remedial action construction.
- **Section 9.0**. Presents the references relied upon in creation of this document.

2.0 Site Description and Summary of Current Environmental Conditions

The Site is generally located at 18304 Bothell Way NE, which is the address of the property containing the source of Site contamination (the source property; refer to Figure 2.1). The source property is approximately 0.25 acres in size and consists of tax parcel 072605-9003 and a portion of tax parcel 072605-9191. The 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 source property is an empty, primarily paved lot on the City's Municipal and City Hall Campus, situated southwest of Bothell City Hall. 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 Auto Glass (Speedy Glass), and Hillcrest Bakery. Farther south, past Main Street, lies a vacant City-owned lot (Lot E,F,G) and additional commercial properties including Baskin-Robbins. Buildings and businesses in the vicinity of the Site are also identified on Figure 2.1.

The City anticipates future development in the vicinity of 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 within the Site downgradient of the source property, as shown on Figure 2.1.

2.1 SITE BACKGROUND

From the 1950s through 1967, Raincheck Cleaners and Laundry occupied a former building 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. The City purchased the source property in 2012 and demolished the remaining building in 2013.

Numerous investigations at the Site, conducted between 2002 and 2020, identified contamination in soil and groundwater by chlorinated volatile organic compounds (CVOCs) caused by releases of dry cleaning solvents. The nature and extent of CVOC contamination in environmental media at concentrations that pose a risk to human health and the environment were defined in the RI/FS (Floyd|Snider 2022b). The RI/FS additionally identified elevated arsenic concentrations in groundwater due to geochemical conditions that may have been caused by prior CVOC remediation which caused temporary increases in the solubility of naturally occurring metals in soil. Downgradient of the source property, a separate release of gasoline-range organics (GRO) in shallow soil was identified at the Speedy Glass property. The GRO release was not related to releases of dry cleaning solvent and does not commingle with the groundwater CVOC plume present beneath the property. This release is not included in the definition of the Site, and the City is not responsible for any cleanup that may be required to address this contamination.

The Site is not defined by an address or property boundary under MTCA, but rather defined by the extent of contamination before cleanup activities begin (WAC 173-340-200). Therefore, the Site includes the source property and several adjacent or downgradient impacted properties as shown on Figure 2.1. Impacted adjacent properties include: private properties occupied by Ranch Drive-In, Speedy Glass, Hillcrest Bakery and Baskin-Robbins; the City-owned Lot E,F,G; and City-owned rights-of-way (ROWs) of NE 183rd St, Bothell Way and Main St.

The Site is additionally located upgradient of several other cleanup sites listed in Ecology's CSCSL, as shown on Figure 2.1. These include the Bothell Hertz, Bothell Landing, and Bothell Riverside total petroleum hydrocarbons and halogenated volatile organic compound sites south and downgradient of the Site. The properties of these adjacent sites are predominantly City owned. The RI/FS found that Site contamination does not commingle with contamination present within surrounding cleanup sites. Shallow petroleum contamination in soil on the Bothell Landing site, which overlaps the extent of downgradient groundwater impacts from the Site, did not historically commingle with Site contamination and has been remediated.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

The source property lies at a ground surface elevation of approximately 46 feet North American Vertical Datum of 1988, and the Site generally slopes gently downward from north to south toward the Sammamish River.

The downtown Bothell 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. Glacial till is a compact, poorly sorted mixture of silt, sand, and gravel. The alluvium predominantly consists of sands and silts deposited by moving water associated with the deposition caused by the nearby Sammamish River. The alluvium also includes localized peat lenses that have been identified in several borings (HWA 2018).

Groundwater at the Site is generally encountered between 5 to 13 feet below ground surface (bgs). Groundwater elevation typically becomes shallower toward the Sammamish River. Groundwater elevation measurements collected for the RI/FS estimated a primarily flow direction to the south-southeast. For the purposes of characterization and remediation, 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. The bottom of the deep water bearing zone is delineated by compact glacial till at depths ranging from approximately 40 to 60 feet bgs at the Site, which then acts as a confining layer for groundwater.

2.3 CONCEPTUAL SITE MODEL

The dry-cleaning solvent tetrachloroethene (PCE) was released at the Site in the liquid phase at the historically unpaved ground surface of the source property. PCE migrated downward through permeable shallow soils into groundwater. Once in groundwater, contamination continues to migrate laterally in the direction of groundwater flow, which is generally southward toward the Sammamish River. Because PCE is denser than water, groundwater contamination is found at deeper depths with increasing distance from the source property as contamination migrates both downward and downgradient. Breakdown of PCE is also occurring in groundwater both naturally and as a result of previously completed interim measures (IMs). Breakdown of PCE produces additional CVOCs including trichloroethene (TCE), *cis*-1,2-dichloroethene (DCE) and vinyl chloride.

IMs for groundwater remediation completed at the Site in 2015 and 2016 used bioinjection with a combination of zero-valent iron (ZVI), emulsified vegetable oil and dehalococcoides bacterial culture capable of breaking down CVOCs. Implementation of IMs has resulted in a discontinuous plume of CVOCs in groundwater. Most areas within and immediately downgradient of the IM injection areas were successfully remediated; however, CVOCs in groundwater remain at elevated concentrations between the targeted IM areas, in the deep aquifer zone, and in areas where PCE breakdown was incomplete.

2.4 CONTAMINANTS OF CONCERN, CLEANUP STANDARDS, AND REMEDIAL ACTION OBJECTIVES

Site contaminants of concern (COCs) comprise the chemicals that pose the greatest overall threat to human health and the environment due to toxicity, spatial distribution, and/or concentrations present. Cleanup standards for the COCs are protective of all active or potentially active exposure pathways at the Site, considering both current and future land use.

2.4.1 Contaminants of Concern

The Site COCs were determined in the CAP (Ecology 2022a) and include the following:

- **Groundwater.** PCE and toxic breakdown products of PCE (TCE, DCE, and vinyl chloride); and arsenic.
- **Soil.** PCE and GRO.

PCE and its breakdown products represent most of the contamination at the Site. Additional COCs, including arsenic in groundwater and GRO in soil, had comparatively rare detections at elevated concentrations and do not represent a significant exposure risk.

There are no current or former sources at the Site that would contribute to a release of arsenic to groundwater. Elevated arsenic concentrations are expected to be present within the boundaries of the CVOC plume due to reducing geochemical conditions caused by IMs performed at the Site. Reducing conditions can cause the release of naturally occurring arsenic in native soils into groundwater. This process is reversible following a return to normal geochemical conditions. GRO in soil is limited to an area of shallow soil on the downgradient Speedy Glass property, separate from CVOC-contaminated groundwater, and is thus not associated with the Site and will not impact remediation for CVOCs in groundwater on this property. GRO in shallow soil is not considered in further discussion of cleanup standards or cleanup action components.

2.4.2 Cleanup Standards

The cleanup standards include a cleanup level (CUL) combined with a point of compliance (POC) where the CUL applies. Cleanup standards for the COCs are protective of all active or potentially active exposure pathways at the Site, considering both current and future land use.

2.4.2.1 Groundwater Cleanup Standards

Groundwater cleanup standards include CULs to be achieved by remediation and supplemental remediation levels (RELs) for protection of human health during remediation. The standard POC for groundwater, which applies to all groundwater COCs, is throughout the Site to the maximum depth where contamination from the Site is present. Compliance is determined for each groundwater monitoring well individually in accordance with WAC 173-340-720(9)(c)(iv).

The Site groundwater CUL for arsenic is based on the natural background concentration (Ecology 2022b). The CULs for CVOCs are based on MTCA Method A, which is protective of all pathways for a simple site with a single contaminant source (e.g., PCE releases from former dry cleaning operations). CULs for each groundwater COC are summarized in Table 2.1

Table 2.1
Groundwater Cleanup Levels

Contaminant	CAS No.	CUL (µg/L)	CUL Basis	Toxicity Basis (1)
Total Metals				
Arsenic	7440-38-2	8.0	Background	Carcinogenic (2)
Chlorinated Volatile Organic Compounds				
PCE	127-18-4	5.0	MTCA Method A	Carcinogenic
TCE	79-01-6	5.0	MTCA Method A	Carcinogenic
DCE	156-59-2	70	Federal MCL	Short-Term/Acute
Vinyl chloride	75-01-4	0.20	MTCA Method A	Carcinogenic

Notes:
1. In accordance with WAC 173-340-720(9)(c)(v), compliance with CULs will be determined using an upper percentile concentration for CULs based on short-term or acute toxic effects on human health or the environment, and the true mean concentration for CULs based on chronic or carcinogenic effects.
2. The lowest human-health risk-based criterion is protective of the cancer endpoint, which is adjusted upward to natural background (Ecology 2022b).

Abbreviations:
CAS Chemical Abstracts Service

Contaminant	CAS No.	CUL (µg/L)	CUL Basis	Toxicity Basis (1)

MCL Maximum contaminant level
µg/L Micrograms per liter

Groundwater RELs based on vapor intrusion into a commercial building were additionally developed to aid in determining whether groundwater concentrations are protective of commercial activities on private property in areas overlying plumes while the remedy is in process. The RELs were calculated consistent with Section 4.4 of Ecology's vapor intrusion guidance (Ecology 2022c), assuming that workers are exposed for a duration of 45 hours per week for 50 weeks per year. Short-term RELs are presented in Table 2.2.

Table 2.2
Groundwater Remediation Levels for Vapor Intrusion

Contaminant	CAS No.	REL (µg/L)
PCE	127-18-4	120
TCE	79-01-6	12 (1)
Vinyl chloride	75-01-4	1.5

Note:
1 A short-term action level of 31 µg/L is additionally applicable for TCE and will be assessed by performance monitoring where groundwater contamination may be present beneath buildings.

2.4.2.2 Soil Cleanup Standards

Soil cleanup standards are protective of unrestricted current and future land use for a site where the ecological exposure pathway is not active. The standard POC for soil is throughout the Site, up to the maximum depth where contamination from the Site is present. CULs for soil are summarized in Table 2.3.

Table 2.3
Soil Cleanup Levels

Contaminant	CAS No.	CUL (mg/kg)	CUL Basis
Chlorinated Volatile Organic Compounds			
PCE	127-18-4	0.050	Protection of Groundwater

Abbreviation:
mg/kg Milligrams per kilogram

2.4.3 Areas Of Concern

Areas of concern (AOCs) were defined in the RI/FS to encompass Site soil and groundwater contamination and to facilitate evaluation and selection of remedial alternatives. AOCs encompass Site soil and groundwater locations where recent results exceed CULs for COCs associated with Site activities including CVOCs and arsenic. AOCs are summarized below; Figure 2.2 illustrates CVOC AOCs.

Source Property CVOC AOC. This AOC includes soil contamination located within the source property. There are three localized PCE hotspots in soil at the source property. Most PCE contamination is present in shallow vadose zone soil at depths less than 3 feet bgs. Contamination is deepest in the southernmost hotspot, where contamination may be as deep as 9.5 feet bgs. Groundwater contamination is present in shallow groundwater on the southern parcel of the source property, as described below.

Shallow Groundwater CVOC AOC. Contamination in this AOC was partially addressed by previous groundwater IMs. As a result of these IMs, groundwater contamination in the shallow groundwater zone is present in four discrete groundwater plumes or hotspots, as shown on Figure 2.2. Contamination is located at properties and City ROWs south of the source property. Contamination in this AOC is deepest in the hotspot on the southern portion of the Speedy Glass property, where PCE contamination remains at depths of 10 to 19 feet bgs.

Residual low-level soil contamination is present in the City ROW near the intersection of Bothell Way NE and NE 183rd Street. This contamination may have migrated with groundwater and partitioned onto soil.

Deep Groundwater CVOC AOC. Groundwater contamination is present in the deep groundwater zone at properties and City ROWs south of the source property. The maximum depth of contamination is approximately 35 feet bgs. This depth corresponds to the depth of the confining layer of glacial till present across the deep groundwater plume extent.

Arsenic AOC. There are three discrete groundwater hotspots where arsenic exceeds its CUL, which together constitute the arsenic AOC. Two hotspots are in the shallow groundwater zone: primarily in City ROW centered around UCCMW-24 and UCCMW-25, and on City-owned Lot E,F,G centered around UCCMW-27. One hotspot is in the deep groundwater zone, centered around UCCMW-4D near the southern boundary of the source property. Each hotspot is centered on or immediately downgradient of bio-injection locations where groundwater geochemistry was intentionally altered to create reducing conditions.

2.4.4 Remedial Action Objectives

Remedial Action Objectives (RAOs) for the Site, established in the CAP, were developed to specifically identify goals that should be accomplished to meet the minimum requirements of the MTCA Cleanup Regulations (WAC 173-340) and other objectives set forth by the City. The following RAOs are defined for the Site:

- Protect humans and the environment (ecological receptors) by reducing concentrations of Site contaminants to concentrations less than the cleanup standards presented in Section 2.4.2.

  - Address residual contaminated soil to reduce exposure to hazardous substances via direct contact.
  - Reduce concentrations of hazardous substances in groundwater to mitigate human health risk that could result from consumption of drinking water impacted by groundwater contamination at the Site.[1]
  - Reduce, to the extent practicable, concentrations of CVOCs in shallow groundwater to reduce or eliminate the potential for vapor intrusion into commercial buildings located above areas of the Site with shallow groundwater impacts.
- Prevent transport of contaminants from the Site by groundwater migration.
- Reduce, to the extent practicable, concentrations of COCs in soil that are potential sources of continuing groundwater contamination.
- Remediate contaminants in a manner that (a) does not interfere with or restrict proposed Site development and future use plans and (b) minimizes impacts to private businesses during remedial construction. This includes allowing for redevelopment of the City property (source property and Lot E,F,G).
- Properly manage any contaminated soil or groundwater generated during Site cleanup and ensure that these activities do not result in unacceptable exposure to contamination.
- Comply with local, state, and federal laws (Applicable or Relevant and Appropriate Requirements [ARARs]; WAC 173-340-710) and site-specific cleanup standards. ARARs specific to the cleanup are described in the CD and are limited to applicable federal and state laws and those that Ecology determines are relevant and appropriate.
- Provide for compliance monitoring to evaluate the effectiveness of the preferred cleanup action and to evaluate when the cleanup standards are met.

2.4.5 Cleanup Action Components

The CAP identifies the following components for the cleanup action, which are shown on Figure 2.2.

Soil Excavation and Off-Site Disposal. Shallow PCE contamination greater than proposed CULs in soil within the source property CVOC AOC will be excavated in three distinct areas to depths ranging from 5 feet to 9.5 feet bgs, targeting a total of approximately 550 cubic yards of PCE-contaminated soil for removal. A conceptual layout of the excavation areas is shown on Figure 2.2. In the deepest excavation area, ZVI will be mixed with saturated soil after removal of contaminated soil to promote degradation of CVOCs.

[1] 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.

In Situ Groundwater Treatment. In situ groundwater treatment will be conducted throughout the groundwater CVOC AOCs to address CVOCs (specifically, PCE and vinyl chloride) at concentrations that are greater than their respective CULs. A mixture of liquid-activated carbon and sulfidated micro ZVI (S-mZVI), such as proprietary PlumeStop with S-mZVI mixture, will be injected in a series of in situ groundwater treatment barriers targeting the groundwater CVOC AOCs. A conceptual layout of in situ groundwater treatment barriers is shown on Figure 2.2. In targeted areas, the treatment barriers will be supplemented with a soluble carbon electron donor and bacterial cultures to enhance downgradient bioremediation.

Monitored Natural Attenuation (MNA) and Groundwater Monitoring. MNA for groundwater is a component of the cleanup action within the CVOC AOCs, particularly those within ROWs, where implementation of in situ injections is infeasible, after the removal of the soil source contamination. As part of MNA, post-remedy groundwater monitoring will be required after cleanup action implementation.

ICs. ICs, if necessary, will be implemented to address remaining soil contamination in the ROW as well as development or changes in land use on private properties where contamination is known or suspected to exist.

Together, the individual technologies remove contaminant mass in soil through excavation and in groundwater through adsorption and degradation. The cleanup action is a comprehensive final remedy for the Site that is compliant with all the applicable remedy selection requirements under MTCA provided in WAC 173-340-360(2)(a) and WAC 173-340-360(2)(b) as well as the RAOs for the Site, as described in Section 2.4.4

3.0 Summary of Pre-Design Data Collection

In February 2023, Floyd|Snider personnel completed pre-design data collection as described in detail in the PDIWP to support design of the remedial components of the cleanup action. Data collection occurred in two separate field events, which took place on February 8 and 27, 2023. The first field event included groundwater sampling and passive flux meter (PFM) deployment at three wells (BB-2, UCCMW-29, UCCMW-34D) near proposed in situ treatment Barriers 3, 4, and 5, which are shown on Figure 2.2. The second field event included soil sampling and PFM retrieval for sampling. Soil samples were collected using direct push drilling methods at the source property and at locations along the proposed Barriers 2, 4, and 5. Groundwater and soil samples were analyzed by OnSite Environmental in Redmond, Washington. PFM samples were analyzed by EnviroFlux, LLC in Gainsesville, Florida. Sample analytical results and soil boring logs are included in Appendix A.

3.1 PRE-DESIGN DATA RESULTS FOR EXCAVATION

Soil sample analysis included CVOCs (PCE, TCE, DCE, and vinyl chloride) for samples taken at the source property. Samples were collected at key base and sidewall locations to confirm the extent of soil excavation to remove PCE contamination exceeding the CUL. All PCE soil sample results were either non-detect or detected at concentrations less than the CULs. A comprehensive summary of PCE distribution in soil, including the samples collected during the PDI, is discussed further in Section 4.2. Boring logs are presented in Appendix A.

3.2 PRE- DESIGN DATA RESULTS FOR IN SITU TREATMENT BARRIER INJECTION

Groundwater sample analysis was performed in coordination with Regenesis[2] to analyze groundwater geochemical parameters that can impact the effectiveness of the PlumeStop and S-mZVI materials to adsorb and break down CVOCs. Samples for geochemical evaluation were analyzed for total metals (arsenic, calcium, iron, and magnesium), dissolved metals (calcium, iron, and magnesium), sulfate, and nitrate. Prior to collecting samples, field parameters were recorded until they stabilized at each well using a water quality meter. Groundwater sample results indicated that there are low levels of total and dissolved cations (calcium and magnesium), which indicates that groundwater chemistry will not hinder the distribution of PlumeStop. Field parameters and groundwater sample results for metals, sulfate, and nitrate are shown in Table 3.1.

PFMs were used to measure the ambient groundwater flux and CVOC contaminant mass flux at three groundwater wells on the Site. PFMs were placed inside the wells to cover the entire screened interval within each well and sampled in 2-foot sections following retrieval. Flux refers to the mass of water and contaminants flowing per unit area at a measured point in a well screen averaged over an approximately 19-day period.

[2] Regenesis is the creator of the trademarked product PlumeStop that is utilized in the in situ treatment barrier injection.

PFM results are presented in Appendix A and in Table 3.2. The ambient groundwater flux values are shown in terms of Darcy velocity (centimeters per day [cm/day]), which is the volumetric water flux through a specified cross-sectional area. The contaminant flux values were determined as Flux=mass/unit area/time and represented with the units of milligrams per square meter per day. The flux average concentration values were calculated based on the measured contaminant and Darcy fluxes. The contaminant mass flux values measured at the local scale (approximately 10-feet or 15-feet vertical intervals) were integrated over the vertical profile and represented in terms of mass discharge per unit width of aquifer (milligrams per meter per day). The results can in turn be used to estimate the mass discharge (milligrams per day) through a specified aquifer width.

Average Darcy velocity values for wells BB-2, UCCMW-29, and UCCMW-34D were determined to be 2.8, 1.0, and 7.1 cm/day, respectively (refer to Table 3.2). BB-2, UCCMW-29, and UCCMW-34D were chosen for PFM analysis because these wells are within, or in close proximity to, proposed treatment Barriers 2, 3, and 5. Therefore, these results are used to aid in understanding the groundwater conditions at these proposed treatment barriers for design consideration. Detailed PFM results are included in Table 3.2. Based on these results, estimated groundwater velocities in these wells ranged from approximately 75 to 100 feet/year at UCCMW-29, 100 to 200 feet/year at BB-2, and 300 to 500 feet/year at UCCMW-34D. These results indicate that groundwater velocities increase with subsurface depth and proximity to the Sammamish River.

Grain size analysis found that the major soil types within the subsurface at the Site are silts and sands with limited gravels and clays observed. Laboratory grain size results are included in Table 3.3 and additional grain size results that were analyzed by Regenesis as part of the basis of design are included in Appendix B. These results help support estimated groundwater velocities and the general trend that velocities increase with subsurface depth. As described in the Design Verification Testing Technical Memo by Regenesis (refer to Appendix B), increased grain size in deeper samples can be used to justify the observation of these greater velocities. In addition, these results indicate that the radius of distribution of PlumeStop will be limited by the large fines content, which impacts the application of PlumeStop injection as described further in Section 4.3.4.

4.0 Engineering Design

Design strategies have been developed as part of this EDR to ensure compliance with ARARs and other requirements consistent with MTCA. In accordance with WAC 173-340-400(a)(viii), this section includes the design criteria and engineering justification for design and operation parameters of the cleanup action. The cleanup action components were designed to comply with the CAP and to achieve the RAOs described in Section 2.4.4.

4.1 ENGINEERING JUSTIFICATION AND DESIGN CRITERIA

The remedial technologies that will be used in the cleanup were selected for their implementability and expected efficiencies in removing or destroying contaminants to achieve Site cleanup standards. The Site data presented in the RI and the additional PDI data described in Section 3.0 provide the basis of design for the remedial technologies. Further discussion of the expected efficiencies and effectiveness of the cleanup action components, and expectations of how these technologies will allow for achieving the cleanup standards, is presented in the following sections.

4.1.1 Expected Efficiencies and Degree of Effectiveness

The remedial technologies for the cleanup action include soil excavation and in situ groundwater treatment.

Excavation is a proven and effective method of removing contaminants from the subsurface. The excavation design, discussed further in Section 4.2, is intended to remove soil with PCE concentrations greater than the CUL on the source property (refer to Table 4.1). The CUL is protective of groundwater via leaching from contaminated soil. Removal of remaining source soil will benefit the groundwater cleanup action over time and will immediately achieve compliance with PCE soil CULs across the source property.

In situ groundwater treatment is a proven and effective method of removal/reduction of CVOCs and will be accomplished using a mixture of liquid activated carbon (PlumeStop) and S-mZVI injected as treatment barriers to capture and abiotically degrade CVOCs as groundwater flows across the Site. The PlumeStop and S-mZVI are both colloidal compounds that disperse minimally (generally within 6 lateral feet or less) in the saturated zone to form a stationary treatment area that relies on passive groundwater flow through the barrier. Simultaneous injection of dehalococcoides bacterial culture using proprietary Bio-Dechlor Inoculum (BDI Plus) and a soluble electron donor (AquiFix) will provide enhanced bioremediation in targeted areas with the potential to disperse downgradient with groundwater flow. The selected components of the in situ treatment are all proven and effective methods of groundwater treatment, and are further designed to work together to effectively reduce the extents and concentration of CVOCs in groundwater in an accelerated manner. The effectiveness of the treatment components was verified by review of several case studies conducted at sites with similar or more contaminated CVOC conditions in groundwater.

The first step within the in situ treatment barriers is the capture of organic contaminants in groundwater by liquid activated carbon. Activated carbon is a porous adsorption media with extremely high internal surface area. It is a proven technology with high removal efficiencies (up to 99.9%) for many VOCs, including PCE and TCE (USEPA 2023). At the Site, where PCE is present at the greatest concentrations in groundwater, recent PCE detections range from 80 to 130 µg/L (refer to Section 4.3 below); activated carbon is expected to reduce these concentrations to 1 µg/L or less (USEPA 2023). This expected post-treatment concentration meets the PCE CUL. Activated carbon is also capable of achieving CULs for TCE, DCE, and vinyl chloride with consideration of both the current concentrations at the Site and as the PCE cleanup progresses. Adsorption by activated carbon also consolidates CVOC contaminants within the barriers for more efficient treatment by dehalococcoides bacteria, which will be added to the barriers to supplement the existing bacterial populations.

The addition of S-mZVI in the treatment barriers, as well as within the source area saturated zone after excavation, causes degradation of CVOCs through abiotic reductive dechlorination. ZVI is a fast-acting electron donor, which replaces chlorine atoms with hydrogen atoms to transform CVOCs to successive breakdown products, ending with nonhazardous ethene and ethane. Sulfidation of ZVI increases the efficiency of the electron donor by decreasing competition for electrons in the environment. The expected dechlorination efficiency of S-mZVI is approximately 4 millimole TCE per gram of ZVI (Gong et. al. 2021). The degradation of CVOCs creates vacant sorption sites on the activated carbon, prolonging the life of the barrier and ensuring that back-diffusion from saturated soil to groundwater does not cause rebound of CVOC concentrations. S-mZVI additionally ensures that reducing conditions conducive to anaerobic biodegradation are present in the saturated zone.

As a final step in the dechlorination process, a mixture of soluble organic carbon and dehalococcoides bacteria applied in targeted areas will allow for a slower and more dispersed bioremediation mechanism to occur within the downgradient plume. Dehalococcoides are the only known bacterium able to fully break down PCE to nonhazardous ethene and ethane. The soluble organic carbon source product proposed for treatment releases electrons via fermentation, which are used by dehalococcoides bacteria in anaerobic biodegradation. Electron release is designed to occur in two phases, with an initial rapid release to stimulate the initial bioremediation reaction and growth of the bacterial colony, followed by slow release to facilitate full anaerobic biodegradation of CVOCs. The soluble electron donor and bacteria are able to migrate downgradient with groundwater rather than remaining in a barrier configuration and thus provide ongoing remediation of CVOCs downgradient of the area of application.

The abiotic and biotic processes described above work in combination to achieve degradation of CVOCs, resulting in complete degradation via dechlorination to produce nonhazardous ethene, ethane, and chloride anions.

Some of the selected treatment components have also been used successfully to treat groundwater at the Site during prior IMs. Injection of organic carbon in the form of edible oil, supplemented with ZVI, was effective in remediating contamination in the shallow CVOC AOC downgradient of the injection points. Prior IMs also successfully created a reducing environment, as indicated by lowered dissolved oxygen (DO) relative to background conditions and negative oxidation-reduction potential (ORP). The success of the prior IMs is demonstrated by the currently discontinuous footprint of the shallow plume after treatment and by measurable decreases in groundwater concentrations at many wells targeted for treatment.

The selected treatment components are designed to create and maintain a reducing environment in groundwater to facilitate anaerobic dechlorination of CVOCs. Reducing geochemical conditions additionally increase the solubility of naturally occurring metals in the saturated zone. This effect has been observed at the Site, where reducing conditions are present downgradient of the previous IMs. Elevated arsenic concentrations (at concentrations less than 2 times the CUL) have been measured in these areas and are attributed to the temporarily altered geochemical conditions caused by the IMs. Elsewhere on the Site, shallow groundwater conditions are generally oxidizing (refer to Table 4.2) and arsenic concentrations are consistent with regional background values. Arsenic concentrations are expected to temporarily increase in response to the application of the treatment components described above; however, over time, as geochemical conditions return to background conditions following CVOC remediation, arsenic concentrations are expected to also return to background conditions within the restoration time frame.

4.1.2 Compliance with Cleanup Requirements

The requirements for cleanup actions are specified in MTCA. These include both the minimum threshold requirements described in WAC 173-340-360(2)(a) and additional requirements described in WAC 173-340-360(2)(b). The threshold requirements are to protect human health and the environment, comply with cleanup standards, comply with applicable state and federal laws, and provide for compliance monitoring. The additional requirements are to use permanent solutions to the maximum extent practicable, provide for a reasonable time frame, and consider public concerns.

The cleanup action is designed to achieve cleanup standards in soil and groundwater Site-wide. The cleanup standards are protective of exposures to all human and environmental receptors per the requirements of State and Federal Law. The cleanup standards will be met for soil immediately upon excavation, and will be met for groundwater within an approximate restoration time frame of 6 to 8 years, as described in the CAP. Compliance with additional applicable laws related to worker safety, environmental media management and disposal, in situ injection and protection of archaeological resources is ensured by the provisions of this EDR. Proposed compliance monitoring, which is a key remedy component to assess progress toward cleanup standards, is additionally described in this EDR.

4.2 CONTAMINATED SOIL EXCAVATION DESIGN

Analytical results for CVOCs form the design basis for contaminated soil excavation. These analyses define the extents of soil removal necessary to achieve CULs. Additional criteria for implementation of the excavation include City requirements for shoring or sidewall sloping, ground surface protection, and utility protection.

PCE was the only CVOC that exceeded its CUL in soil on the source property. More than 60 discrete soil samples, collected at depths ranging from 1 foot to 15 feet bgs, define the extents of PCE concentrations exceeding the CUL in soil on the source property.

The limits of PCE exceeding soil were estimated in the CAP on the basis of sample results primarily collected between 2009 and 2020. Additional design verification samples collected in 2023, as described in Section 3.1, were used to verify current conditions and adjust the final excavation extents for design. The distribution of PCE in soil at various depth intervals is illustrated on Figure 4.1, along with the limits of excavation in Areas A, B, and C. The magnitude and depth of PCE results in soil are shown on Figure 4.1. The locations labelled on Figure 4.1 are key locations that delineate the excavation design and are presented in detail in Table 4.1. Figure 4.1 also illustrates results at numerous locations that were not used to inform excavation design, but which confirm that the designated excavation Areas A, B and C represent the full extent of PCE contamination on the source property.

In excavation Area A, PCE was detected at a concentration of 0.21 mg/kg (approximately 4 times the CUL of 0.050 mg/kg) in a sample collected at 3 feet bgs at location EAIb-B15. The underlying samples collected at 8 and 14 feet bgs at EAIb-B15 had nondetectable levels of PCE. Based on these results, and to ensure removal of all potentially impacted soil containing PCE at concentrations greater than the CUL, a conservative excavation depth of 5.5 feet was determined as part of design. This depth was verified with PDI data, as summarized in Section 3.0: PCE was not detected in the sample taken at 5.5 feet bgs at location A-B1. The western, southern, and eastern extents of excavation in Area A were determined based on PDI and historical samples collected at 3 feet bgs at locations A-S1, A-S2, and EAIb-B14, all of which did not contain detectable PCE. The northern excavation extent was inferred based on PCE results at surrounding soil sample locations EAIb-B19 and PP-13. Soil samples collected at locations EAIb-B19 did not contain detectable PCE and samples from PP-13 exhibited detectable PCE at a concentration less than the CUL. Given the lack of PCE detections at the surrounding sample locations, historical and PDI soil data were used to bound all potentially impacted soil, ensuring PCE exceeding the CUL will be removed through excavation.

In excavation Area B, PCE was detected at a concentration of 0.057 mg/kg, slightly exceeding the CUL, in a sample collected at 2.5 feet bgs at location PP-30. In the underlying sample collected at 7 feet bgs at PP-30, PCE was detected at a concentration less than the CUL. Based on these results and a lack of groundwater contamination in the underlying saturated zone, a conservative excavation depth of 5 feet was determined as part of design to ensure removal of all potentially impacted soil containing PCE at concentrations greater than the CUL. The lateral excavation extents in Area B are inferred based on PCE results at surrounding locations EAIb-B4, EAIb-B8, and Lot8-3. Samples collected at locations EAIb-B4 and EAI-B8 between 3 and 15 feet did not contain detectable PCE. At Lot8-3, PCE was detected at concentrations less than the CUL in samples collected at 5.5 and 10 feet. Given the lack of PCE detections at the surrounding sample locations, the lateral extents of excavation were conservatively inferred as part of design to ensure all potentially impacted soil with PCE exceeding the CUL will be removed through excavation.

In excavation Area C, PCE was detected at concentrations greater than the CUL, ranging from 0.075 to 0.12 mg/kg, in samples collected at 5, 7, and 8.5 feet bgs at locations PP-7, PP-24, and PP-1, respectively. The underlying samples (collected at 9.5, 10, and 12 feet bgs at PP-7, PP-24, and PP-1, respectively) contained PCE at concentrations less than the CUL. Based on these results, and to ensure removal of all potentially impacted soil containing PCE at concentrations greater than the CUL, a conservative excavation depth of 9.5 feet bgs (measured from the ground surface at PP-7) to 10 feet bgs (measured from the surface of a former concrete building pad at PP-24) was determined as part of design. These excavation depths were verified with PDI data collected at a depth of 10 feet bgs at location C-B1, which met the PCE CUL. The lateral excavation extents in Area C were inferred based on PCE results at surrounding locations PP-2, PP-3, PP-5, PP-8, PP-9, PP-11, PP-23, and UST-SS-5 at sample depths between 2 and 9.5 feet bgs. No samples collected at any of these locations had detected PCE results exceeding the CUL. The lateral excavation extent is further supported by a verification sample taken at 5.5 feet bgs at location C-S1, which confirms detected PCE concentrations are less than the CUL along the northwestern excavation sidewall. Given the lack of PCE detections at the surrounding sample locations and limited footprint of groundwater contamination in the underlying saturated zone, the lateral extents of excavation were conservatively inferred as part of design to ensure all potentially impacted soil with PCE exceeding the CUL will be removed through excavation.

To further document the removal of soil with PCE exceeding the CUL, additional performance and confirmation data will be collected during excavation as described in Sections 6.2 and 6.3, respectively.

4.3 IN SITU GROUNDWATER TREATMENT DESIGN

The design of the in situ groundwater treatment is informed by several types of data:

- **Hydrogeologic study data**, including measurements of groundwater horizontal gradients and flow velocities. These data inform the horizontal placement of treatment barriers to ensure that treatment occurs via passive flow through the barriers at adequate rates across the plume.
- **Contaminant distribution data**, including the most recent groundwater sample results for CVOCs, which inform the extents of the groundwater treatment areas; and CVOC profiling field data collected by membrane interface probe (MIP), which inform the target placement within the CVOC plume and vertical thickness of treatment barriers.
- **Contaminant flux data**, including flux data collected by PFMs, which inform the quantities of activated carbon necessary for adsorption and the need for supplemental electron donors to allow for full anaerobic dechlorination.

- **Anaerobic dechlorination indicator data**, including contaminant concentration trends and field measurements of geochemical parameters (such as DO and ORP). These data are used to identify areas of the plume that are more or less conducive to anaerobic dechlorination and also inform the quantities of electron donors or beneficial bacterial culture necessary to promote degradation.
- **Treatment component dispersal potential data**, including soil grain size distribution data in the saturated zone, concentrations of calcium and magnesium cations, and PlumeStop adhesion testing. These data inform the assumed radius of influence for in situ injection points and the recommended horizontal spacing and injection screen length to achieve consistent and even application of the barrier materials.

A summary of the key design data inputs is presented in Figure 4.2 and discussed in the following sections. Additional documentation of the in situ treatment design basis is presented in Appendix B.

4.3.1 Hydrogeologic Study

Groundwater flow directions were determined by synoptic water level measurement presented in the RI/FS. The overall flow direction from the source property was found to be southerly, shifting to a southeasterly direction downgradient in the vicinity of Lot E,F,G. The treatment barriers were situated perpendicular to the groundwater flow direction to achieve the most effective treatment, with Barriers 1 and 2 oriented west-east and Barriers 3 through 5 oriented southwest-northeast.

Groundwater velocity estimates collected by PFM samples during the PDI range from approximately 75 to 200 feet/year in the shallow zone and 300 to 500 feet/year in the deeper zone (refer to Table 3.2 and Appendix B). These velocity estimates are slower than suggested by dispersion testing completed during MIP investigations, which were more focused on characterization of the deeper zone. While this suggests that shallower in situ treatment barriers should be more closely spaced to achieve consistent treatment rates, the current configuration of shallow plume boundaries after the completion of previous IMs (refer to Section 4.3.2 below) as well as constraints due to existing structures are also factors that inform the layout of the in situ treatment barriers.

The approximate groundwater flow velocities and flow directions through different CVOC-contaminated zones are shown on Figure 4.2.

4.3.2 Contaminant Distribution

The nature and extent of CVOCs in groundwater was determined in the RI/FS. CVOC results for the most recent sampling event (conducted in 2020) are presented in Table 4.2. The CVOC groundwater contamination exceeding CULs at the Site originates as a shallow plume emanating from the southern portion of the former dry cleaning source property. The shallow plume spreads laterally downgradient the south-southeast and also widens downgradient to the east and west.

A deeper zone of CVOCs exceeding CULs in groundwater is also present downgradient and south-southwest of the source property.

Concentrations of PCE are generally greatest in shallow groundwater in the vicinity of the source property, with greater PCE concentrations present at increasing depth as PCE migrates downward and downgradient. The shallow CVOC plume is discontinuous due to the lasting effect of the prior IMs, which remediated limited areas as shown on Figure 4.2. Areas of no CUL exceedances or only lower-level exceedances of the vinyl chloride breakdown product are present in the shallow zone downgradient of several IMs.

In situ groundwater treatment will be completed in the southern portion of the source property concurrently with excavation, in downgradient treatment barriers oriented perpendicular to groundwater flow, and in key supplemental treatment zones to fully remediate CVOCs. The distribution of CVOC contamination that informs the basis of design for each area is described in the following sections.

4.3.2.1 Source Property Treatment Zone

PCE source contamination in saturated soil and collocated groundwater is present in a limited portion of excavation Area C (refer to Section 4.2 above for at detailed description of the limits of PCE in soil). The most elevated concentrations of PCE in shallow groundwater have been detected in this vicinity, which comprises the upgradient edge of the CVOC plume.

During excavation, the shallow saturated zone will be accessible for application of comparatively large quantities of treatment components relative to application rates achievable by injection. Treatment in this area will include bucket mixing treatment components into saturated soil approximately 5 feet below the base of the completed excavation. Following source soil excavation, treatment in this area will target residual PCE as it begins to migrate downgradient and vertically from the uppermost saturated zone. Because it comprises the upgradient edge of the plume, a treatment barrier is not warranted in the source property treatment zone, and treatment will be accomplished by mixing granular ZVI to provide ample amounts of donor electrons.

4.3.2.2 In Situ Treatment Barriers

The in situ treatment barriers, which are stationary treatment zones, are designed to be placed immediately downgradient of areas with the greatest concentrations of PCE in groundwater to capture and degrade source contamination as groundwater flows through the barrier. The lateral and vertical distribution of PCE source contamination is informed by the magnitude of PCE detections within the monitoring well screen intervals from which groundwater samples were collected. Monitoring well groundwater sample results suggest that treatment barriers should be focused on the most contaminated shallow groundwater immediately south of the source property, in remaining downgradient shallow areas on private properties that were not targeted by IMs, and in deeper zones downgradient where PCE has migrated vertically downward. The current plume extent supplemented by PCE exceedance factors informs the basis of design for the lateral limits of in situ treatment barriers, and the well screen depth intervals where CVOCs were detected at elevated concentrations inform the basis of the vertical treatment zone for in situ injection. These design features are shown on Figure 4.2. Additional information regarding the vertical distribution of PCE source contamination in groundwater is provided by continuous vertical profiling by MIP response completed during the RI/FS. MIP response was measured by gas chromatography using three sensors to measure CVOCs: a halogen-specific detector, flame ionization detector, and photoionization detector (PID). Because the well screens range from 5 to 15 feet in length and in some cases may only partially penetrate the most contaminated intervals of groundwater, the intervals of peak MIP response supplement the information provided by monitoring wells to ensure that the target treatment zone encompasses the full depth of the most contaminated groundwater. The peak response interval for MIP locations with indications of contamination are annotated on Figure 4.2.

Based on a combination of monitoring well sample results and MIP data, the shallowest depth of groundwater contamination is consistent throughout the targeted portions of the shallow zone at approximately 7 feet bgs (9 to 10 feet bgs on the higher-elevation source property). The bottom of the heavily contaminated shallow aquifer zone interval to be targeted for treatment is approximately 22 feet bgs in the vicinity of the source property, deepening to approximately 27 feet near the southern boundary of the Ranch Drive-In property. Near the southern boundary of the Speedy Glass property, the targeted treatment depth interval extends to 30 feet. This area is considered the transition zone, where contamination begins to migrate vertically.

On the adjacent downgradient Lot E,F,G, the most contaminated interval targeted for treatment ranges from approximately 15 to 35 feet bgs near the northern property line to 31 to 51 feet bgs at the southward toe of the plume.

4.3.2.3 Supplemental Treatment Zones

Supplemental treatment zones are identified for areas where partial remediation has been accomplished by IMs and treatment barriers are not recommended but additional treatment is warranted to achieve the RAOs within a reasonable time frame. There are limited remaining areas of CVOC contamination downgradient of the previous IMs that are not candidates for treatment barriers. These areas are just upgradient of the Ranch Drive-In building (UCCMW-7) and just upgradient of the Speedy Glass building (UCCMW-29). Treatment barriers are not appropriate in these areas because (a) upgradient groundwater is clean and (b) it is desirable to accelerate treatment with components that disperse with groundwater flow due to the presence of an occupied downgradient building. These areas are designated as supplemental treatment zones TZ1 and TZ2 for application of AquiFix, which is an organic carbon source designed to release electrons through fermentation and migrate downgradient with groundwater.

At UCCMW-7, only vinyl chloride exceeding the CUL remains in groundwater, indicating that anaerobic degradation is nearly complete in the vicinity of the Ranch Drive-In building after the previous IM (refer to Figure 4.2). The shallow zone upgradient of UCCMW-7 from 7 feet bgs to the bottom of the well screen at 18 feet bgs, designated TZ1, is targeted for supplemental AquiFix treatment to promote complete biodegradation of the remaining vinyl chloride.

At UCCMW-29, PCE remains in a limited area immediately upgradient of the treatment barrier but groundwater further upgradient is clean due to previous IMs (refer to plume extents on Figure 4.2). The shallow zone upgradient of UCCMW-29 from 6 feet bgs to 18 feet bgs, designated TZ2, is also targeted for supplemental treatment with AquiFix to promote more rapid biodegradation of the limited remaining area of residual PCE upgradient of the Speedy Glass building.

4.3.3 Contaminant Flux

Additional CVOC flux data collected during the PDI inform the quantity of PlumeStop needed to achieve adequate contaminant adsorption and electron donors and/or dehalococcoides bacteria needed to achieve dechlorination. Total CVOC flux rates (refer to Figure 4.2 and Appendix B) were greatest in the shallow-to-deep transition zone represented by well BB-2, where peak flux exceeded 6 micrograms per square meter per day ($\mu g/m^2/day$). Peak flux was the least in the shallow zone represented by UCCMW-29, with a maximum of 0.82 $\mu g/m^2/day$. Peak flux in the deep zone, represented by UCCMW-34D, was 4.42 $\mu g/m^2/day$. Flux rates for these wells are shown on Figure 4.2. Based on these results, the greatest dosing of PlumeStop is required in Barriers 3 and 4 in the shallow to deep transition relative to Barriers 1, 2 and 5.

Where CVOC flux is greatest, it was determined as part of design that it would be beneficial to supplement the in situ treatment barriers with the addition of an electron donor in focused areas to accelerate reductive dechlorination within and downgradient of the barrier. The addition of electron donors provided by AquiFix is warranted in key areas in Barriers 3 and 4 and in a supplemental treatment zone (TZ3) from 20 to 40 feet bgs downgradient of Barrier 4.

To supplement the existing bacterial colonies and aid in biodegradation of CVOCs, BDI Plus dehalococcoides culture will be added to the in situ injections in all treatment locations.

4.3.4 Anaerobic Dechlorination Indicators

The primary indicators of anaerobic dechlorination include: decreasing concentration trends for PCE accompanied by increasing concentration trends for TCE, DCE, and/or vinyl chloride; and reducing geochemical conditions, including negative ORP and relatively lower DO (generally less than 0.5 µg/L) compared to background conditions. Geochemical parameter data for sampling conducted in 2020 are presented in Table 4.2. Generally, in shallow groundwater, the geochemical indicators in both the contaminated and uncontaminated saturated zones are oxidizing except in a limited portion of the Site downgradient of prior IMs and upgradient of Barrier 2, where ZVI was applied. This zone corresponds to groundwater results less than the CUL for PCE and residual vinyl chloride exceeding the CUL, indicating incomplete biodegradation. This zone of reducing conditions, and locations of prior IMs that likely influenced these conditions, are shown on Figure 4.2. Geochemical conditions within the deep CVOC AOC were variable within the plume in the most recent dataset; however, some indications of oxidizing conditions were observed.

Based on these findings, relatively greater dosing rates of S-mZVI are required to ensure reducing conditions in the shallow-to-deep zone and deep zone at Barriers 3, 4, and 5. Greater dosing rates of ZVI are also required in S-mZVI in the vicinity of Barrier 1; however, S-mZVI in this barrier will be supplemented with mixing of granular ZVI in the saturated zone below the base of excavation. The least S-mZVI dosing is required in Barrier 2 due to previous groundwater treatment. Supplemental application of S-mZVI is also warranted in TZ2 and TZ3 but is not needed where reducing conditions and partial biodegradation are present in TZ1. Reducing conditions will also be promoted by addition of granular ZVI in the source area treatment zone.

4.3.5 Treatment Component Dispersal Potential

Grain size data collected during the PDI are the primary indicator with respect to whether treatment components will disperse adequately in the saturated zone. As shown in Table 3.3, saturated zone soil at the Site is primarily fine grained and relatively consistent across the vertical thickness of the targeted treatment zones. As described in Appendix B, adhesion rates for PlumeStop during bench testing were within the expected range for fine-grained soils. Concentrations of calcium and magnesium were not found to be rate-limiting for PlumeStop dispersal, and given the relatively fine-grained soils, supplemental calcium application to prevent over-dispersion is not required. The expected radius of influence for each injection point is expected to be approximately 3.5 feet. Therefore, the injection configuration (two overlapping rows at modest injection volumes) is based on the vendor's recommendation to ensure the required amounts of the treatment components can be injected evenly into the formation. Additional details regarding implementation of injection are provided in Section 5.7.

4.4 GREEN AND SUSTAINABLE REMEDIATION COMPONENTS

Green and sustainable cleanup considerations are increasingly being integrated into cleanup programs, including under MTCA in Washington. Sustainable Remediation: Climate Change Resiliency and Green Remediation (Ecology 2023) is a Washington-specific resource to incorporate resiliency into the selected cleanup remedy. In accordance with green and sustainable remediation (GSR) principles, the five core elements of energy, air, water, land/ecosystems, and materials/waste should be considered to reduce the project's net environmental footprint in ways that are consistent with applicable statutes and regulations. Common GSR elements that may be incorporated into design of a cleanup action include the reduction of waste generation, optimization of material use or reuse, minimization of impacts to resources, minimization of air pollutants, and positive economic impact to the local community.

Environmental remediation is intrinsically a green process, as the environment is improved and risk to the community and human health is reduced or diminished. The environmental "footprint" associated with Site remediation has been reduced by incorporating the following GSR elements into the design:

- Collecting key samples to delineate excavations during predesign, which minimizes potentially unnecessary mobilization of extra equipment for activities such as shoring and dewatering.

- Using in situ treatment, which relies on the natural flow of groundwater through treatment barriers, rather than energy-intensive ex situ treatment technologies.

Additional measures will be incorporated into the construction specifications to minimize environmental and community impacts, including the following:

- Trucks will not be allowed to queue and idle in ROWs; trucks will be parked until ready to be direct-loaded.
- A no-idling policy will be implemented for all construction equipment and support vehicles when not in use.
- Where possible, materials such as concrete and asphalt pavements will be recycled, rather than disposed at a landfill.
- To the fullest extent possible, trucking mileage for disposal and import of materials will be minimized by identifying backfill sources proximal to disposal facilities and allowing stockpiling of backfill onsite, to facilitate round-trip rather than one-way truck trips.
- Local remediation contractors and vendors will be utilized when available.
- The truck haul route will be limited to arterial streets (designated as principal, minor, or feeder arterial roadways by the City) to minimize traffic, noise, and economic neighborhood impacts.

Finally, during post-construction monitoring, field sampling activities will be performed in accordance with Floyd|Snider's GSR practices, which include minimizing vehicle trips and using dedicated sampling equipment.

5.0 Remedial Action Construction Planning and Implementation

This section provides details for implementation of the cleanup action. The City is responsible for planning and implementation of the cleanup action.

5.1 SITE ACCESS

The Site consists of a combination of travel lanes/street parking, sidewalks, concrete paver-surfaced parking areas (referred to herein as access lanes), paved and unpaved City-owned properties and paved private properties as shown on Figure 5.1. Where possible, existing driveways (refer to Figure 5.1) will be used to access work areas. Appropriate traffic control measures will be implemented in accordance with an approved Traffic Control Plan whenever working in City-owned ROWs including roadways, parking areas, and sidewalks.

There are currently no driveways allowing trucking access to the source property. For construction, a temporary construction entrance will be established using appropriate ground surface protection as shown on Figure 5.2. Access to City-owned Lot E,F,G is unrestricted, via driveways along Main Street and SR-522.

The private properties of Ranch Drive-In and Speedy Glass are unsecured and accessible to vehicles via a driveway along Bothell Way and a driveway along Main Street. Work on the Ranch Drive-In and Speedy Glass properties will be performed under access agreements secured by the City, which will be provided to the remediation contractor(s) prior to construction.

5.2 PERMITS AND EXEMPT PERMITS

Anticipated permits and other approvals to fulfill state requirements for the cleanup action include an Ecology-issued contained-in determination (CID) for PCE-contaminated soil disposal and an Ecology-issued Underground Injection Control (UIC) permit for injection of PlumeStop and other amendments in the in situ treatment barriers.

A CID allows environmental media that are contaminated with hazardous wastes listed under the Resource Conservation and Recovery Act (RCRA) to be handled and disposed as a nonhazardous waste, provided Ecology determines that the contaminant concentrations are less than risk-based screening levels. PCE is listed under RCRA under waste code F002, which includes spent halogenated solvents. The City has applied to Ecology for CID for PCE-contaminated soil to be excavated at the Site. The City will provide disposal approvals to the remediation contractor(s) prior to construction.

The UIC program is administered by Ecology to protect groundwater by regulating the discharge of fluids from underground injection wells. Registration under UIC is required for injection of reagents for groundwater treatment. The temporary injection points were registered with Ecology as Class V UIC wells for cleanup sites. A copy of the UIC registration will be provided to the remediation contractor(s) prior to construction.

Additional local permits applicable to the cleanup action will be acquired as needed. Under MTCA, Ecology-led cleanups are exempt from these local permits but must comply with the substantive requirements of the permits. Because the City is both the Site owner/operator and the entity responsible for review and approval of permits, the City may request that the remediation contractor(s) prepare permit applications or prepare equivalent submittals demonstrating substantive compliance with the permit requirements to fulfill the terms of contracts for the cleanup action.

5.3 SITE PREPARATION

Site preparation for the cleanup action will include establishing site controls and protecting or decommissioning underground structures as described in the following sections.

5.3.1 Site Controls

The City-owned source property is partially fenced along its southern property line and protected by concrete ecology blocks along its perimeter. During excavation, temporary fencing will be extended along the unfenced property boundaries and connected with the partial permanent fence to control access by members of the public. The temporary fence will encompass all work areas including loading areas. The remediation contractor(s) will be allowed to move and reuse ecology blocks on the source property, if needed, to complete the required cleanup action construction activities. The City may additionally opt to enclose a portion of Lot E,F,G with temporary fencing during construction for the purposes of creating a secured equipment and material storage area.

Truck traffic for hauling contaminated soil and importing clean fill at the source property will be routed along an established haul route, protecting the ground surface and other improvements. Required ground surface protection is shown on Figure 5.2. Trucks will enter and exit the haul route via Bothell Way, and the remediation contractor(s) will be required to submit a Haul Route Plan that identifies loading areas, property entry/exit points, and required ground surface protection. Because the haul route will likely obstruct pedestrian and vehicle traffic, and require crossings against established signals, an approved Traffic Control Plan will likely be required. The remediation contractor(s) will be permitted to construct temporary work areas, including haul routes, on adjacent City-owned properties. To construct temporary work areas, ground surface protection appropriate to the intended use such as geotextile or plastic sheeting will be placed on all unpaved surfaces including areas of vegetation, gravel surfacing, or paver-block surfacing. Areas of sidewalk underlain by Silva Cells, a suspended pavement system constructed of soil-filled plastic cells for future tree roots, are required to be protected with steel plates.

5.3.2 Utilities and Monitoring Wells

Several underground structures, including utility lines and monitoring wells, are present in areas that may be disturbed by cleanup action construction. Limited surface utilities (including light poles/lampposts and fire hydrants) are also present in some work areas. The locations of utilities and wells in the vicinity of the cleanup action are shown on Figure 5.3.

City-owned subsurface utilities in the vicinity of the cleanup action include sewer and water main lines and lateral service lines. Other utilities in the area include buried electrical main lines and gas lines owned by Puget Sound Energy, buried electrical service lines connected to streetlights and signals owned by the City, and buried electrical and gas service lines to buildings within the Site. The buried utility main lines are relatively new and expected to be equipped with metallic tracer wires; therefore, the general remediation contractor(s) will be responsible for locating underground utilities within 10 feet of ground disturbing activities using electromagnetic methodology. If sewer lateral lines are not locatable with electromagnetic methods, a camera survey may be performed to trace the alignment at the ground surface by equipping the camera equipment with a Global Positioning System transmitter or tracer wire. A 3-foot buffer will be maintained between buried utilities and any ground disturbing activities.

Site monitoring wells are located on the source property, Ranch Drive-In property, Speedy Glass property, Lot E,F,G, and in the surrounding ROWs. A series of injection wells used for previous IMs are also located along the southern boundary of the source property. All wells are constructed with flush-mounted surface monuments. Wells on the source property will require decommissioning if they fall within the potential maximum layback of excavation sidewalls at a slope of 1.5:1. Wells that are anticipated to require decommissioning due to excavation include four monitoring wells (UCCMW-02, UCCMW-15, UCCMW-16, and UCCMW-17) and 13 of the 17 injection wells. The remaining injection wells will be decommissioned as a best management practice (BMP) to prevent potential pathways to contamination. The well decommissioning plan is shown on Figure 5.3. The remaining monitoring wells will be protected during construction.

Well decommissioning will be performed prior to excavation by a licensed driller in accordance with the Washington State Minimum Standards for Construction and Maintenance of Wells (Minimum Standards; WAC 173-160). Available boring logs and Ecology well tag IDs are provided for the monitoring wells to be decommissioned; per the Minimum Standards, the casings of these wells may be sealed to the ground surface with hydrated bentonite, bentonite slurry, neat cement grout, or neat cement. Boring logs and Ecology well tag IDs are not available for UCCMW-02. If UCCMW-02 can be located, this well will require abandonment by perforating or removing the casing and backfilling the borehole with bentonite slurry, neat cement grout, or neat cement. Available logs for wells to be decommissioned are provided in Appendix C.

5.3.3 Stormwater, Erosion, and Sediment Controls

Cleanup action construction work is expected to begin in the early portion of the wet season, which is defined as October 15 to May 15 in Ecology’s Stormwater Manual for Western Washington (Ecology 2019). The scope of work of primary concern for stormwater erosion and sediment control is excavation on the source property, which will include removal of pavement and soil handling activities. The total potential disturbed area of ground surface on the source property is less than 1 acre; therefore, a Construction Stormwater General Permit (CSGP) is not required for construction. However, work will implement BMPs consistent with CSGP requirements to protect stormwater quality. The total disturbed area when installing a direct-push injection point is approximately 2 inches in diameter and therefore of minimal concern for stormwater run-on and run-off during injection activities.

Prior to beginning excavation, BMPs will be installed to control run-on and run-off of surface water within the planned excavation areas and to prevent commingling of stormwater with excavated soil, as shown on Figure 5.4. BMPs to prevent run-on into disturbed areas (such as berming, or placement of a silt fence, straw wattle, coir log, or compost sock) will be installed along the uphill sides of the anticipated excavation laybacks assuming a maximum slope of 1.5:1. All stormwater will be captured or allowed to infiltrate through the unpaved sidewalk within the work area and will not be allowed to enter catch basins. One catch basin underlying the southwest corner of the source property will be plugged, as shown on Figure 5.4, to allow for construction of a temporary construction entrance, if needed. The catch basins located on the western side of the access lane will be protected with filter inserts as a precautionary measure to protect general stormwater quality despite increased traffic in this area relative to its normal use as a low-occupancy parking area.

Traffic will be routed on paved areas or via stabilized construction entrances and haul routes as described in Section 5.3.1. above. The remediation contractor(s) will be required to submit a haul route plan and temporary erosion and sediment control plan for the Engineer’s review to ensure that the requirements are met. Measures to minimize the spread of contaminated media specific to the construction methodologies are discussed in further detail in Sections 5.6 and 5.9.

5.3.4 Spill Controls

Potential releases of hazardous or potentially dangerous substances may occur during cleanup action construction. The hazardous substances of primary concern are CVOCs, which are the COCs present in Site media that will be targeted during the cleanup action. BMPs to limit the spread of contaminated soil during contaminated soil handling and disposal are presented in further detail in Section 5.9.2; BMPs to limit the spread of waste waters potentially contaminated with CVOCs are presented in Section 5.9.4.

Additional hazardous or potentially dangerous substances that may be released during the course of the cleanup action include fuels and hydraulic oils used in construction and drilling equipment. The chemical components of the in situ treatment barriers, consisting of liquid activated carbon and S-mZVI, are not considered hazardous to human health or the environment. However, these components may create nuisance conditions or cause public concern if spills or accidental discharges occur. A SPECP to address spills of fuels and other chemicals used during the cleanup action is presented in Appendix D.

Prior to beginning cleanup action construction, spill control devices and countermeasures will be mobilized to the Site in accordance with the SPECP.

5.4 ENGINEERING OVERSIGHT

Oversight of the cleanup action construction will be performed on behalf of the City to ensure that all aspects of the work are performed in accordance with the EDR. Engineering oversight will be performed by a qualified technician under the direct supervision of the Engineer.

The technician performing oversight will maintain a daily log of work performed under the EDR, including but not limited to the following information:

- Construction techniques and equipment used
- Roles and qualifications of personnel present onsite
- Types and quantities of materials exported and imported
- Design verification measurements and test results
- Samples of environmental media collected
- Health and safety protocols and monitoring results
- Corrective actions performed to address work not meeting the standards of the EDR
- Site visits or inspections performed by the City or Ecology

5.5 HEALTH AND SAFETY

The cleanup action construction work described will comply with the health and safety standards prescribed by the Occupational Health and Safety Act (OSHA) and the Washington Industrial Safety and Health Act. A project-specific HASP is attached as Appendix E. This plan includes emergency contacts and response, chemical and physical risk analysis, site controls and monitoring. Copies of the HASPs will always be onsite, and visitors entering the work area will be required to review and sign the project-specific HASP. All work will be performed by remediation contractors with active HAZWOPER certifications, First Aid/cardiopulmonary resuscitation, and all applicable task training for the work required.

As the work will have high public interest and will likely impact the community while being conducted, appropriate site control measures will be maintained in all work areas to limit access during and after work hours. Site control measures include the site perimeter fence, sidewalk/access closures, and informational signage. Informational signage will be placed in the safest accessible location during the project work to discourage congregation near the perimeter of excavation areas or in the vicinity of operating equipment.

The Health & Safety Officer will visually inspect the Site during active excavation work at least daily to identify any new potential hazards. Additional monitoring will be conducted during injection when moving between barriers and setting up work zones, when working in ROWs, and during increases in third party activity outside the Site. If new potential hazards are identified, immediate measures will be taken to eliminate or reduce the risks associated with these hazards.

Site perimeter noise and air monitoring will be conducted to ensure that populated areas adjacent to the Site are not negatively affected by work involving contaminated soil and heavy machinery. See Section 5 of the HASP (Appendix E) for relevant monitoring and action levels.

5.6 CONTAMINATED SOIL EXCAVATION

Contaminated soil excavation will be performed in three areas designated Area A, Area B, and Area C, as shown on Figure 5.4. Procedures for completion of the excavations are presented in the following sections.

5.6.1 Excavation Methodology

Excavation will be performed using standard construction equipment and means and methods. The excavation areas are sufficiently far from the City ROWs that the sidewalls may be stabilized by sloping or benching without the use of shoring.

The paved surface overlying the excavation areas will be saw-cut prior to excavation to minimize the amount of excess pavement removed. The anticipated sidewall slope is 1:1; however, an area corresponding to a maximum slope of 1.5:1 may be removed to provide a buffer for safety or access to the excavation.

The seasonal high water table on the source property, occurring in the late winter to early spring, has historically been measured between 8.5 feet and 10 feet bgs. During remaining portions of the year, groundwater on the source property generally occurs below 10 feet bgs. The maximum depth of excavation, which is anticipated to be completed during the later portion of the dry season, is 9.5 feet bgs. Therefore, dewatering is not expected to be required to complete the required excavation. As an additional measure to ensure that soils are dry for loading and disposal, contaminated soil excavation will be scheduled for days when precipitation is not forecasted whenever possible.

Excavation will be completed to remove all identified soil with PCE exceeding the CUL on the source property. The extents of excavation will be confirmed with base and sidewall samples that are discussed in further detail in the sampling plan provided in Section 6.3. If necessary, based on performance and confirmation sampling results, the excavation will be expanded at the direction of the Engineer until compliance with cleanup standards is met. Upon confirmation that the excavation extents have been achieved, excavations will be backfilled and compacted, as described in Section 5.10.

Additional excavation details for Area A are discussed in Section 5.6.1.1 and details for Areas B and C are discussed in Section 5.6.1.2.

5.6.1.1 Excavation Area A

Excavation Area A is located in the northwest portion of the source property and is defined by vertices, or control points, designated A1 through A7, as shown on Figure 5.5.

The footprint of Area A is 210 square feet and the required depth of excavation at the extents defined by the control points is 5.5 feet below the lowest surrounding ground surface, encompassing approximately 43 bank cubic yards of PCE-contaminated soil. A conceptual cross-section of the excavation is additionally shown on Figure 5.5. The expected sidewall slope of Area A is 1:1, resulting in a total removed soil volume of 78 bank cubic yards. The excavation area defined by the control points lies fully within the source property boundary. The sidewall perimeter of Area A measures 55 linear feet.

5.6.1.2 Excavation Area B

Excavation area B is located in the south-central portion of the source property. Excavation details for Area B are shown on Figure 5.6.

The footprint of Area B is 130 square feet and is defined by control points B1 through B5 with a required depth of 5 feet below the lowest surrounding ground surface at the limits defined by the control points, encompassing approximately 29 bank cubic yards of PCE-contaminated soil. The expected sidewall slopes of Area B are 1:1, resulting in a total removed soil volume of 53 bank cubic yards. The area defined by the control points lies fully within the source property. A conceptual cross section of the excavation is also shown on Figure 5.6. The sidewall perimeter of Area B measures 46 linear feet.

5.6.1.3 Excavation C

Excavation Area C is located in the southeast portion of the source property. Excavation details for Area C are shown on Figure 5.7.

The footprint of Area C is 570 square feet and is defined by control points C1 through C7 with a required depth of 9.5 feet below the lowest surrounding ground surface at the limits defined by the control points, encompassing approximately 200 bank cubic yards of PCE-contaminated soil. The expected sidewall slopes of Area C are 1:1, resulting in a total removed soil volume of 420 bank cubic yards. The area defined by the control points lies fully within the source property. A conceptual cross section of the excavation area is also shown on Figure 5.7. The sidewall perimeter of Area C measures 112 linear feet.

At the base of Area C, where elevated CVOC concentrations are additionally present in shallow groundwater, application of ZVI will be performed following excavation of PCE-contaminated soil. A quantity of 2,500 pounds of granular ZVI will be added evenly within the mixing area, as shown on Figure 5.7, and incorporated into saturated zone soil from the excavation base to a depth of 15 feet bgs using an excavator bucket or auger to turn over and work the soil. Mixing will be performed at the direction of the Engineer until the ZVI is determined to be evenly distributed into the soil by visual inspection.

5.6.2 Survey

During excavation, the remediation contractor(s) will be required to locate the excavation control points to the nearest 0.1 horizontal feet by survey, and additionally to provide final coordinates for any sidewalls that are extended to remove additional PCE beyond the specified control points. The remediation contractor(s) will be required to survey the pre-excavation ground surface and verify the final excavation depth to the nearest 0.1 feet bgs.

5.7 IN SITU GROUNDWATER TREATMENT INJECTION

The following sections describe the alignment and injection details for installation of downgradient in situ groundwater treatment. In situ groundwater treatment will consist of the following applications:

- **In situ Treatment Barriers**. In situ groundwater treatment will be implemented in both shallow and deep groundwater by installation of five treatment barriers (Barriers 1 through 5) perpendicular to the direction of groundwater migration within the footprint of the CVOC plume. The proposed in situ treatment barriers range between 80 and 130 feet in length and 13 and 23 feet in thickness, with injection points installed at 6.5-foot intervals in two offset rows to obtain an effective spacing of 3.25-foot centers.
- **Supplemental Treatment Zone**s. Targeted supplemental treatment zones will be implemented by installation of injection points at 10-foot intervals in three zones, as shown on Figure 5.8.

The in situ treatment barrier and supplemental treatment zone alignments are shown on Figure 5.8. The injection details are presented in Table 5.1.

Prior to beginning in situ injection, the remediation contractor(s) will be required to survey the control points defining each barrier and supplemental treatment zone point shown on Figure 5.8 to the nearest 0.1 horizontal feet. Survey of each barrier injection point is not required; however, the remediation contractor(s) will field-mark the locations of injection points consistent with the requirements specified in this section to the Engineer’s satisfaction prior to beginning injection. Additionally, the remediation contractor(s) will communicate any points modified due to the presence of utilities or other obstructions to the Engineer.

5.7.1 Injection Methodology

Treatment fluids will be injected into the subsurface through a series of direct-push borings to create a passive treatment zone of chemical reduction and bioremediation. Fluids will be injected at each location under low pressure (less than 80 pounds per square inch) using a direct-push drill rig to provide even distribution of treatment media within the target treatment zone. Injection depths are designed to treat the most contaminated portions of the saturated zone, as described in Section 4.3.2, with depths ranging from 7 to 27 feet bgs within the shallow zone of contamination, 7 to 35 feet bgs in the shallow and shallow-to-deep transition zone, and up to approximately 50 feet bgs in the deep aquifer zone. Typical injection cross sections for the barriers are shown on Figure 5.9.

Targeted supplemental treatment will also be injected by direct push methodology. The targeted treatment zone depths range from approximately 6 to 18 feet bgs on the upgradient Ranch Drive-In and Speedy Glass properties and from 20 to 40 feet bgs in the downgradient deep zone at Lot E,F,G. Typical injection cross sections for the supplemental treatment zones are shown on Figure 5.10.

5.7.1.1 Treatment Components

Treatment components will be batch-mixed in aqueous solution to achieve the manufacturer-recommended dosages at an injection rate of 35 gallons per foot. The recommended dosages vary according to the current contaminant concentration and geochemical conditions and contaminant flux rates. Refer to Table 5.1 for a summary of injection details in each barrier and Treatment Zone.

In Barriers 1 and 2, where recent IMs have been completed and groundwater conditions are generally reducing, treatment will consist of PlumeStop and S-mZVI:

- PlumeStop colloidal carbon dosing of 15 to 18 pounds per vertical foot
- S-mZVI dosing of 2.3 to 2.5 pounds per vertical foot
- BDI Plus dosing of 0.023 to 0.025 liters per vertical foot

In Barrier 3 and 4, which are situated on either side of the transition zone and which target a broader depth interval than prior IMs, greater CVOC flux rates occur and geochemical conditions are generally oxidizing. In this area, increased quantities of S-mZVI treatment components will be included to enhance CVOC adsorption and biodegradation, according to the following dose rates:

- PlumeStop dosing of 15 to 20 pounds per vertical foot
- S-mZVI dosing of 5.3 to 5.4 pounds per vertical foot
- AquiFix dosing of 5 pounds per vertical foot
- BDI Plus dosing of 0.023 liters per vertical foot

In Barrier 5, which is situated in the deep aquifer zone along the downgradient toe of the plume, CVOC flux rates are relatively lower than in the transition zone and conditions are generally oxidizing. In this area, required quantities of PlumeStop are less than in the transition zone; however, a sufficient quantity of S-mZVI is still needed to create reducing conditions and promote anaerobic dechlorination. Treatment media dosage rates for Barrier 5 are as follows:

- PlumeStop dosing of 16 pounds per vertical foot
- S-mZVI dosing of 5.3 pounds per vertical foot
- BDI Plus dosing of 0.023 liters per vertical foot

Additionally, a limited application of treatment components for enhanced bioremediation of CVOCs with the capacity to disperse in groundwater is proposed in areas where access to the plume is limited by the presence of buildings, or where more rapid cleanup at the toe of the plume is desired to meet the City's RAOs. The recommended supplemental treatment in these zones varies by contaminant and geochemical conditions.

At TZ1, upgradient of the Ranch Drive-In, geochemical conditions are reducing and limited vinyl chloride remains in groundwater following an IM completed in this area. Supplemental treatment is intended to promote complete biodegradation. Recommended treatment media dosage rates are as follows:

- AquiFix dosing of 27 pounds per vertical foot
- BDI Plus dosing of 0.091 liters per vertical foot

At TZ2, upgradient of Speedy Glass, conditions do not appear to be affected by prior IMs. Elevated PCE and oxidizing geochemical conditions are present. In this area, treatment to enhance biodegradation will be supplemented with S-mZVI to ensure reducing conditions using the following dosage rates:

- S-mZVI dosing of 12.5 pounds per vertical foot
- AquiFix dosing of 25 pounds per vertical foot
- BDI Plus dosing of 0.10 liters per vertical foot

At TZ3, in the downgradient portion of the plume on Lot E,F,G, bioremediation appears to be occurring at the toe of the plume. However, elevated PCE remains in groundwater and conditions are generally oxidizing. In this area, supplemental treatment is intended to enhance biodegradation and achieve faster remediation of the downgradient plume. Recommended treatment media and dosage rates are listed below, and will include supplemental S-ZVI to ensure reducing conditions:

- S-mZVI dosing of 12.5 pounds per vertical foot
- AquiFix dosing of 33 pounds per vertical foot
- BDI Plus dosing of 0.075 liters per vertical foot

5.8 DECONTAMINATION

Decontamination procedures will be strictly followed to prevent the spread of contamination. All construction and drilling equipment will be decontaminated before it leaves the Site. Decontamination procedures will additionally be implemented for equipment when moving between handling contaminated and uncontaminated media (such as using an excavator bucket to remove contaminated soil, then using the bucket to place backfill) and when moving between in situ barrier injection rows.

Equipment and vehicle decontamination will consist of dry sweeping to achieve a visually debris-free surface. If dry sweeping is not sufficient to remove visual evidence of debris, equipment will be decontaminated by pressure washing with detergent solution followed by a potable water rinse. Direct push drill rods will be decontaminated using the above procedure or by steam cleaning.

Equipment decontamination wash water will be captured and not allowed to run onto the ground surface. Decontamination wash water will be managed according to the procedures for waste water management as described in Section 5.9.4.

5.9 ENVIRONMENTAL MEDIA MANAGEMENT

Environmental media, including soil and other solids and waste waters, will be managed in accordance with the following sections.

5.9.1 Recycling

Recyclable materials generated during construction are anticipated to include sections of asphalt and concrete pavement that will be removed for excavation preparation. Asphalt and concrete will be hauled off-site for recycling at a licensed facility.

5.9.2 Soil Handling and Disposal

BMPs will be implemented during contaminated soil handling to prevent the spread of contamination. BMPs for excavation include the following:

- Contaminated soil will be direct loaded to trucks or roll-off containers; no stockpiles of contaminated soil will be stored onsite.
- Loading will be performed only where ground surface protection is installed. If loading is performed in paved areas of the source property, regular sweeping will be performed. Other ground surface protection will be regularly cleaned and secured at the end of each workday.
- Trucks will use the established haul route and cover loads before entering the City ROW.

Contaminated soil will be hauled off-site to a RCRA Subtitle D licensed facility for disposal as contained-in waste in accordance with the determination provided in Appendix C.

5.9.3 Stockpile Management

Stockpiles will be maintained for uncontaminated materials only (i.e., clean backfill); contaminated soils will not be stockpiled at the Site. Uncontaminated stockpiles may be stored in paved areas. Stockpiles will be managed in accordance with the Stormwater Management Manual for Western Washington (Ecology 2019). Stockpiles will be covered and stabilized to prevent erosion at the following times:

- When the stockpile will remain unworked for greater than 48 hours.
- When rain is forecast overnight between working days.

5.9.4 Waste Water Management

Waste water anticipated to be generated during construction of the cleanup action includes decontamination wash water and purge water produced during injection implementation and monitoring. Waste water has the potential to contain CVOC contamination.

Waste waters will be containerized in U.S. Department of Transportation approved drums, labeled with their contents, and temporarily stored on City-owned property pending profiling. Waste waters will be disposed off-site at a licensed facility.

5.10 SITE RESTORATION AND DEMOBILIZATION

Site restoration will consist of backfilling excavated areas with suitable clean materials, repairing pavement, and demobilization of equipment and temporary materials and structures.

Excavations will be backfilled with material with chemical quality suitable for unrestricted property use and grain size gradation to allow compaction per the City's construction standards. The applicable standard is 90% of maximum dry density according to the Modified Proctor test method (Bothell Design and Construction Standards Section 4-4.3). Excavations will be backfilled and compacted in 1-foot lifts to the surrounding subgrade elevation, then paved with asphalt to match the surrounding grade.

The remediation contractor(s) will be required to provide laboratory analytical results to the City for backfill material showing that regulated contaminants are not detectable at reporting limits less than the applicable MTCA criteria, including Method A CULs for unrestricted land use listed in WAC 173-340-900 (Table 740-1), MTCA Method B cancer CUL for dioxins/furans, and MTCA B noncancer CULs for dichloroethenes. Results will be provided for the following analytes which may be present in imported backfill material:

- GRO
- Diesel-range organics and oil-range organics
- Benzene, toluene, ethylbenzene, and total xylenes
- Carcinogenic polycyclic aromatic hydrocarbons toxic equivalent
- Arsenic, lead, cadmium, chromium (total), and mercury (inorganic)
- CVOCs, including 1,1,1-trichloroethane
- Polychlorinated biphenyls
- Dioxins/furans

Direct push injection points will be sealed with bentonite, bentonite slurry, neat cement grout, or neat cement in accordance with the Minimum Standards for decommissioning of direct push borings (WAC 173-160-460(2)(d)) after injection is completed and the drill rods are removed. After sealing the injection point, the small, disturbed area will be restored consistent with the surrounding ground surface (i.e., gravel, asphalt, or concrete). Concrete paver blocks removed for installation of injection points in the access lane ROW will be replaced.

Following completion of construction activities, all equipment will be demobilized and temporary structures, including constructed ramps or other ground surface protection, will be removed. Gravel used to construct curb crossings or temporary haul routes may be reused as pavement subgrade below repaved excavation area surfaces or on the unpaved City-owned Lot E,F,G property if laboratory analyses are performed for the material prior to placement, as described above. It is assumed that temporary fencing will be removed and concrete ecology blocks will be restored at the source property; however, the City may retain or remove these site access controls at its discretion after the other restoration activities are completed. Any vegetated areas damaged by construction activities will be re-seeded and/or stabilized with mulch at the City's direction.

5.11 PROPOSED SEQUENCING AND SCHEDULE FOR CONSTRUCTION

A general schedule for implementation of the cleanup action was provided in the CAP (Ecology 2022a). Due to the expected duration of the City contracting process, bid documents will be prepared concurrently with the EDR. The bid period for remediation contractors is expected to open approximately concurrently with Ecology approval of the final EDR. Construction is targeted to be completed in late 2023/early 2024 to ensure that the cleanup fulfills the RAO of facilitating future site development and use.

Construction will proceed as two scopes to ensure that qualified remediation contractor(s) can be selected for both excavation and drilling (including in situ injection and well installation). In situ treatment barrier injection will not proceed prior to initiation of soil contaminant source removal via excavation.

Following selection of the remediation contractor(s), a construction schedule will be provided that will detail dates for the construction phase of the project.

6.0 Construction Compliance Monitoring

This section presents the Compliance Monitoring Plan to be implemented during construction, consisting of protection monitoring for health and safety, performance monitoring to ensure quality control during implementation of the remedial technologies, and confirmation monitoring to ensure cleanup standards are met.

6.1 PROTECTION MONITORING

The primary concerns for protection monitoring for both community and worker exposures are high noise levels and CVOC compounds in air during excavation work.

Noise levels and air concentrations of CVOCs will be monitored continuously at the source, in addition to the engineering and administrative controls outlined in the HASP (Appendix E) to ensure they remain under the OSHA permissible exposure limits for those working in proximity. Additional monitoring will be performed during excavations and at peak noise activities to monitor exposure to the community. The noise monitoring will align with the maximum permissible exposure levels of WAC 173-60-050. Refer to Section 5.7 of the HASP (Appendix E) for action levels. If action levels are exceeded, additional work site and/or work practice controls will be implemented in accordance with the HASP.

Additional protection monitoring for vapor intrusion in the current commercial use buildings at the site will be performed to assess ongoing risk to workers during the restoration time frame for groundwater following injection of in situ treatment barriers. Vapor intrusion monitoring after construction is discussed in further detail in Section 7.2.

6.2 PERFORMANCE MONITORING

Performance monitoring during construction will include testing, measuring, and documentation to ensure that the implementation of the remedial technologies and actions were effectively applied.

During excavation, performance monitoring will include completing surveys to verify that the minimum horizontal and vertical limits of PCE-contaminated soil have been removed. Once confirmation monitoring via soil sampling (refer to Section 6.3) has verified that the cleanup standards for PCE are met, the excavation areas will be backfilled and compacted. During backfilling, the remediation contractor(s) will perform compaction testing to ensure that the final backfilled area meets City standards for compaction, as described in Section 5.10. The remediation contractor(s) will be responsible for proposing and implementing a plan for adequate compaction testing for the City's approval.

During in situ treatment barrier injection, the weights/volumes of each component when batch-mixing the aqueous injection solution, as well as the volume of solution injected in each interval of the treatment zone, will be recorded. Periodic verification testing of soil and groundwater within the injection zone will also be performed as directed by Regenesis Remediation Services or the Engineer. Soil verification testing is performed by advancing a direct-push boring within the barrier after completion of the injection. Adequate dispersion of treatment barrier in soil and groundwater in the target treatment zone is visually assessed by noting color change to dark gray/black caused by liquid activated carbon and S-mZVI. Soil verification samples will be collected using direct push borings at a frequency of 1 to 2 per barrier or, more frequently, when significant variability in the lithology is indicated by observation of injection pressures/rates. The injection spacing may be field adjusted to be more closely or widely spaced if indicated by the findings of visual assessment, with corresponding adjustment made to the quantities of treatment components injected per depth interval at each point, to ensure consistent and even application of the specified quantities of treatment components required for each barrier. Groundwater verification samples will be collected using a pump when injecting within 10 feet of a well screened within the treatment zone. Other geochemical indicators of successful in situ treatment barrier injection (such as DO, conductivity, and ORP) may not be immediately apparent during injection, but will be collected as field parameters during subsequent performance monitoring that will be completed after injection, as described in Section 7.1.

Lastly, a key component of in situ groundwater treatment is short-term groundwater performance monitoring, which is described in Section 7.1.

6.3 CONFIRMATION MONITORING

Confirmation monitoring during construction will consist of collection of soil samples for chemical analysis to ensure that the CUL for PCE is met at the limits of the source property excavations.

Soil confirmation samples will be collected along the sidewalls at the perimeter of the excavation at a frequency of one sample per 20 linear feet of sidewall. The depth of the sidewall samples will target the interval where previously measured concentrations exceeded CULs, or where field indications—such as staining, odors, or elevated volatiles concentrations measured with a PID (if encountered)—are present. Confirmation samples will be collected at a frequency of one sample per 400 square feet of excavation base at the final design depth of the excavation, targeting field indications of contamination, if observed. Soil confirmation samples will be collected and analyzed in accordance with the procedures presented in the QAPP, which is provided as Appendix F.

Where available at the appropriate locations and depths, existing sample results collected during the RI/FS and PDI (refer to Section 4.2 and Table 4.1) will serve as excavation confirmation samples. The numbers of required samples at each excavation area, target depth intervals, and locations of existing samples used for confirmation in each excavation area are presented in Figure 6.1.

Statistical compliance with soil cleanup standards will be assessed for the dataset comprising the confirmation samples in accordance with WAC 173-340-740(7)(c). Compliance will be demonstrated by the following conditions:

- Fewer than 10% of sample results exceed the CUL.
- The 95% upper confidence limit of the mean soil concentration is less than the CUL.
- No single result is greater than 2 times the CUL.

6.4 CULTURAL RESOURCE MONITORING

The Washington State Department of Archaeology and Historic Preservation's predictive model on the Washington Information System for Architectural and Archaeological Records Data characterizes the project area for the Site as high to moderate risk for containing buried archaeological materials including historical and prehistoric or pre-contact features and artifacts. No archaeological resources have been identified in any of the work areas for the cleanup action; however, there are eight previously recorded archaeological sites within a 1-mile radius of the project area. The majority of these sites are historical in nature.

During all ground-disturbing activities, the field technician will monitor for cultural resources in accordance with the Inadvertent Discovery Plan (IDP) provided in Appendix G. In the event that cultural resources are encountered, the field technician will stop work in the area as required by the IDP and notify the City and the Engineer. The City will comply with the IDP to perform additional evaluation and notifications appropriate to the type of resources encountered.

7.0 Short-Term Performance Monitoring, Operation, and Maintenance

The following sections describe the short-term operation, monitoring and maintenance activities that will be performed for the first 2 years after initial construction of the cleanup action, including soil excavation and in situ groundwater treatment injection, as described in Section 5.0. After short-term monitoring, a long-term compliance monitoring plan (LTCMP) will be developed to evaluate and ensure that the cleanup achieves the RAOs for the Site.

7.1 GROUNDWATER PERFORMANCE MONITORING

This section presents short-term performance monitoring that will be implemented for the first 2 years after installation of the in situ treatment components to assess the performance of the barriers in removing and degrading CVOCs and to determine whether any additional treatment will be implemented as part of the cleanup action.

7.1.1 Monitoring Well Locations

A monitoring well network of existing and new wells will be established to assess performance of the cleanup action and compliance with CULs for CVOCs. This network will include paired monitoring wells placed both upgradient and downgradient of the in situ treatment barriers, wells within the groundwater CVOC plumes, upgradient wells, and sentinel wells downgradient of the plume area to evaluate plume boundary conditions.

The existing network of monitoring wells will be used for groundwater monitoring to the extent possible; however, several wells are proposed for decommissioning prior to construction, and several additional wells are needed to complete the performance monitoring well network after construction, as described in Section 7.1.2. Additional wells not designated for performance monitoring will be maintained as sentinel wells and may be sampled as needed to further investigate remedy performance.

7.1.2 Well Installation

New monitoring wells will be installed to fill in key monitoring areas to complete the monitoring well network. The well screens will be situated to monitor CVOC conditions in groundwater within the most highly contaminated pre-remediation intervals. The well screens may be adjusted in the field to target more transmissive units, if encountered, within the in situ treatment zone. The new performance monitoring wells to be installed are shown on Figure 7.1 and include the following:

- One shallow well (UCCMW-37) downgradient of the Barrier 1. The treatment zone monitored by this location is 9 to 22 feet bgs, and the target well screen is approximately 10 to 20 feet bgs.
- One shallow well (UCCMS-38) downgradient of Barrier 2. The treatment zone monitored by this location is 7 to 27 feet bgs, and the target well screen is approximately 8 to 18 feet bgs.

- One shallow well (UCCMW-39) upgradient of Barrier 3. The treatment zone monitored by this location is 7 to 30 feet bgs, and the target well screen is approximately 15 to 25 feet bgs.
- One deep well (UCCMW-40D) downgradient of Barrier 4. The treatment zone monitored by this location is 15 to 35 feet bgs, and the target well screen is approximately 20 to 30 feet bgs.
- One deep well (UCCMS-41D) upgradient of Barrier 5. The treatment zone monitored by this location is 30 to 50 feet bgs, and the target well screen is approximately 35 to 50 feet bgs.
- One deep well (UCCMW-42D) screened approximately 35 to 50 feet bgs downgradient of Barrier 5 at the toe of the plume.

The new wells will be installed, developed, and surveyed in accordance with the procedures in the QAPP (refer to Appendix F).

7.1.3 Groundwater Sampling and Analysis

Groundwater monitoring will be conducted in accordance with the procedures included in Appendix F and will involve collecting groundwater samples and/or groundwater elevation measurements at the locations shown on Figure 7.2.

Samples will be analyzed for all or a subset of the following chemicals as specified in Table 7.1:

- CVOCs: PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride
- Secondary geochemical parameters for assessment of natural attenuation (also known as MNA parameters): anions (nitrate, nitrite, and sulfate), sulfide, ferrous iron and dissolved gases (ethene, ethane, and methane)
- CVOCs will be analyzed at all locations to assess both cross- and within-barrier contaminant removal and degradation performance. MNA parameters will be additionally analyzed at locations between the barriers to determine whether the treatment components are achieving the desired geochemical conditions for anaerobic dechlorination. Field water quality parameters including ORP, DO, pH, temperature, and turbidity will additionally be collected during sampling at all locations and will provide additional information for assessment of MNA.

Groundwater monitoring will be conducted quarterly during year 1 at the following performance wells:

- UCCMW-7 to monitor degradation in the shallow zone beneath the Ranch Drive-In building
- UCCMW-36D to monitor deep groundwater at the transition of contamination from the shallow to deep aquifer zone

- Wells within and downgradient of Barrier 1 (UCCMW-18, UCCMW-21, and UCCMW-37)
- Paired wells upgradient and downgradient of Barrier 2 (UCCMW-29 and UCCMW-38), which additionally monitor degradation in the shallow zone beneath the Speedy Glass building
- Paired wells upgradient and downgradient of Barrier 3 (UCCMW-39 and BB-2)
- Paired wells upgradient and downgradient of Barrier 4 (UCCMW-31D and UCCMW-40D)
- Paired wells upgradient and downgradient of Barrier 5 (UCCMW-41D and UCCMW-42D) and within Barrier 5 (UCCMW-34D)

The first monitoring event of Year 1 will also include baseline sampling for CVOCs and MNA parameters at the upgradient and downgradient sentinel wells, which include the following:

- UCCMW-11S
- UCCMW-33D

Groundwater elevation measurements will be collected from each performance well designated for chemical analysis, in addition to plume boundary wells that may not be designated for chemical analysis to refine groundwater flow direction and measure the magnitude of hydraulic gradients at the Site. Separate assessments will be completed for the shallow and deep aquifer zones.

7.2 VAPOR INTRUSION SCREENING

Shallow groundwater contamination beneath the southern parcel of the source property and Speedy Glass and Ranch Drive-In properties currently exceeds the vapor intrusion SLs for unrestricted land use, but does not exceed RELs developed for current commercial use. However, as PCE is degraded, concentrations of PCE breakdown products are expected to temporarily increase before decreasing as biodegradation progresses towards completion. Protection monitoring after installation of the in situ treatment barriers will monitor groundwater for comparison to RELs developed for the current commercial usage of the Speedy Glass and Ranch Drive-In properties and inform potential mitigation measures, if determined to be necessary.

During performance monitoring, groundwater results for CVOCs at key wells adjacent to private property buildings will additionally be evaluated for vapor intrusion risk according to the RELs presented in embedded Table 2.2. Key wells of interest include UCCMW-7, which is situated in the shallow zone immediately upgradient of the Ranch Drive-In building, and UCCMW-29, which is situated in the shallow zone immediately upgradient of the Speedy Glass building. If groundwater concentrations are found to exceed the RELs for current commercial building use, additional vapor intrusion assessment and/or mitigation measures will be implemented. If a change in land usage occurs on these private properties during remedy implementation, further vapor intrusion assessment and mitigation would also be required for future development. If further vapor intrusion assessment is needed, a work plan for data collection would be prepared in accordance with the City development standards, discussed in Section 7.3.

7.3 INSTITUTIONAL CONTROLS

ICs are necessary to protect the long-term safety of humans and the environment where hazardous substances will remain in place after implementation of the cleanup action.

PCE that will remain in soil includes one isolated area in the Bothell Way ROW near the intersection of NE 183rd Street and Bothell Way NE, approximately 90 feet southwest of the source property. Contamination at this location was measured at concentrations of 0.12 to 0.15 mg/kg and is presumed to extend to approximately 8 feet bgs. It is well-bounded by other soil samples less than the CUL, encompassing a maximum approximate area of 750 square feet or less (approximately 220 cubic yards). The detected PCE in soil at this location was attributed to adsorption to soil from highly PCE-contaminated groundwater and is expected to attenuate with ongoing groundwater treatment to reduce PCE.

PCE in groundwater beneath the ROW of Bothell Way is not targeted for active treatment because there is limited potential for receptors to be exposed to this contamination. PCE in groundwater beneath the ROW is still expected to attenuate to less than CULs following aggressive upgradient source removal; however, the restoration time frame outside of the areas targeted for active treatment is expected to be slower than within the treatment areas.

The City signed a Memorandum of Agreement (MOA) with Ecology to address contamination in ROWs adjacent to contaminated sites. In accordance with the MOA, the City prepared a Contaminated Soil and Groundwater Protocol (Protocol) that is incorporated into the Bothell Design and Construction Standards and is presented in Appendix H. This Protocol acts as an IC for the remaining soil and groundwater contamination beneath Bothell Way.

Under the Protocol and the MOA, the City must provide analytical data to any developer performing work within areas of ROW contamination or adjacent properties (designated the Contamination Review Area). The Protocol includes worker safety and environmental management requirements that are triggered by future ROW construction that will disturb contaminated soil. The Protocol additionally requires that developers follow all Federal and State requirements, such as current vapor intrusion assessment regulations and guidance for construction on private properties within the Contamination Review Area. The Protocol and MOA additionally prohibit groundwater withdrawal for drinking water use within areas of ROW contamination and require proper management and disposal of construction dewatering water generated in these areas.

7.4 ADDITIONAL ASSESSMENT OR TREATMENT EVALUATION

The need for additional vapor intrusion assessment and/or groundwater treatment will be determined annually after the completion of year 1 and year 2 performance monitoring. When making determinations for additional assessment or treatment, the following sources of performance data may be evaluated:

- Cross-barrier removal efficiencies for CVOCs calculated for paired wells at each treatment barrier
- Overall rates of CVOCs source mass reduction in Site groundwater based on statistical metrics (such as median and upper confidence limits) calculated Site-wide and at each monitoring well for successive quarterly monitoring datasets
- Trend analysis at individual wells in accordance with Ecology statistical guidance (Ecology 1992) to determine the potential presence and slope of downward trends in CVOC concentrations
- Concentration trends of PCE breakdown products relative to PCE Site-wide and at individual wells
- Geochemical indicators of the occurrence of natural attenuation
- Geochemical conditions conducive to anaerobic dechlorination
- Exceedances or projected exceedances of RELs in groundwater underlying enclosed buildings
- Anticipated changes in land use that may trigger RELs for unrestricted, rather than commercial, exposures

If additional assessment or treatment is determined to be needed, the additional work will be proposed in coordination with Ecology.

8.0 Reporting

Reports will be prepared to document the implementation of the cleanup action and progress toward achieving the cleanup standards, as described in the following sections.

8.1 CONSTRUCTION COMPLETION REPORTS

An interim Construction Completion Report (or as-built report) will be prepared and submitted to Ecology within 180 days after completion of excavation and in situ injection, as described in this EDR.

Information provided in the interim Construction Completion Report will include an opinion from the Engineer, based on testing results and inspections, as to whether the cleanup action has been constructed in substantial compliance with the plans and specifications and related documents (WAC 173-340-400(6)(b)(ii)) providing the following, as appropriate:

- Description of remedial activities, including deviations from this EDR
- Photo-documentation of construction activities and the finished construction
- Information on the horizontal and vertical limits of all excavations, including survey data confirming contaminated soil removal, maps illustrating excavation areas, and other pertinent information
- Documentation of in situ treatment component injection, including locations, depths and quantities injected
- Detailed sampling and analysis information, including location, matrix, analytical methods, and data quality review findings for the performance monitoring
- Disposal documentation, including quantities of soil removed and disposed of and landfill certificates of disposal
- Well decommissioning and installation logs
- Copies of weekly construction reports

A Performance Monitoring Report will be prepared following each year of initial performance monitoring conducted in accordance with Section 7.1 of this EDR. The Performance Monitoring Reports will present groundwater monitoring results relative to CULs and RELs, analysis of contaminant concentration and geochemical trends, and recommendations for continued monitoring and/or additional treatment. Construction completion will be determined after completion of 2 years of post-injection monitoring and any additional treatment implemented for the cleanup action, if required.

If no additional treatment is recommended after year 2 monitoring, the Performance Monitoring Report will additionally serve the purpose of documenting construction completion.

If additional treatment is required, the proposed scope will be presented in an addendum to this EDR. The additional treatment will be documented in a final Construction Completion Report in accordance with the requirements described above.

Additionally, all analytical data collected for the Site during construction of the cleanup action must be submitted to Ecology's Environmental Information Management (EIM) System within 30 days of receipt of validated data. EIM will also be updated after excavation to flag existing samples that were removed by excavation.

8.2 LONG-TERM MONITORING REPORTS

A LTCMP will be prepared as part of, or concurrently with, the final Performance Monitoring Report or Construction Completion Report and submitted within 180 days following construction completion. The LTCMP will outline additional groundwater confirmation monitoring to be implemented no later than 1 year following construction completion. It is expected that long-term monitoring will begin immediately after completion of year 2 post-construction groundwater performance monitoring. Data collected during groundwater confirmation monitoring will be reported in annual compliance monitoring reports. These annual compliance monitoring results will include results of groundwater monitoring when compared to CULs and RELs, an assessment of COC concentration trends, and recommendations for monitoring or contingency actions to be implemented in coordination with Ecology.

9.0 References

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Engineering Design Report

Ultra Custom Care Cleaners Site

Tables

Table 3.1
Groundwater Pre-Design Sample Results Summary

Analyte	Sample Results		
	BB-2	**UCCMW-29**	**UCCMW-34D**
Total Metals - EPA 200.8/200.7			
Arsenic (µg/L)	3.3 U	3.3 U	3.3 U
Calcium (µg/L)	**21,000**	**28,000**	**25,000**
Iron (µg/L)	50 U	**250**	**1,400**
Magnesium (µg/L)	**10,000**	**8,200**	**12,000**
Dissolved Metals - EPA 6010D			
Calcium (µg/L)	**19,000**	**26,000**	**22,000**
Iron (µg/L)	56 U	56 U	56 U
Magnesium (µg/L)	**11,000**	**8,800**	**13,000**
Additional Parameters - ASTM D516-11/EPA 353.2			
Sulfate (µg/L)	**9.9**	**12**	**21**
Nitrate (µg/L)	**1.3**	**0.94**	**0.96**
Field Parameters			
pH	6.23	6.05	6.06
Dissolved Oxygen (mg/L)	2.85	5.20	2.09
Specific Conductivity (µs/cm)	189	207.7	210.6
Turbidity (NTU)	0.62	5.14	4.63
Temperature (°C)	14.1	12.4	14.0
Oxidation Reduction Potential (mV)	152.7	192.7	130.8

Note:
BOLD Result was detected.

Abbreviations:
°C Degrees Celsius
EPA Environmental Protection Agency
µg/L Micrograms per liter
mg/L Milligrams per liter
µs/cm MicroSiemens per centimeter
mV Millivolts
NTU Nephelometric turbidity units

Qualifier:
U Analyte was not detected at the associated reporting limit.

Table 3.2
Passive Flux Meter Pre-Design Sample Results Summary

Well ID	BB-2					UCCMW-29				
Sample Name	**BB-2-9-11-022723**	**BB-2-11-13-022723**	**BB-2-13-15-022723**	**BB-2-15-17-022723**	**BB-2-17-19-022723**	**UCCMW-29-5-7-022723**	**UCCMW-29-7-9-022723**	**UCCMW-29-9-11-022723**	**UCCMW-29-11-13-022723**	**UCCMW-29-13-15-022723**
Depth Interval (ft bgs)	**9 - 11**	**11 - 13**	**13 - 15**	**15 - 17**	**17 - 19**	**5 - 7**	**7 - 9**	**9 - 11**	**11 - 13**	**13 - 15**
Summary of Darcy Flux Values										
Darcy Velocity (cm/day)	2.3	2.1	3.8	3.4	2.5	0.2	1.3	1.0	0.5	1.8
Average Darcy Velocity (cm/day)	2.8					1.0				
Summary of Contaminant Concentration										
cis-1,2DCE (µg/L)	4	1	3	3	0	0	0	0	7	4
Average cis-1,2DCE (µg/L)	2					2				
TCE (µg/L)	9	4	8	6	0	0	0	0	0	0
Average TCE (µg/L)	6					0				
PCE (µg/L)	131	62	102	172	196	144	17	50	122	41
Average PCE (µg/L)	133					75				
Summary of Mass Flux Values										
cis-1,2DCE (mg/m^2/day)	0.08	0.03	0.11	0.09	0.00	0.00	0.00	0.00	0.04	0.06
Average cis-1,2DCE (mg/m^2/day)	0.06					0.02				
TCE (mg/m^2/day)	0.21	0.09	0.30	0.21	0.00	0.00	0.00	0.00	0.00	0.00
Average TCE (mg/m^2/day)	0.16					0.00				
PCE (mg/m^2/day)	2.99	1.31	3.92	5.77	4.93	0.36	0.23	0.52	0.65	0.75
Average PCE (mg/m^2/day)	3.78					0.50				
Estimated Groundwater Velocity (1)										
Groundwater Velocity (ft/year)	75–100					100–200				
Average Mass Discharge Per Unit Width										
Darcy Velocity (cm/day)	2.8					1.0				
cis-1,2DCE (mg/m/day)	0.19					0.06				
TCE (mg/m/day)	0.5					0.0				
PCE (mg/m/day)	11.5					1.5				

Note:

1 Regenesis estimated groundwater velocities by interpretion of PFM results. This interpretation is limited when estimated slower groundwater velocities below 100 ft/year. Further discussion on groundwater velocity interpretation is discussion in Appendix B.

Abbreviations:

bgs Below ground surface
cm/day Centimeters per day
DCE Dichloroethane
ft Feet
ft/year Feet per year
µg/L Microgram per liter
mg/m/day Milligrams per meter per day
mg/m^2/day Milligrams per square meter per day
PCE Tetrachloroethylene
TCE Trichloroethylene

Table 3.2
Passive Flux Meter Pre-Design Sample Results Summary

Well ID	UCCMW-34D							
Sample Name	**UCCMW-34D-35-37-022723**	**UCCMW-34D-37-39-022723**	**UCCMW-34D-39-41-022723**	**UCCMW-34D-41-43-022723**	**UCCMW-34D-43-45-022723**	**UCCMW-34D-45-47-022723**	**UCCMW-34D-47-49-022723**	**UCCMW-34D-49-50-022723**
Depth Interval (ft bgs)	**35 - 37**	**37 - 39**	**39 - 41**	**41 - 43**	**43 - 45**	**45 - 47**	**47 - 49**	**49 - 50**
Summary of Darcy Flux Values								
Darcy Velocity (cm/day)	4.0	4.4	6.9	5.3	7.6	10.1	8.3	9.8
Average Darcy Velocity (cm/day)	7.1							
Summary of Contaminant Concentration								
cis-1,2DCE (µg/L)	0	0	0	0	0	0	0	0
Average cis-1,2DCE (µg/L)	0							
TCE (µg/L)	0	0	0	0	0	0	0	0
Average TCE (µg/L)	0							
PCE (µg/L)	0	48	47	49	27	44	34	15
Average PCE (µg/L)	33							
Summary of Mass Flux Values								
cis-1,2DCE (mg/m^2/day)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average cis-1,2DCE (mg/m^2/day)	0.00							
TCE (mg/m^2/day)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average TCE (mg/m^2/day)	0.00							
PCE (mg/m^2/day)	0.02	2.15	3.23	2.62	2.03	4.42	2.77	1.51
Average PCE (mg/m^2/day)	2.34							
Estimated Groundwater Velocity (1)								
Groundwater Velocity (ft/year)	300–500							
Average Mass Discharge Per Unit Width								
Darcy Velocity (cm/day)	7.1							
cis-1,2DCE (mg/m/day)	0.0							
TCE (mg/m/day)	0.0							
PCE (mg/m/day)	0.0							

Note:

1 Regenesis estimated groundwater velocities by interpretion of PFM results. This interpretation is limited when estimated slower groundwater velocities below 100 ft/year. Further discussion on groundwater velocity interpretation is discussion in Appendix B.

Abbreviations:

bgs Below ground surface
cm/day Centimeters per day
DCE Dichloroethane
ft Feet
ft/year Feet per year
µg/L Microgram per liter
mg/m/day Milligrams per meter per day
mg/m^2/day Milligrams per square meter per day
PCE Tetrachloroethylene
TCE Trichloroethylene

Table 3.3
Grain Size Pre-Design Sample Results Summary

Sample Name	B5-28-30			B5-33-35			B4-18-20			B4-23-25		
Seive Opening (mm)	% Retention	Fraction		% Retention	Fraction		% Retention	Fraction		% Retention	Fraction	
4.75	< 0.1 %			< 0.1 %			< 0.1 %			< 0.1 %		
4.00	0.2 %	**Gravel**	0.30 %	< 0.1 %	**Gravel**	0.00 %	< 0.1 %	**Gravel**	0.00 %	< 0.1 %	**Gravel**	0.00 %
2.00	0.1 %			< 0.1 %			< 0.1 %			< 0.1 %		
1.00	0.1 %			0.1 %			0.1 %			< 0.1 %		
0.50	0.1 %			0.1 %			0.8 %			0.1 %		
0.25	1.1 %	**Sand**	46.0 %	0.1 %	**Sand**	41.3 %	1.8 %	**Sand**	50.4 %	9.8 %	**Sand**	71.6 %
0.125	10.6 %			9.2 %			30 %			35.7 %		
0.063	34.1 %			31.8 %			17.7 %			26 %		
0.032	12.7 %			11.2 %			19.2 %			5.8 %		
0.016	21.9 %	**Silt**	45.3 %	24.8 %	**Silt**	50.1 %	15.1 %	**Silt**	43.0 %	10.5 %	**Silt**	21.4 %
0.008	8.6 %			11.6 %			6.3 %			4.1 %		
0.004	2.1 %			2.5 %			2.4 %			1 %		
0.002	1.5 %			2.6 %			1.2 %			1.4 %		
0.001	0.9 %	**Clay**	8.20 %	1.6 %	**Clay**	8.70 %	0.5 %	**Clay**	6.50 %	0.9 %	**Clay**	6.90 %
< 0.001	5.8 %			4.5 %			4.8 %			4.6 %		
	79.1 %			**77.7** %			**79.4** %			**79.3** %		

Sample Name	B4-28-30			B4-33-35			B2-12-15			B2-18-20		
Seive Opening (mm)	% Retention	Fraction		% Retention	Fraction		% Retention	Fraction		% Retention	Fraction	
4.75	< 0.1 %			1.7 %			0.2 %			10.1 %		
4.00	< 0.1 %	**Gravel**	0.20 %	0.1 %	**Gravel**	2.80 %	0.2 %	**Gravel**	0.70 %	0.1 %	**Gravel**	11.6 %
2.00	0.2 %			1 %			0.3 %			1.4 %		
1.00	< 0.1 %			0.9 %			0.3 %			1.9 %		
0.50	0.1 %			3.9 %			3.4 %			5 %		
0.25	0.1 %	**Sand**	44.6 %	34.7 %	**Sand**	59.6 %	28.6 %	**Sand**	62.0 %	28.2 %	**Sand**	65.0 %
0.125	0.9 %			13.9 %			11.9 %			10.7 %		
0.063	43.5 %			6.2 %			17.8 %			19.2 %		
0.032	14.9 %			15.3 %			15.2 %			6.5 %		
0.016	22.2 %	**Silt**	47.2 %	10.7 %	**Silt**	30.9 %	10.6 %	**Silt**	30.5 %	6.1 %	**Silt**	17.7 %
0.008	7.7 %			3.2 %			2.9 %			3.1 %		
0.004	2.4 %			1.7 %			1.8 %			2 %		
0.002	2.1 %			1 %			1.5 %			0.7 %		
0.001	1.3 %	**Clay**	7.90 %	0.6 %	**Clay**	6.60 %	0.9 %	**Clay**	6.80 %	0.3 %	**Clay**	5.70 %
< 0.001	4.5 %			5 %			4.4 %			4.7 %		
	76.4 %			**83.4** %			**83.1** %			**82.6** %		

Abbreviation:
mm Millimeters

Qualifier:
< Soil was not retained at the given threshold for weight percentage measurement.

Table 4.1
Source Property Excavation Design Soil Data for PCE

Location	Depth Range (feet bgs)	PCE (mg/kg)
A-S1	3–3	0.00071 U
A-B1	5.5–5.5	0.0011 U
A-S2	3–3	0.00079 U
C-S1	5.5–5.5	0.00074 U
C-B1	10–10	0.0023
EAIb-B11	3–3	0.025 U
	8–8	0.025 U
	14–14	0.025 U
EAIb-B14	3–3	0.025 U
	8–8	0.025 U
	14–14	0.025 U
EAIb-B15	3–3	**0.21**
	8–8	0.025 U
	14–14	0.025 U
EAIb-B19	4–4	0.025 U
	9–9	0.025 U
	14–14	0.025 U
EAIb-B4	5–5	0.025 U
	10–10	0.025 U
	15–15	0.025 U
EAIb-B8	3–3	0.025 U
	8–8	0.025 U
	14–14	0.025 U
EAIb-B9	3–3	0.025 U
	8–8	0.025 U
	14–14	0.025 U
Lot8-3	5.5–5.5	0.0033
	10–10	0.0015
PP-1	8.5–8.5	**0.081**
	12–12	0.0062
PP-2	6–6	0.0027
	8.8–8.8	0.028
PP-3	5–5	0.0032
	9–9	0.047
PP-5	6–6	0.0054
	7.5–7.5	0.0032
PP-7	5–5	**0.12**
	9.5–9.5	0.0043
PP-8	4.5–4.5	0.041
	6–6	0.0051
PP-9	5.8–5.8	0.029
	9.5–9.5	0.020
PP-11	2–2	0.0010
	6.5–6.5	0.015
PP-13	2–2	0.0014
	8.5–8.5	0.00065 U
PP-23	6–6	0.0085
	9–9	0.0056
PP-24	7–7	**0.075**
	10–10	0.0099
PP-30	2.5–2.5	**0.057**
	7–7	0.0022
UST-SS-5	5–5	0.0044

Notes:
Soil results are rounded to two significant figures.
RED/BOLD Result exceeds the cleanup level of 0.050 mg/kg.

Abbreviations:
bgs Below ground surface
mg/kg Milligrams per kilogram
PCE Tetrachloroethene

Qualifier:
U Analyte is not detected at the associated reporting limit.

Table 4.2
2020 Groundwater Design Data for CVOCs and Geochemical Parameters

		Analyte Class	CVOCs					Geochemical Parameters					
		Analyte	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl chloride	Dissolved Oxygen	ORP	pH	Ethane	Ethene	Methane
		Groundwater Cleanup Level	5.0	5.0	70	100	0.20	--	--	--	--	--	--
		Units	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mV	Standard Units	µg/L	µg/L	µg/L
Location	Depth Interval (feet bgs)	Sample Date											
Shallow Aquifer Zone Wells													
BB-2	9–19	3/11/2020	**80**	0.97	0.60	0.40 U	0.046	2.84	97.8	6.49	0.22 UJ	0.29 UJ	2.0 J
BI-3	5–10	3/9/2020	1.1	0.39	2.4	0.20 U	**0.52**	0.83	53.8	6.53			
BLMW-10	5–10	3/9/2020	0.20 U	0.29	1.0	0.20 U	0.024	0.53	-9.5	6.49	0.22 UJ	0.29 UJ	150 J
UCCMW-5	10–20	3/10/2020	1.4	0.20 U	0.20 U	0.20 U	0.020 U	9.44	140.3	6.19	0.22 UJ	0.29 UJ	5.5 J
UCCMW-7	8–18	3/10/2020	1.4	1.3	13	0.20 U	**1.9**	0.53	-42.9	6.23	0.22 UJ	0.29 UJ	1,000 J
UCCMW-8	5–15	3/11/2020	2.2	0.50	0.55	0.20 U	0.020 U	0.62	161.8	6.06	0.22 UJ	0.29 UJ	33 J
UCCMW-9	5–15	3/9/2020	0.20 U	0.20 U	0.99	0.20 U	0.15	0.48	25.7	6.66			
UCCMW-10	5–15	3/10/2020	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.74	58.1	5.98	0.22 UJ	0.29 UJ	8.0 J
UCCMW-17	10–20	3/11/2020	**21**	1.2	26	0.21	0.020 U	3.90	149.8	6.09	0.22 UJ	0.29 UJ	0.55 UJ
UCCMW-18	10–20	3/11/2020	**130**	1.9	19	1.0 U	**2.8**	0.55	-48.3	6.21	0.22 UJ	2.2 J	1,400 J
UCCMW-21	12–22	3/9/2020	2.8	1.4	0.61	0.20 U	**0.25**	0.34	1.3	6.18			
UCCMW-24	8–18	3/9/2020	0.20 U	0.20 U	0.30	0.20 U	0.020 U	0.48	20.9	6.36	0.22 UJ	0.29 UJ	1,100 J
UCCMW-25	8–18	3/9/2020	1.1	0.88	3.8	0.20 U	**0.75**	0.34	-35.4	6.37	0.22 UJ	0.29 UJ	8,300 J
UCCMW-27	5–15	3/9/2020	0.20 U	0.21	3.1	0.20 U	0.094	0.76	-54.7	6.42	0.22 UJ	0.29 UJ	2,700 J
UCCMW-29	5–15	7/13/2020	**9.2**	0.20 U	0.20 U	0.20 U	0.020 U	7.29	118.7	6.55	0.22 U	0.29 U	83
UCCMW-32	15–25	7/13/2020	**8.6**	2.9	3.2	0.20 U	0.043	2.16	116.4	6.58	0.22 U	0.29 U	32
Deep Aquifer Zone Wells													
UCCMW-4D	35–40	3/11/2020	0.20 U	0.20 U	0.21	0.20 U	0.020 U	0.65	-19.1	7.01	0.22 UJ	0.29 UJ	0.64 J
UCCMW-28D	40–50	8/4/2020	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.50	138.2	5.96	0.29	0.29 U	1.2
UCCMW-29D	34–44	7/13/2020	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.24	-91.1	7.61	0.98	0.71	410
UCCMW-30D	26–36	7/14/2020	2.2	0.20 U	0.20 U	0.20 U	0.067	0.39	140.0	5.84	3.3 U	4.3 U	1,100
UCCMW-31D	18–28	7/13/2020	**25**	0.20 U	6.6	0.20 U	**0.24**	0.28	90.1	6.21	3.3 U	4.3 U	1,200
UCCMW-32D	30–40	7/13/2020	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.39	-75.5	6.70	0.22 U	0.29 U	5.9
UCCMW-33D	49–59	7/21/2020	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	0.33	-118.7	7.43	2.2 U	2.9 U	590
UCCMW-34D	35–50	7/21/2020	**18**	0.20 U	0.20 U	0.20 U	0.020 U	2.02 JS	57.5	6.18	6.7 U	8.7 U	2,600
UCCMW-35D	30–40	7/21/2020	0.20 U	0.20 U	0.20 U	0.20 U	0.020 U	1.59	-68.4	6.72	0.22 U	0.29 U	6.0
UCCMW-36D	15–30	7/13/2020	**24**	0.20 U	20	0.20 U	**0.93**	0.44	74.9	6.17	2.2 U	2.9 U	860

Notes:

Results and CULs are rounded to two significant figures.

RED/BOLD Result exceeds CUL.

Abbreviations:

bgs Below ground surface
CUL Cleanup level
CVOC Chlorinated volatile organic compound
DCE Dichloroethene
µg/L Micrograms per liter
mg/L Milligrams per liter
mV Millivolts
ORP Oxidation-reduction potential
PCE Tetrachloroethene
TCE Trichloroethene

Qualifiers:

J Analyte was detected and the concentration is estimated.
JS Analyte was detected and the concentration is estimated based on sampling QC from specific field observations.
U Analyte not detected at the given reporting limit.
UJ Analyte is not detected at the associated reporting limit, which is an estimate.

Table 5.1
Injection Details

	Treatment Location			Treatment Components (1)									
	Length (feet)	Injection Points	Treatment Interval (feet bgs)	Volume (gal)		PlumeStop (lbs)		S-mZVI (lbs)		AquiFix (lbs)		BDI Plus (L)	
				Total	Per Foot	Total	Per Foot	Total	Per Foot	Total	Per Foot	Total	Per Foot
In Situ Treatment Barriers													
1	80	25	9 to 22	11,375	35	6,000	18	800	2.5	--	--	8	0.025
2	130	40	7 to 27	28,000	35	12,000	15	1,800	2.3	--	--	18	0.023
3	80	25	7 to 30	20,125	35	11,600	20	3,100	5.4	3,100	5	13	0.023
4	100	31	15 to 35	21,700	35	12,400	20	3,300	5.3	3,300	5	14	0.023
5	100	31	31 to 51	21,700	35	10,000	16	3,300	5.3	--	--	14	0.023
Supplemental Treatment Zones													
1	40	4	7 to 18	1,980	45	--	--	--	--	1,200	27	4	0.091
2	40	4	6 to 18	2,167	45	--	--	600	12.5	1,200	25	5	0.10
3	60	6	20 to 40	5,400	45	--	--	1,500	12.5	4,000	33	9	0.075

Notes:

-- Not recommended

1 PlumeStop, S-mZVI, AquiFix, and BDI Plus are all registered or pending trademarked products created by Regenesis.

Abbreviations:

BDI Plus Bio-dechlor Inoculum
bgs Below ground surface
gal Gallons
L Liters
lbs Pounds
S-mZVI Sulfidated microscale zero-valent iron

Table 7.1
Groundwater Performance Monitoring Details

Location Information		Data Collection (1)					
		Year 1 Q1			Year 1 Q2-Q4, Year 2		
Well ID	Screen Interval (feet bgs)	Water Level	CVOC	MNA	Water Level	CVOC	MNA
Shallow Aquifer Zone Wells							
BLMW-10	5–10	X			X		
UCCMW-5	10–20	X			X		
UCCMW-7	8–18	X	X	X	X	X	X
UCCMW-11S	8–18	X	X		X		
UCCMW-18	10–20	X	X	X	X	X	
UCCMW-21	12–22	X	X	X	X	X	X
UCCMW-29	5–15	X	X	X	X	X	X
UCCMW-32	15–25	X			X		
UCCMW-37	10–20 (2)	X	X		X	X	
UCCMS-38	8–18 (2)	X	X	X	X	X	X
Shallow to Deep Aquifer Transition Zone Wells (3)							
UCCMW-39	15–25 (2)	X	X	X	X	X	X
BB-2	9–19	X	X		X	X	
Deep Aquifer Zone Wells							
UCCMW-11	18–23	X			X		
UCCMW-28D	40–50	X			X		
UCCMW-29D	34–44	X			X		
UCCMW-30D	26–36	X			X		
UCCMW-31D	18–28	X	X		X	X	
UCCMW-32D	30–40	X			X		
UCCMW-33D	49–50	X	X	X	X		
UCCMW-34D	35–40	X	X		X	X	
UCCMW-36D	15–30	X	X	X	X	X	X
UCCMW-40D	20–30 (2)	X	X	X	X	X	X
UCCMW-41D	35–50 (2)	X	X	X	X	X	X
UCCMW-42D	35–50 (2)	X	X	X	X	X	X

Notes:

1 Data will be collected quarterly for 2 years. CVOC analysis includes PCE, TCE, cis- and trans- 1,2-DCE and vinyl chloride. MNA parameter

2 New well to be installed during construction; screened interval is

3 Shallow-to-deep aquifer transition zone wells are grouped with

Abbreviations:

bgs Below ground surface
CVOC Chlorinated volatile organic compound
DCE Dichloroethene
MNA Monitored natural attenuation
PCE Tetrachloroethene
TCE Trichloroethene

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Figures

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Figure 1.1
Vicinity Map

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7/12/2023

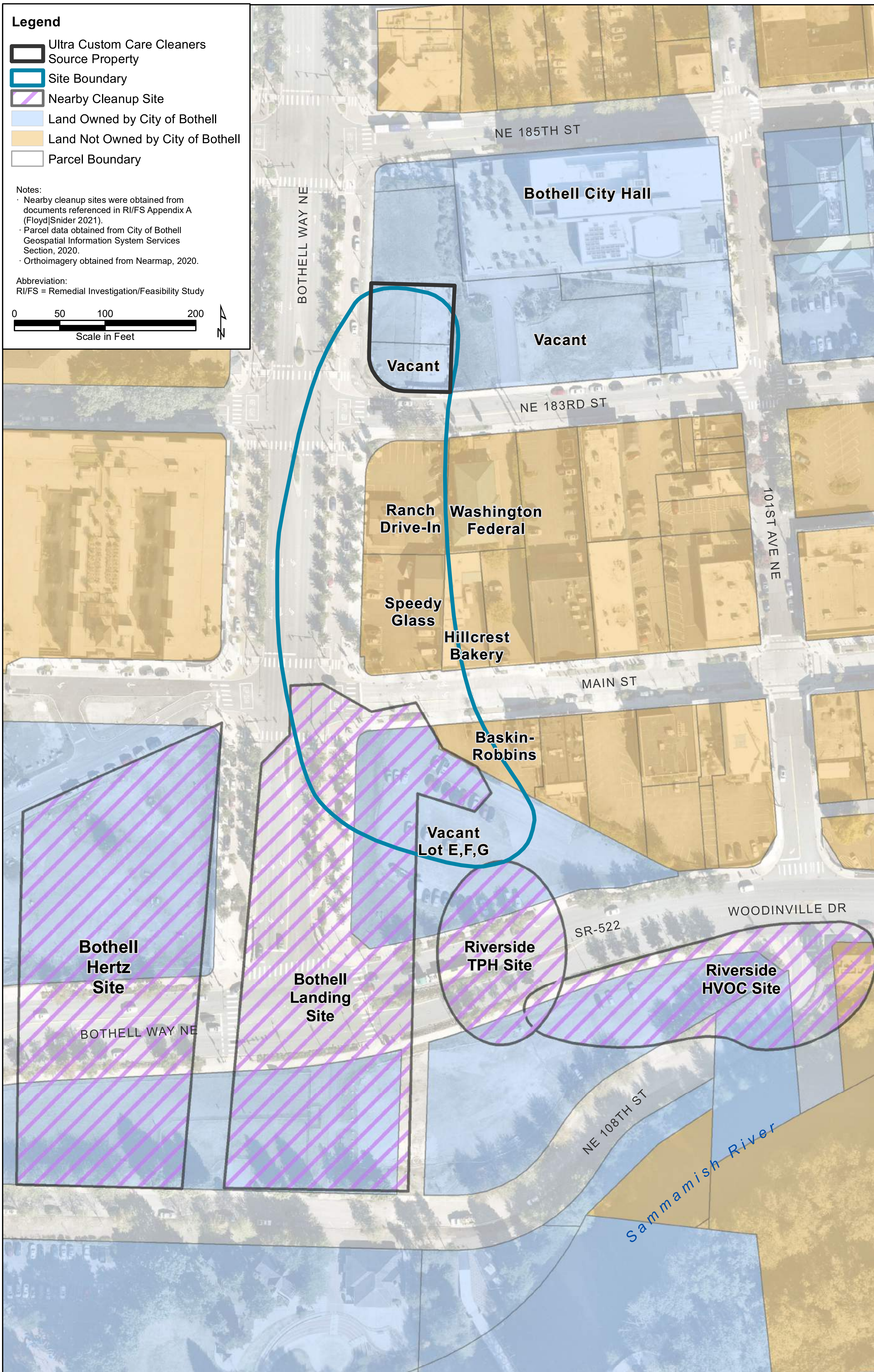

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Figure 2.1
Site Plan and Adjacent Sites

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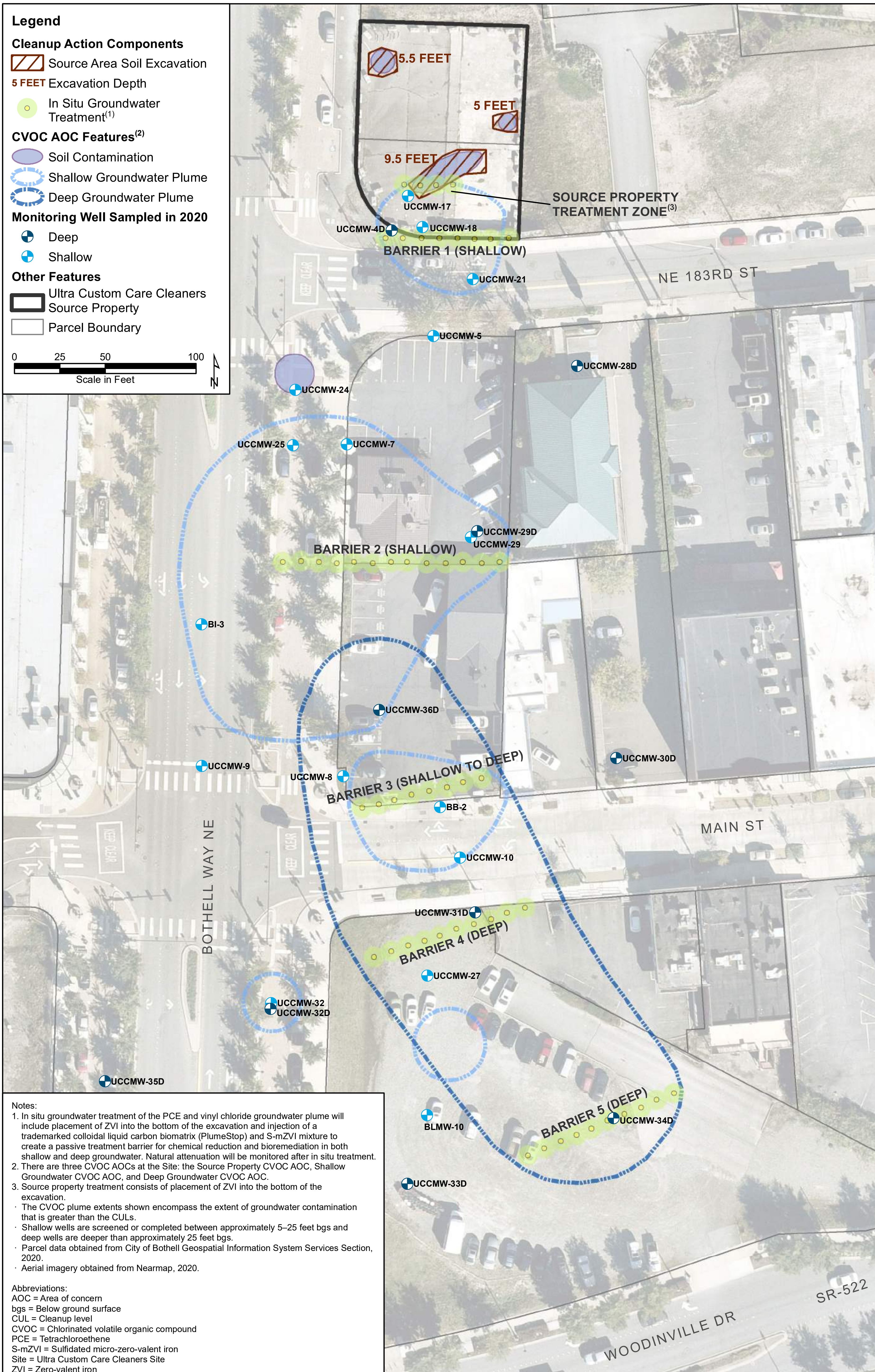
7/12/2023



Notes:
1. In situ groundwater treatment of the PCE and vinyl chloride groundwater plume will include placement of ZVI into the bottom of the excavation and injection of a trademarked colloidal liquid carbon biomatrix (PlumeStop) and S-mZVI mixture to create a passive treatment barrier for chemical reduction and bioremediation in both shallow and deep groundwater. Natural attenuation will be monitored after in situ treatment.
2. There are three CVOC AOCs at the Site: the Source Property CVOC AOC, Shallow Groundwater CVOC AOC, and Deep Groundwater CVOC AOC.
3. Source property treatment consists of placement of ZVI into the bottom of the excavation.
· The CVOC plume extents shown encompass the extent of groundwater contamination that is greater than the CULs.
· Shallow wells are screened or completed between approximately 5–25 feet bgs and deep wells are deeper than approximately 25 feet bgs.
· Parcel data obtained from City of Bothell Geospatial Information System Services Section, 2020.
· Aerial imagery obtained from Nearmap, 2020.

Abbreviations:
AOC = Area of concern
bgs = Below ground surface
CUL = Cleanup level
CVOC = Chlorinated volatile organic compound
PCE = Tetrachloroethene
S-mZVI = Sulfidated micro-zero-valent iron
Site = Ultra Custom Care Cleaners Site
ZVI = Zero-valent iron

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Figure 2.2
Cleanup Action Components

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7/12/2023

Legend

Direct Push or SubSlab Sample Depth

- 0-3 Feet Below Ground Surface
- 3-6 Feet Below Ground Surface
- 6-9 Feet Below Ground Surface
- 9-12 Feet Below Ground Surface
- 12-15 Feet Below Ground Surface

Exceedance Factor

- ≤CUL
- >1x CUL
- >2x CUL

Other Features

- Source Area Soil Excavation
- Ultra Custom Care Cleaners Source Property
- Parcel Boundary

Soil Cleanup Level
PCE: 0.050 mg/kg

Notes:
- Location color is determined using the maximum exceedance factor for any detected PCE result.
- This figure shows in situ soil data from locations sampled on or after January 1, 2009.
- Key sample stations for the basis of excavation design are labeled on the figure. PCE results for these stations are summarized in Table 4.1.
- Well locations were surveyed by Floyd|Snider in 2020; other locations were obtained from documents referenced in Appendix A of the RI/FS (Floyd|Snider 2022).
- Parcel data obtained from City of Bothell Geospatial Information System Services Section, 2020.
- Aerial imagery obtained from Nearmap, 2020.

Abbreviations:
CUL = Cleanup level
mg/kg = Milligrams per kilogram
PCE = Tetrachloroethene
RI/FS = Remedial investigation/feasibility study

0 7.5 15 30
Scale in Feet

N

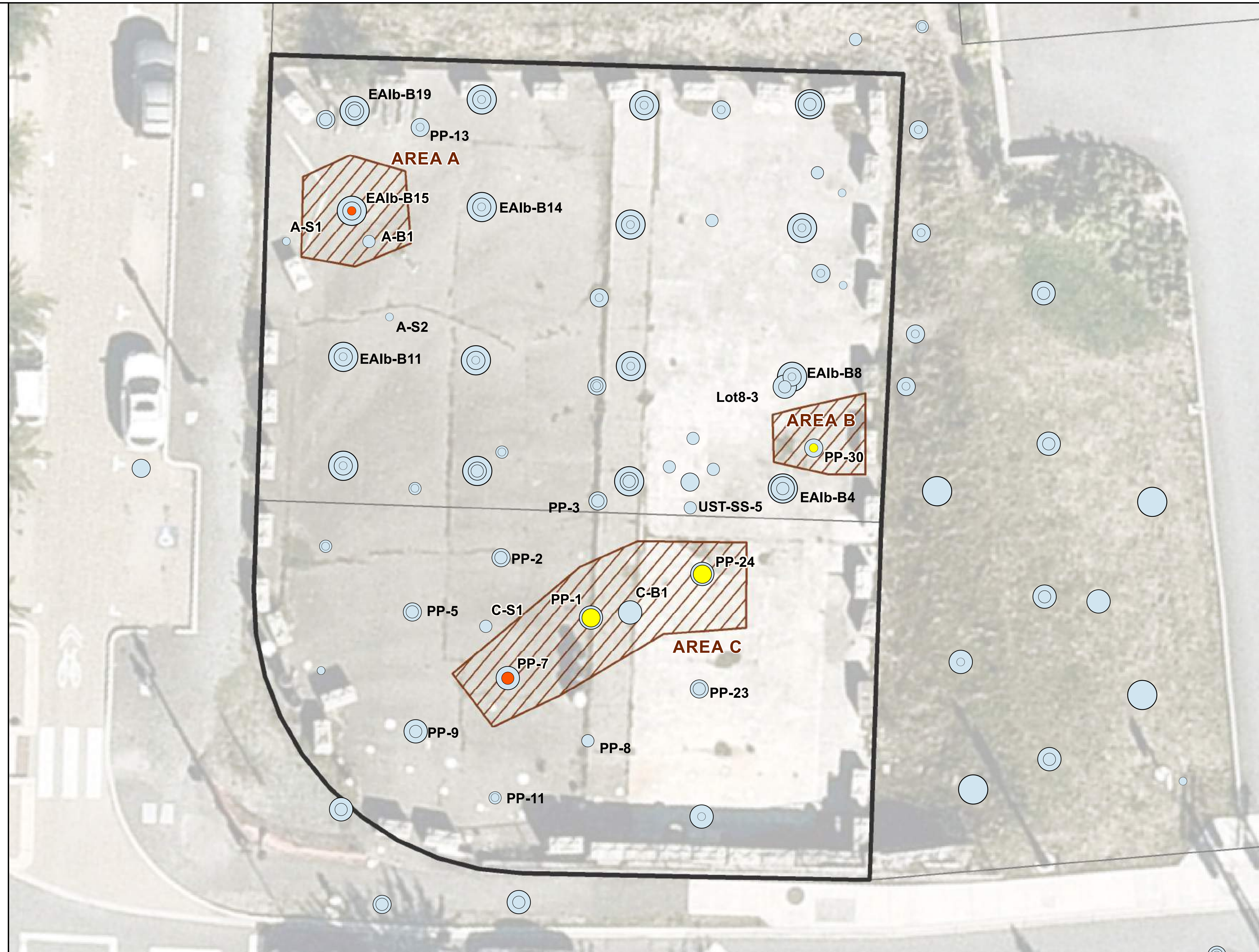

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Figure 4.1
PCE Distribution in Source Property Soil

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7/12/2023

Legend

Ultra Custom Care Cleaners Source Property

Parcel Boundary

Cleanup Action Components

Source Area Soil Excavation

Source Property Treatment Zone ZVI Soil Mixing

Supplemental Treatment Zone Injection Point

In Situ Treatment Barrier

Sample Location

Monitoring Well Analyzed in 2020

Exceedance Factor

>1x–2 CUL

>2x CUL

>10x CUL

MIP Locations

Low-Level

High-Level

MIP Response

Small Response

Moderate/Large Response

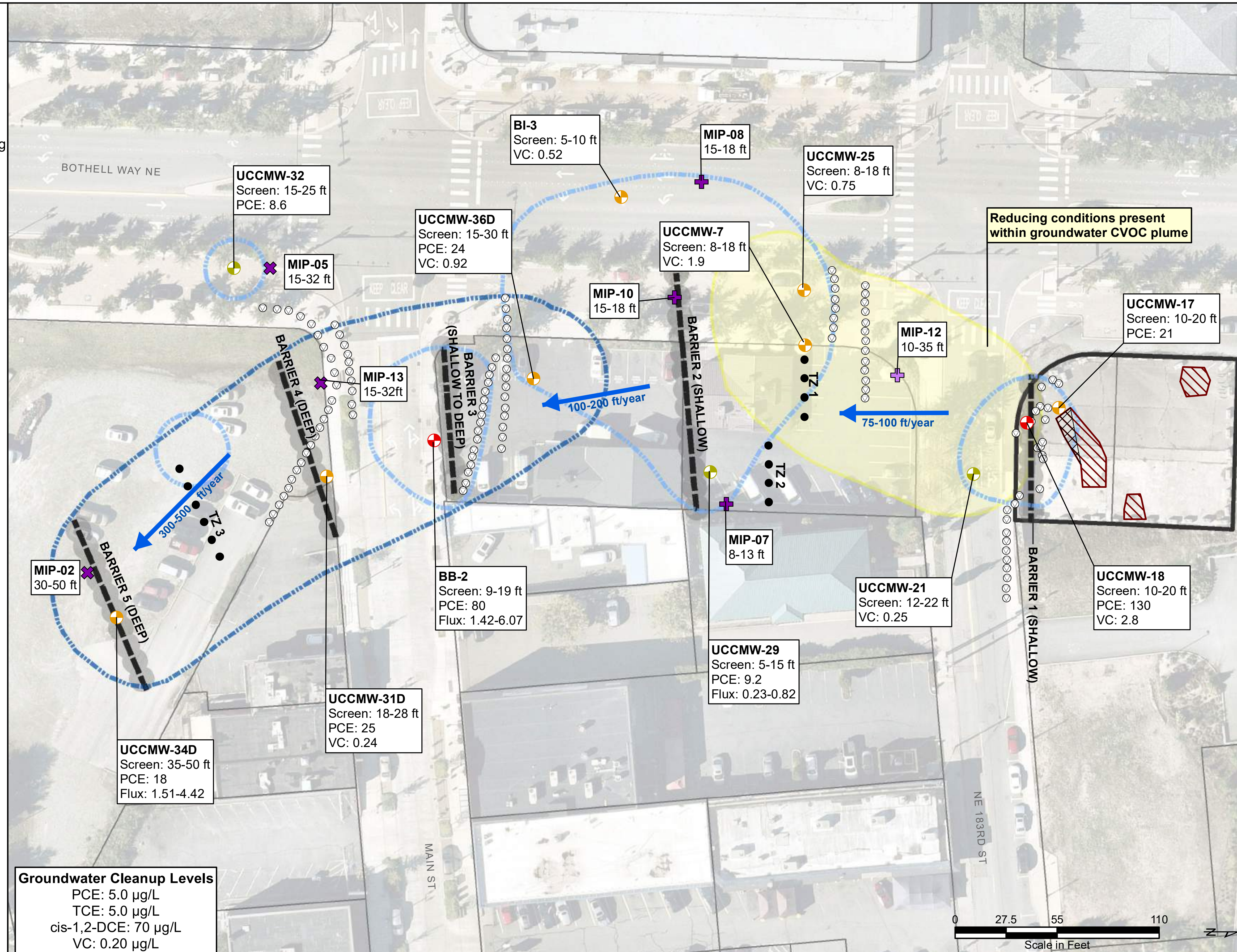
Groundwater CVOC Plumes

Shallow Groundwater Plume

Deep Groundwater Plume

Groundwater Flow Velocity and Direction

Previous IM Injection Location



Notes:

- All results shown are the most recent concentrations and are in μg/L. CVOC flux rates are in μg/m²/day. Qualifiers are omitted.
- Location color is determined using the maximum exceedance factor of the most recent event.
- Well screen intervals are shown in ft bgs for locations with CVOCs exceeding the CULs.
- Peak response intervals are shown in ft bgs for MIP locations with small or moderate/large response.
- Well locations were surveyed by Floyd|Snider in 2020.
- Aerial imagery obtained from Nearmap, 2020.

Abbreviations:

bgs = Below ground surface
CUL = Cleanup level
CVOC = Chlorinated volatile organic compound
DCE = Dichloroethene
ft = Feet
IM = Interim measure
μg/L = Micrograms per liter
μg/m² = micrograms per square meter
MIP = Membrane interface probe
PCE = Tetrachloroethene
TCE = Trichloroethene
TZ = Treatment zone
VC = Vinyl chloride
ZVI = Zero-valent iron

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Figure 4.2
Groundwater Design Data for CVOC Distribution, Geochemistry and Flow Velocity

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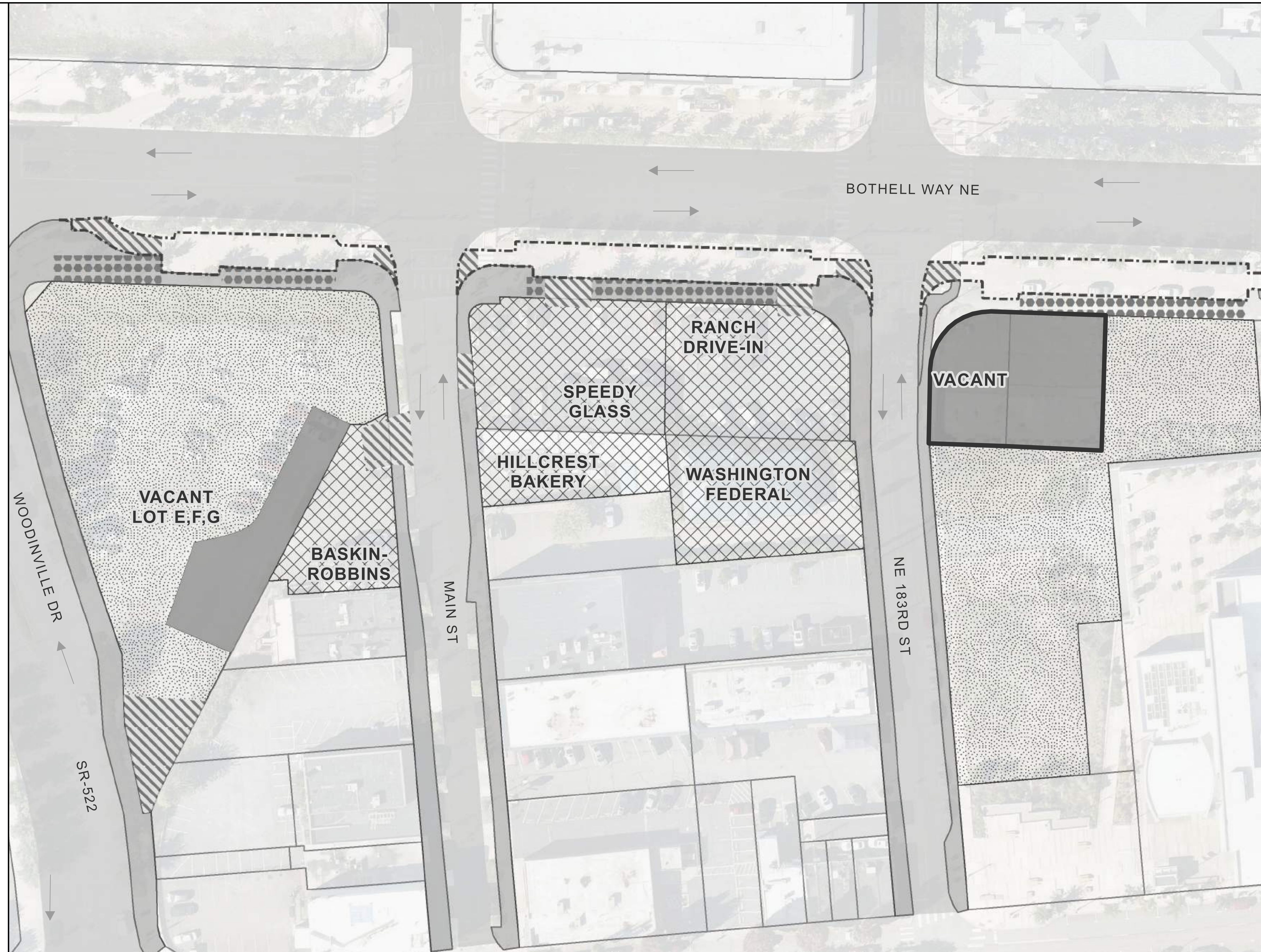
LEGEND

- PAVED CITY PROPERTY[1]
- SIDEWALKS AND PEDESTRIAN USE[1,2]
- SILVA CELLS BELOW SIDEWALK[3]
- CONCRETE PAVER-SURFACED ACCESS LANE[2,4,5]
- PAVED PRIVATE PROPERTY[5]
- UNPAVED CITY PROPERTY
- TRAVEL LANE/STREET PARKING[2]
- DRIVEWAY
- ULTRA CUSTOM CARE CLEANERS SOURCE PROPERTY
- PARCEL BOUNDARY



NOTES:
1. PROTECT CURB CROSSINGS DURING ACCESS
2. IMPLEMENT REQUIRED TRAFFIC CONTROL WHEN OCCUPYING WORK AREA
3. PROTECT CROSSINGS WITH STEEL PLATE
4. ONE-WAY TRAFFIC FLOW SOUTH TO NORTH
5. ACCESS ONLY THROUGH ESTABLISHED DRIVEWAYS

- PARCEL DATA OBTAINED FROM CITY OF BOTHELL GEOSPATIAL INFORMATION SYSTEM SERVICES SECTION, 2020.
- ORTHOIMAGERY OBTAINED FROM NEARMAP, 2020.

0 35 70 140
SCALE IN FEET

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Figure 5.1
Site Layout

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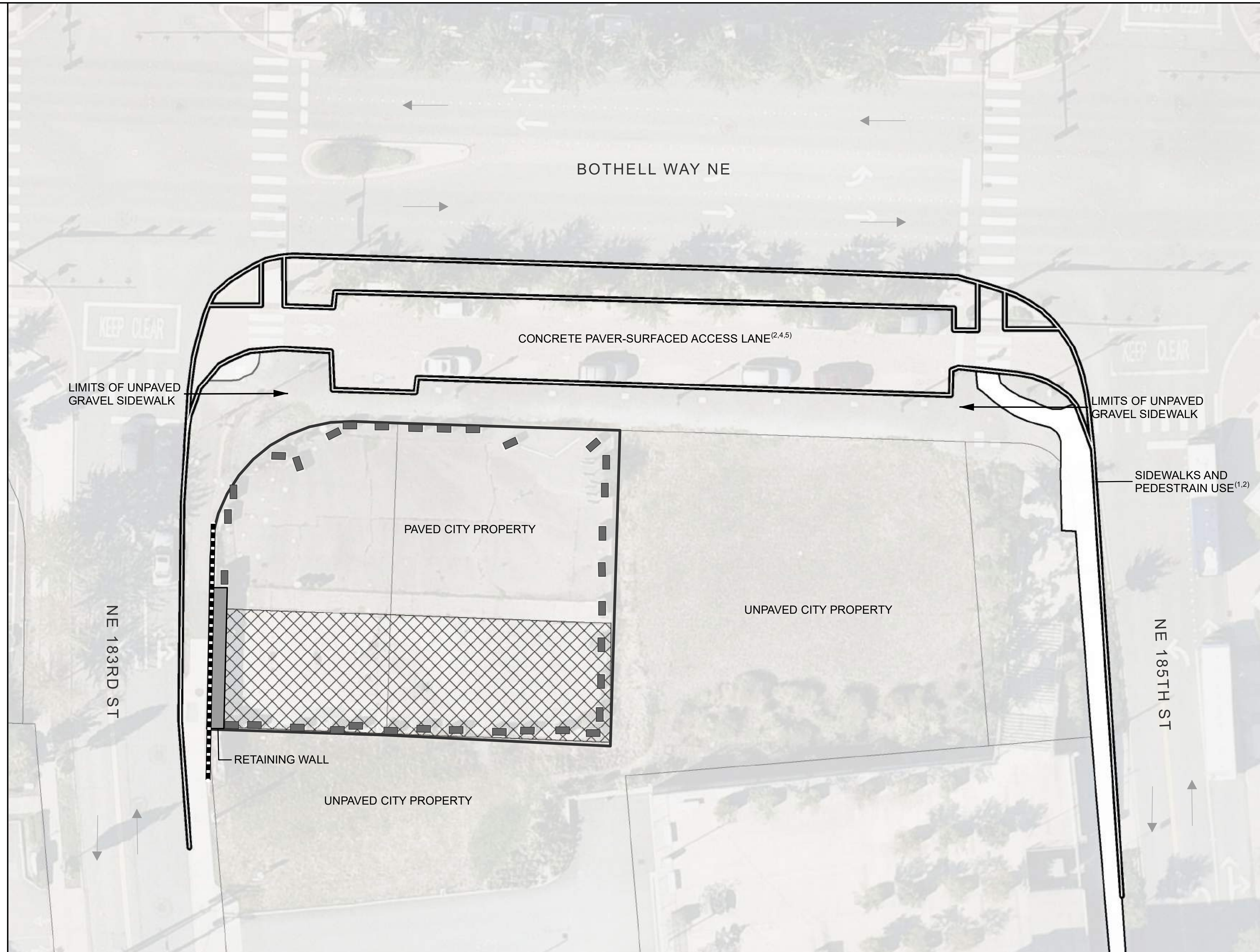
LEGEND

- SIDEWALKS AND PEDESTRIAN USE(1,2)
- SILVA CELLS BELOW SIDEWALK(3)
- CONCRETE FOUNDATION
- CONCRETE CURB
- EXISTING FENCE
- RETAINING WALL
- ECOLOGY BLOCKS(7)
- ULTRA CUSTOM CARE CLEANERS SOURCE PROPERTY(8)
- PARCEL BOUNDARY



NOTES:
1. PROTECT CURB CROSSINGS DURING ACCESS
2. IMPLEMENT REQUIRED TRAFFIC CONTROL WHEN OCCUPYING WORK AREA
3. PROTECT CROSSINGS WITH STEEL PLATE
4. ONE-WAY TRAFFIC FLOW SOUTH TO NORTH
5. ACCESS ONLY THROUGH ESTABLISHED DRIVEWAYS.
6. TEMPORARY WORK AREAS MAY BE ESTABLISHED ON CITY-OWNED PROPERTY ADJACENT TO SOURCE PROPERTY. PROTECT UNPAVED GROUND SURFACE OF TEMPORARY WORK AREAS.
7. MAY BE MOVED AND REUSED DURING CONSTRUCTION AS NEEDED. REPLACE AFTER COMPLETION OF EXCAVATION AND PAVEMENT RESTORATION.
8. INSTALL TEMPORARY FENCE TO ENCOMPASS SOURCE PROPERTY BOUNDARY AND ADJACENT TEMPORARY WORK AREAS. EXTEND TO MEET RETAINING WALL OR EXISTING FENCE.

· PARCEL DATA OBTAINED FROM CITY OF BOTHELL GEOSPATIAL INFORMATION SYSTEM SERVICES SECTION, 2020.
· ORTHOIMAGERY OBTAINED FROM NEARMAP, 2020.

0 15 30 60
SCALE IN FEET

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Figure 5.2
Source Property Protection

LEGEND

MONITORING WELLS

DECOMMISSION DURING CONSTRUCTION

PROTECT DURING CONSTRUCTION

UTILITIES

CATCH BASIN

FIRE HYDRANT

STREET LIGHT

MANHOLE

SD — STORM LINE

SS — SEWER LINE

W — WATER LINE

BP — BURIED POWER

G — GAS LINE

OTHER FEATURES

IN SITU TREATMENT BARRIER

SUPPLEMENTAL TREATMENT ZONE INJECTION POINT

ULTRA CUSTOM CARE CLEANERS SOURCE PROPERTY

PARCEL BOUNDARY

NOTES:

- UTILITY LINES WITHIN 10 FEET OF PLANNED GROUND DISTURBING ACTIVITIES WILL BE LOCATED WITH ELECTROMAGNETIC METHODS PRIOR TO CONSTRUCTION. THE POSITION OF ANY LINES THAT ARE NOT LOCATABLE WITH ELETROMAGNETIC METHODS WILL BE VERIFIED BY POTHOLING OR CAMERA SURVEY PRIOR TO CONSTRUCTION.
- A 3-FOOT BUFFER WILL BE MAINTAINED BETWEEN BURIED UTILITIES AND ALL GROUND DISTURBING ACTIVITIES.
- WELL LOCATIONS WERE SURVEYED BY FLOYD|SNIDER IN 2020; OTHER LOCATIONS WERE OBTAINED FROM DOCUMENTS REFERENCED IN APPENDIX A.
- UTILITY DATA OBTAINED FROM CITY OF BOTHELL GEOSPATIAL INFORMATION SYSTEM SERVICES SECTION, 2023 AND AS-BUILD MAPS PROVIDED BY PUGET SOUND ENERGY, 2023.
- PARCEL DATA OBTAINED FROM CITY OF BOTHELL GEOSPATIAL INFORMATION SYSTEM SERVICES SECTION, 2020.
- ORTHOIMAGERY OBTAINED FROM NEARMAP, 2020.

0 35 70 140

SCALE IN FEET

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Figure 5.3
Utility and Well Protection and Decommissioning Plan

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7/12/2023

LEGEND

- PLUG CATCH BASIN
- INSTALL CATCH BASIN FILTER INSERT
- GROUND SURFACE ELEVATION CONTOUR (FEET NAVD 88) (APPROXIMATE)
- BERM
- EXCAVATION DETAIL CROSS SECTION TRANSECT AND DESIGNATION
- CONTROL RUN-ON AND RUN-OFF
- SOURCE AREA SOIL EXCAVATION(1)
- SIDEWALL ELEVATION CONTOUR
- ZVI SOIL MIXING(2)
- RETAINING WALL
- LIMITS OF ASHPALT PAVEMENT
- LIMITS OF CONCRETE
- ULTRA CUSTOM CARE CLEANERS SOURCE PROPERTY
- PARCEL BOUNDARY

NOTES:
1. SAW CUT ASPHALT AND CONCRETE GROUND SURFACE WITHIN LIMITS OF RUN-ON PROTECTION.
2. BUCKET OR AUGER MIX SPECIFIED QUANTITY OF ZVI UNIFORMLY TO DEPTH OF 15 FEET AT ENGINEER'S DIRECTION.

- WORK AREAS MAY BE ESTABLISHED ON ADJACENT CITY-OWNED PROPERTY FOR ACCESS ROUTES, CLEAN MATERIAL STAGING AND EQUIPMENT STORAGE ONLY. PROTECT GROUND SURFACE, AND BERM AND COVER STOCKPILES.
- CONTAMINATED SOIL LOADING MAY BE PERFORMED ONLY ON PAVED AREAS WITHIN SOURCE PROPERTY BOUNDARY OR AFTER INSTALLATION OF GROUND SURFACE PROTECTION ON UNPAVED AREAS.
- STORMWATER RUNOFF SHALL BE CONTROLLED AND MAY BE INFILTRATED WITHIN WORK AREAS. STORMWATER RUNOFF SHALL NOT ENTER CATCH BASINS.
- CATCH BASIN DATA OBTAINED FROM CITY OF BOTHELL GEOSPATIAL INFORMATION SYSTEM SERVICES SECTION, 2023.
- PARCEL DATA OBTAINED FROM CITY OF BOTHELL GEOSPATIAL INFORMATION SYSTEM SERVICES SECTION, 2020.
- ORTHOIMAGERY OBTAINED FROM NEARMAP, 2020.

ABBREVIATION:
NAVD 88 = NORTH AMERICAN VERTICAL DATUM OF 1988
ZVI = ZERO-VALENT IRON

0 10 20 40
SCALE IN FEET

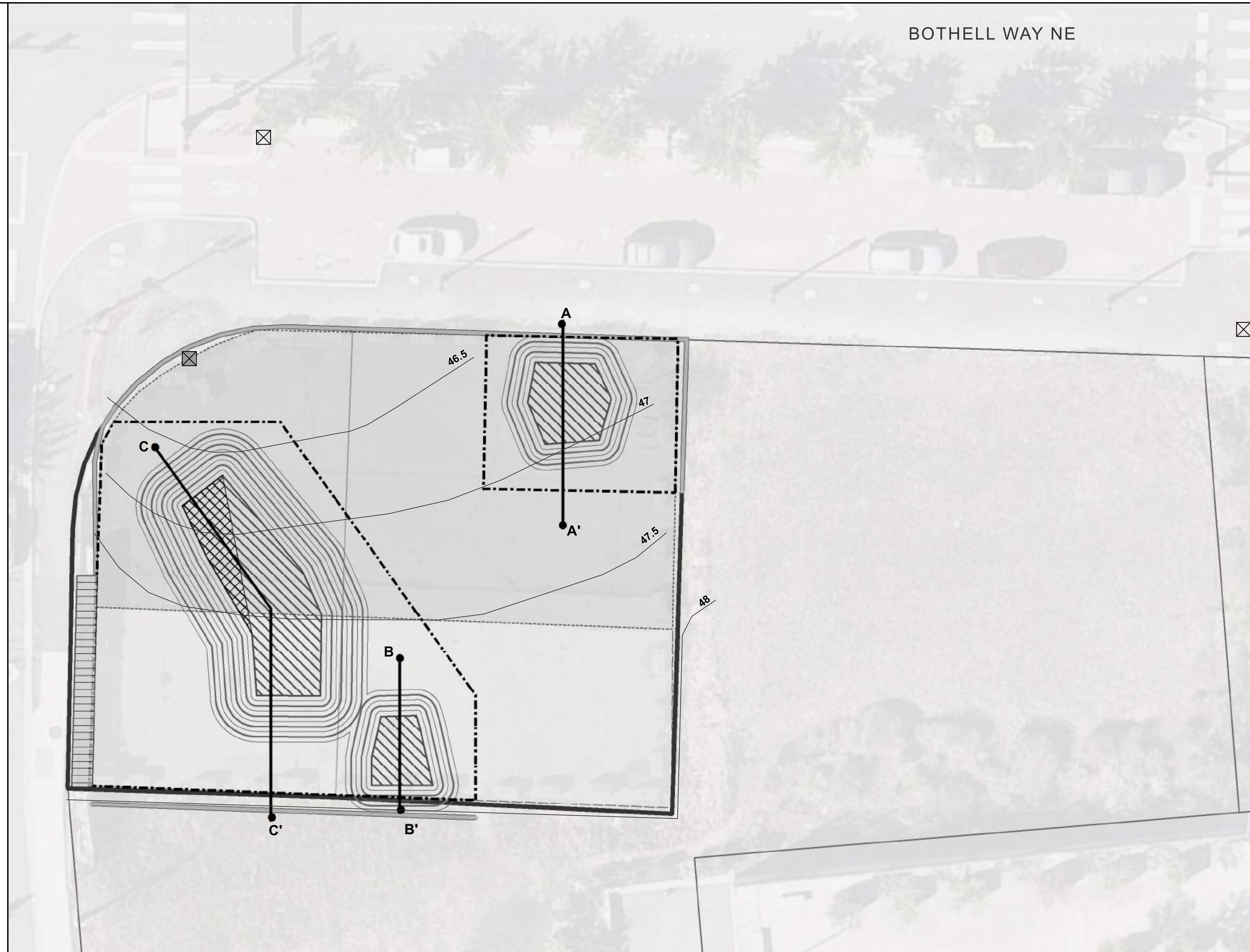

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Figure 5.4
Excavation and Temporary Erosion and Sediment Control Plan

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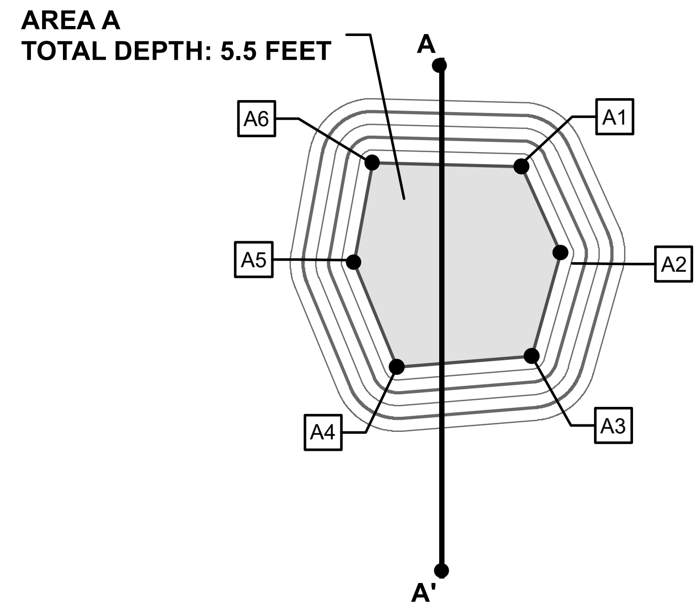
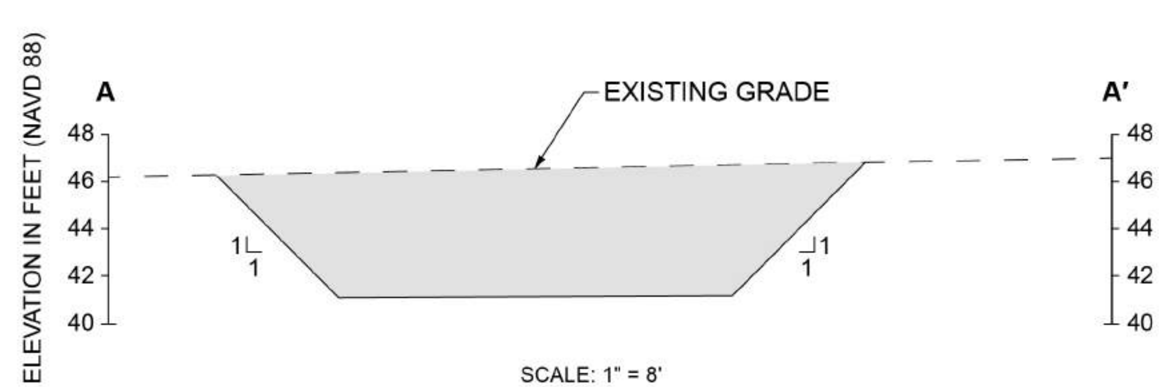
7/12/2023

LEGEND

- CONTROL POINT
- SOURCE AREA SOIL EXCAVATION
- SIDEWALL ELEVATION CONTOUR
- EXCAVATION DETAIL CROSS SECTION TRANSECT AND DESIGNATION



CONTROL POINTS(1)		
POINT ID	NORTHING	EASTING
A1	1302503.4	280674.4
A2	1302511.0	280678.4
A3	1302518.2	280675.2
A4	1302519.1	280664.7
A5	1302510.9	280661.3
A6	1302503.1	280662.8



NOTES:
1. CONTROL POINT COORDINATES ARE PRESENTED IN FEET NAD83 WASHINGTON STATEPLANE NORTH.
- EXCAVATION DEPTHS ARE PRESENTED IN FEET BELOW LOWEST SURROUNDING GRADE. SURROUNDING GRADE ELEVATIONS ARE APPROXIMATE. CONTRACTOR TO VERIFY TOTAL DEPTH OF EXCAVATIONS BELOW SURROUNDING GRADE WITH SURVEY.
- SIDEWALL ELEVATION CONTOURS ARE SHOWN AT 1-FOOT INTERVALS.
- EXCAVATED AREA WILL BE BACKFILLED AND COMPACTED WITH CLEAN IMPORT MATERIAL TO EXISTING PAVEMENT SUBGRADE. PAVED GROUND SURFACES WILL BE REPLACED WITH ASPHALT TO MATCH SURROUNDING PAVEMENT.

ABBREVIATION:
NAD83 = NORTH AMERICAN DATUM OF 1983
NAVD 88 = NORTH AMERICAN VERTICAL DATUM OF 1988

0 7.5 15 30
SCALE IN FEET

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Bothell, Washington

Figure 5.5
Area A Excavation and Restoration Details

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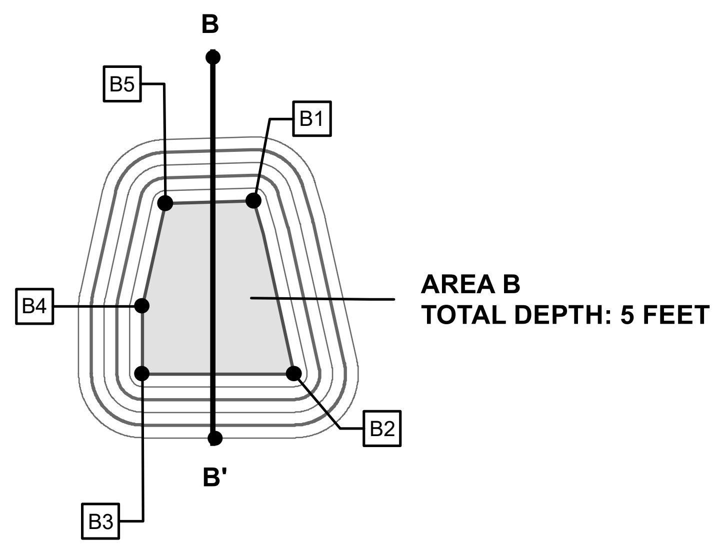
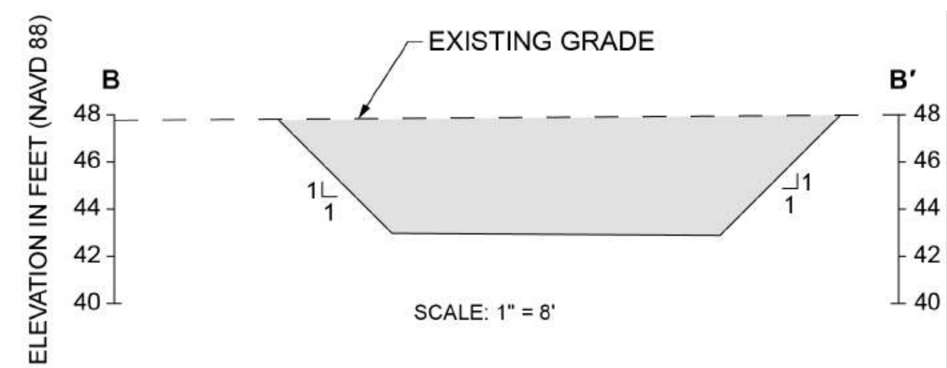
7/12/2023

LEGEND

- CONTROL POINT
- SOURCE AREA SOIL EXCAVATION
- SIDEWALL ELEVATION CONTOUR
- EXCAVATION DETAIL CROSS SECTION TRANSECT AND DESIGNATION

CONTROL POINTS[1]		
POINT ID	NORTHING	EASTING
B1	1302571.6	280639.7
B2	1302585.2	280642.9
B3	1302585.2	280631.0
B4	1302579.9	280631.0
B5	1302571.8	280632.8





NOTES:
1. CONTROL POINT COORDINATES ARE PRESENTED IN FEET NAD83 WASHINGTON STATEPLANE NORTH.
- EXCAVATION DEPTHS ARE PRESENTED IN FEET BELOW LOWEST SURROUNDING GRADE. SURROUNDING GRADE ELEVATIONS ARE APPROXIMATE. CONTRACTOR TO VERIFY TOTAL DEPTH OF EXCAVATIONS BELOW SURROUNDING GRADE WITH SURVEY.
- SIDEWALL ELEVATION CONTOURS ARE SHOWN AT 1-FOOT INTERVALS.
- EXCAVATED AREA WILL BE BACKFILLED AND COMPACTED WITH CLEAN IMPORT MATERIAL TO EXISTING PAVEMENT SUBGRADE. PAVED GROUND SURFACES WILL BE REPLACED WITH ASPHALT TO MATCH SURROUNDING PAVEMENT.

ABBREVIATION:
NAD83 = NORTH AMERICAN DATUM OF 1983
NAVD 88 = NORTH AMERICAN VERTICAL DATUM OF 1988

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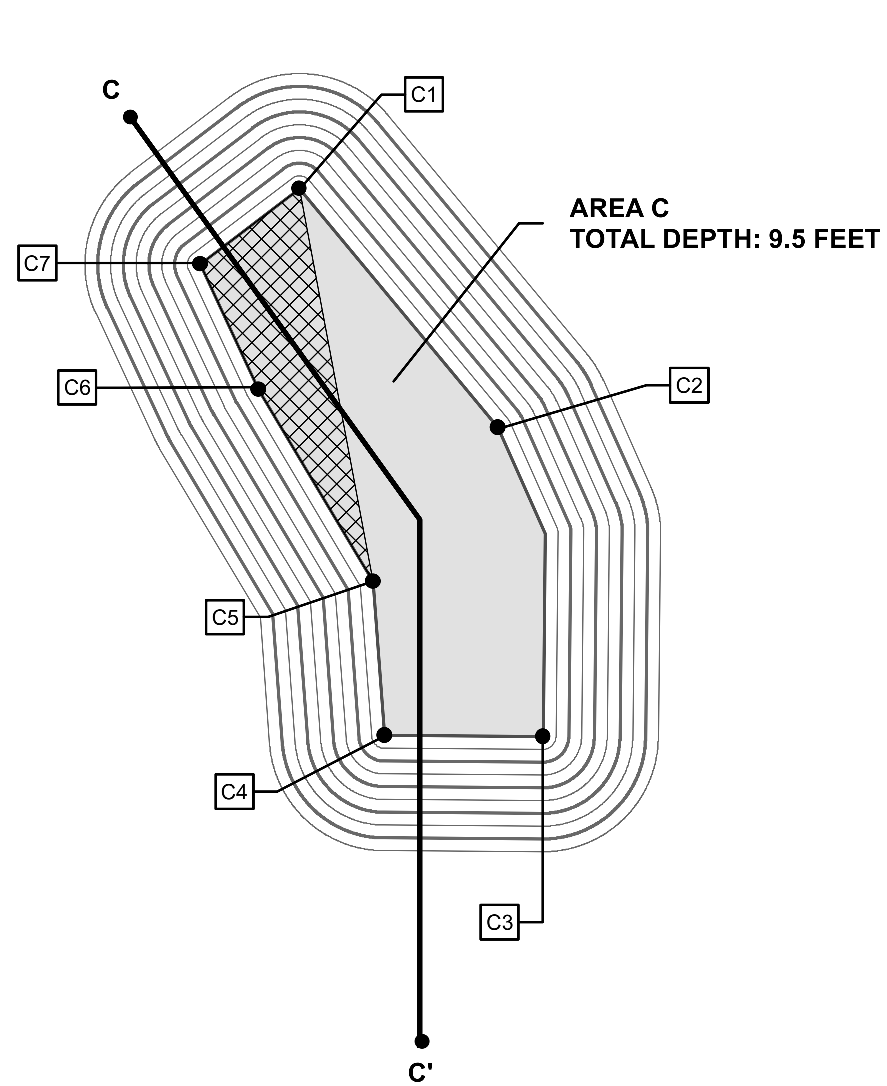
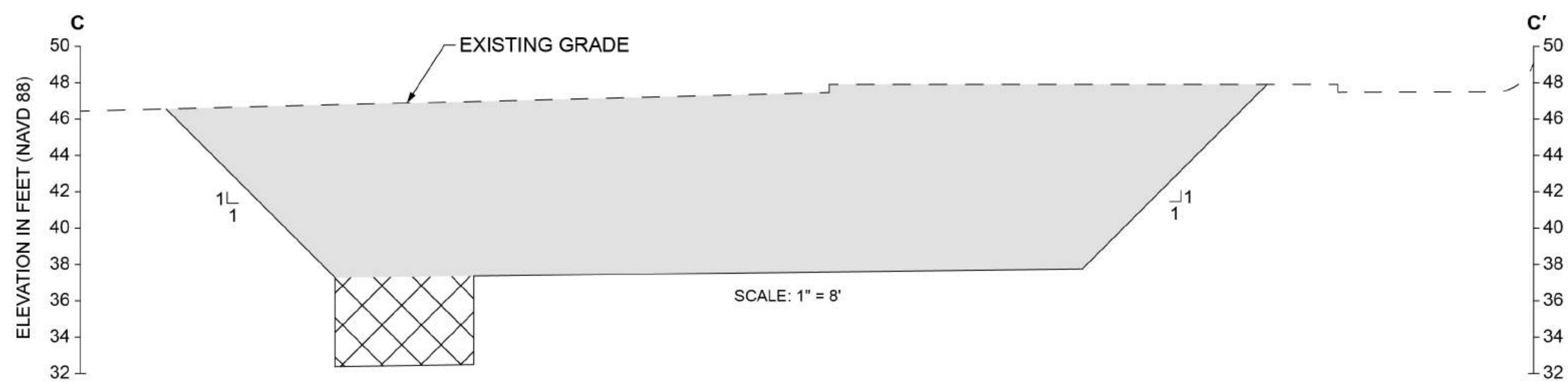
Figure 5.6
Area B Excavation and Restoration Details

LEGEND

- CONTROL POINT
- SOURCE AREA SOIL EXCAVATION
- ZVI SOIL MIXING(2)
- SIDEWALL ELEVATION CONTOUR
- EXCAVATION DETAIL CROSS SECTION TRANSECT AND DESIGNATION



CONTROL POINTS(1)		
POINT ID	NORTHING	EASTING
C1	1302525.1	280602.1
C2	1302543.7	280617.6
C3	1302567.9	280621.1
C4	1302567.8	280608.7
C5	1302555.8	280607.9
C6	1302540.8	280598.9
C7	1302531.0	280594.3



NOTES:

1. CONTROL POINT COORDINATES ARE PRESENTED IN FEET NAD83 WASHINGTON STATEPLANE NORTH.
2. BUCKET MIX SPECIFIED QUANTITY OF ZVI UNIFORMLY TO DEPTH OF 15 FEET AT ENGINEER'S DIRECTION

- EXCAVATION DEPTHS ARE PRESENTED IN FEET BELOW LOWEST SURROUNDING GRADE. SURROUNDING GRADE ELEVATIONS ARE APPROXIMATE. CONTRACTOR TO VERIFY TOTAL DEPTH OF EXCAVATIONS BELOW SURROUNDING GRADE WITH SURVEY.
- SIDEWALL ELEVATION CONTOURS ARE SHOWN AT 1-FOOT INTERVALS.
- EXCAVATED AREA WILL BE BACKFILLED AND COMPACTED WITH CLEAN IMPORT MATERIAL TO EXISTING PAVEMENT SUBGRADE. PAVED GROUND SURFACES WILL BE REPLACED WITH ASPHALT TO MATCH SURROUNDING PAVEMENT.

ABBREVIATION:

NAD83 = NORTH AMERICAN DATUM OF 1983
NAVD 88 = NORTH AMERICAN VERTICAL DATUM OF 1988
ZVI = ZERO VALENT IRON

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Figure 5.7
Area C Excavation and Restoration Details

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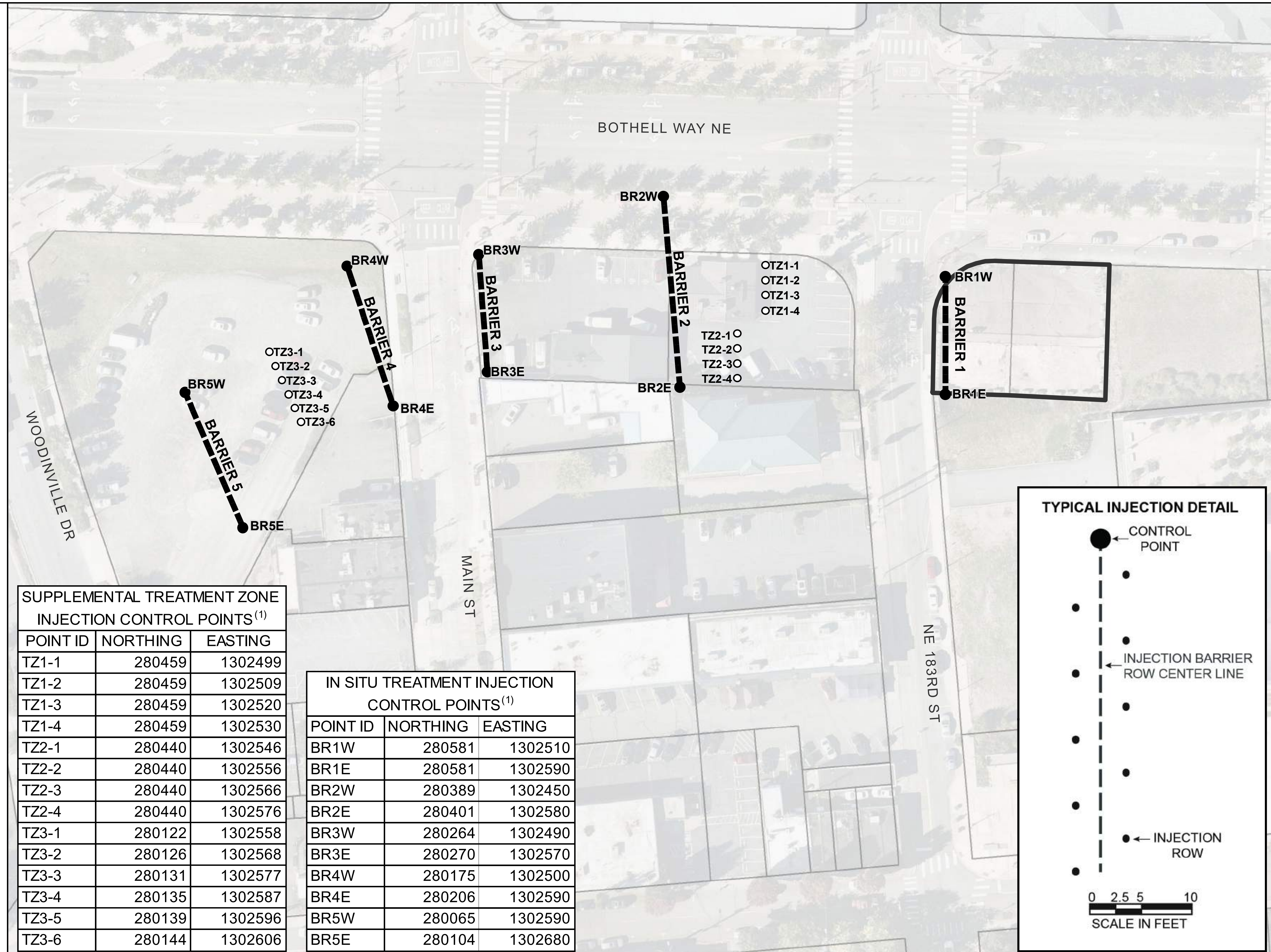
7/12/2023



LEGEND

- ○ SUPPLEMENTAL TREATMENT ZONE INJECTION POINT
- ● IN SITU TREATMENT INJECTION CONTROL POINT
- IN SITU TREATMENT BARRIER ROW
- ULTRA CUSTOM CARE CLEANERS SOURCE PROPERTY
- PARCEL BOUNDARY

SUPPLEMENTAL TREATMENT ZONE INJECTION CONTROL POINTS (1)		
POINT ID	NORTHING	EASTING
TZ1-1	280459	1302499
TZ1-2	280459	1302509
TZ1-3	280459	1302520
TZ1-4	280459	1302530
TZ2-1	280440	1302546
TZ2-2	280440	1302556
TZ2-3	280440	1302566
TZ2-4	280440	1302576
TZ3-1	280122	1302558
TZ3-2	280126	1302568
TZ3-3	280131	1302577
TZ3-4	280135	1302587
TZ3-5	280139	1302596
TZ3-6	280144	1302606

IN SITU TREATMENT INJECTION CONTROL POINTS (1)		
POINT ID	NORTHING	EASTING
BR1W	280581	1302510
BR1E	280581	1302590
BR2W	280389	1302450
BR2E	280401	1302580
BR3W	280264	1302490
BR3E	280270	1302570
BR4W	280175	1302500
BR4E	280206	1302590
BR5W	280065	1302590
BR5E	280104	1302680

NOTES:

1. CONTROL AND INJECTION POINT COORDINATES ARE PRESENTED IN FEET NAD83 WASHINGTON STATEPLANE NORTH.
- SPACING BETWEEN INJECTION POINTS PER TYPICAL INJECTION DETAIL IS SHOWN. INJECTION ALIGNMENT MAY BE FIELD MODIFIED AT ENGINEER'S DIRECTION
- INJECTION DEPTH INTERVALS PER FIGURES 5.8 AND 5.9.
- PARCEL DATA OBTAINED FROM CITY OF BOTHELL GEOSPATIAL INFORMATION SYSTEM SERVICES SECTION, 2020.
- ORTHOIMAGERY OBTAINED FROM NEARMAP, 2020.

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SCALE IN FEET

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Figure 5.8
In Situ Treatment Injection Layout

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7/12/2023

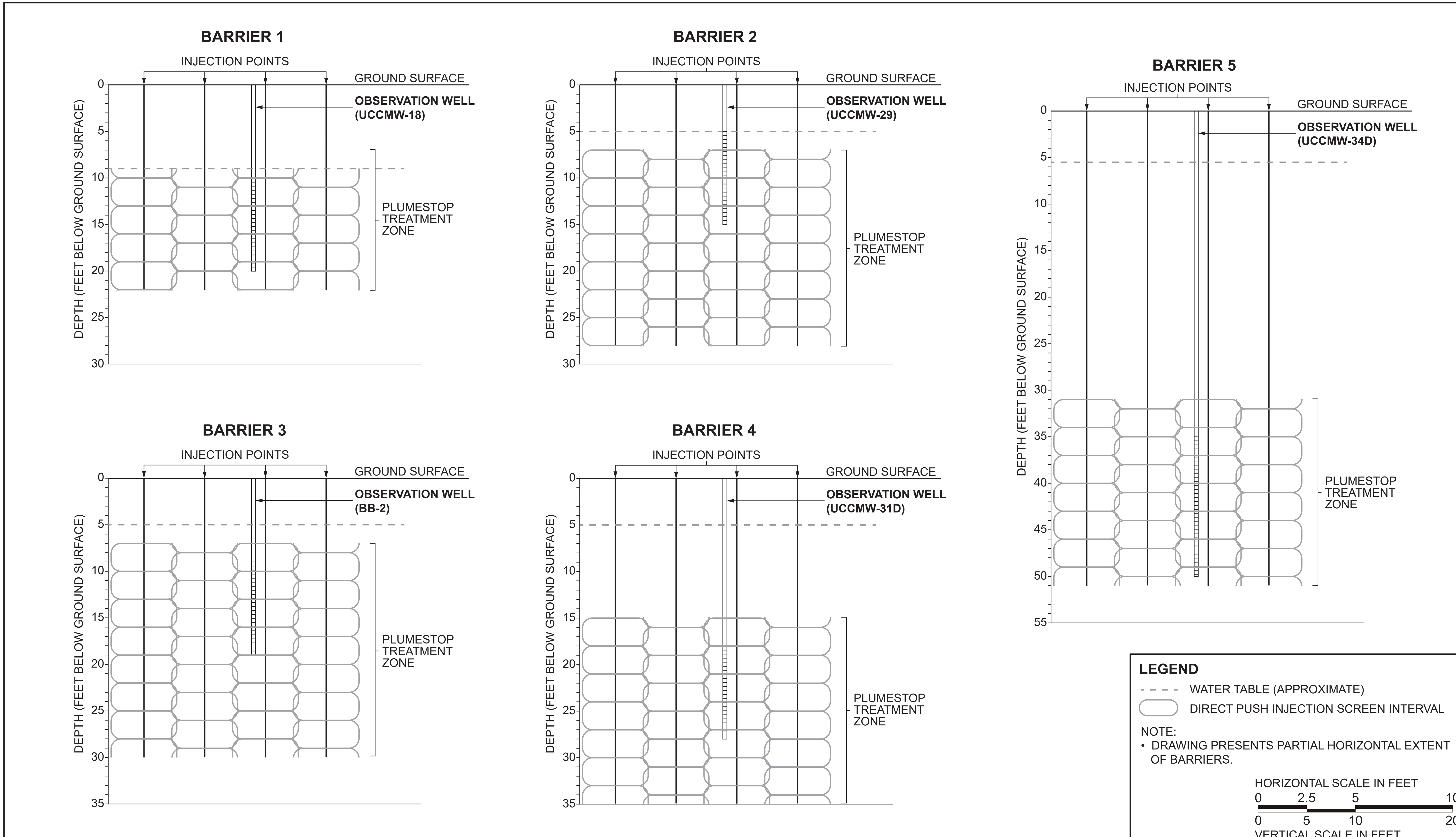

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Figure 5.9
In Situ Treatment Barrier Typical Cross Sections

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6/1/2023

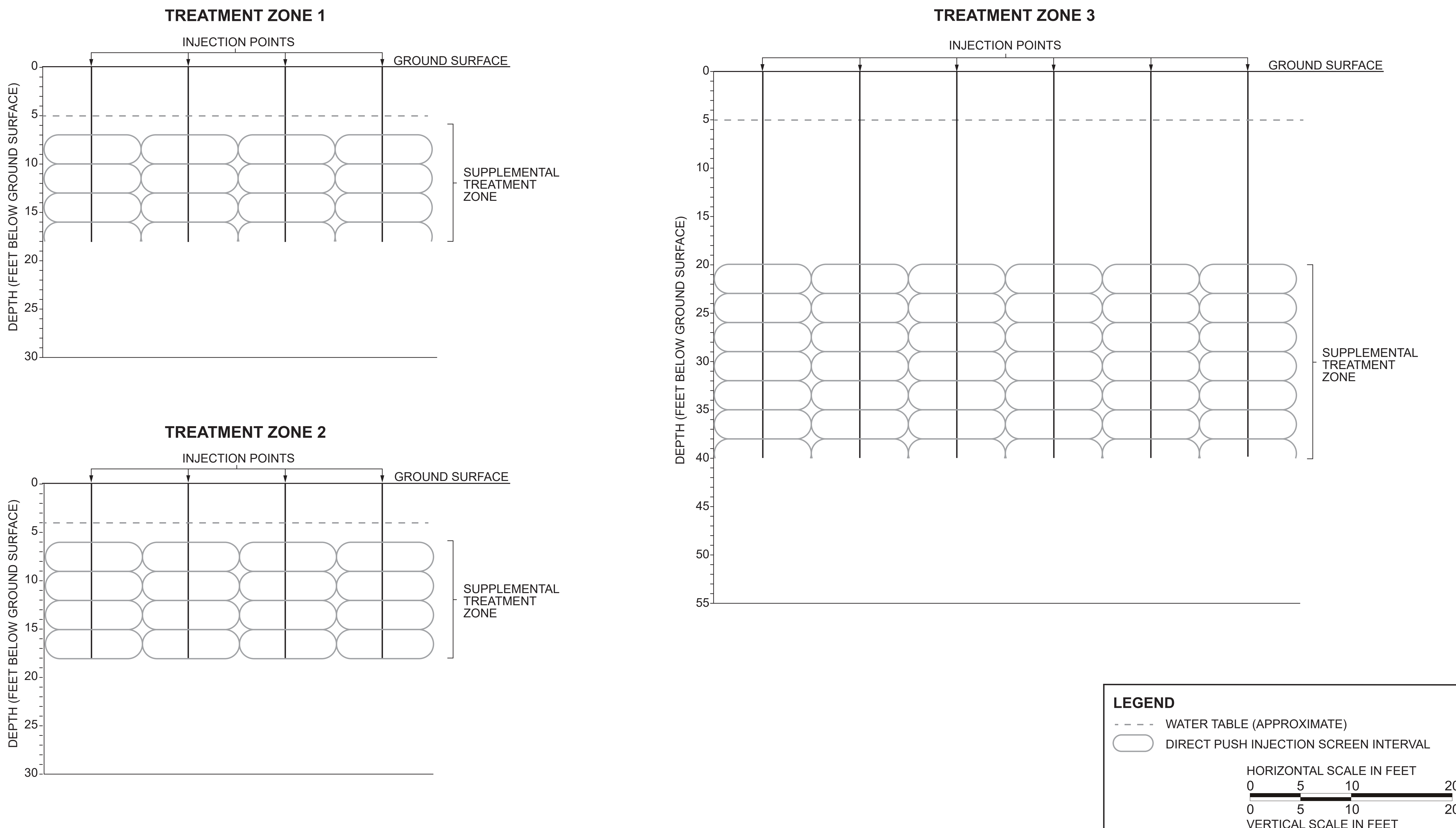

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Figure 5.10
Supplemental Treatment Zone Cross Sections

I:\GIS\Projects\COBothell-Ultra\AI\Engineering Design Report\Figure 5.10 Supplemental Treatment Zone Typical Cross Sections.ai
6/1/2023

Legend

- Existing Confirmation Sample

Proposed Confirmation Samples

- Base
- Sidewall

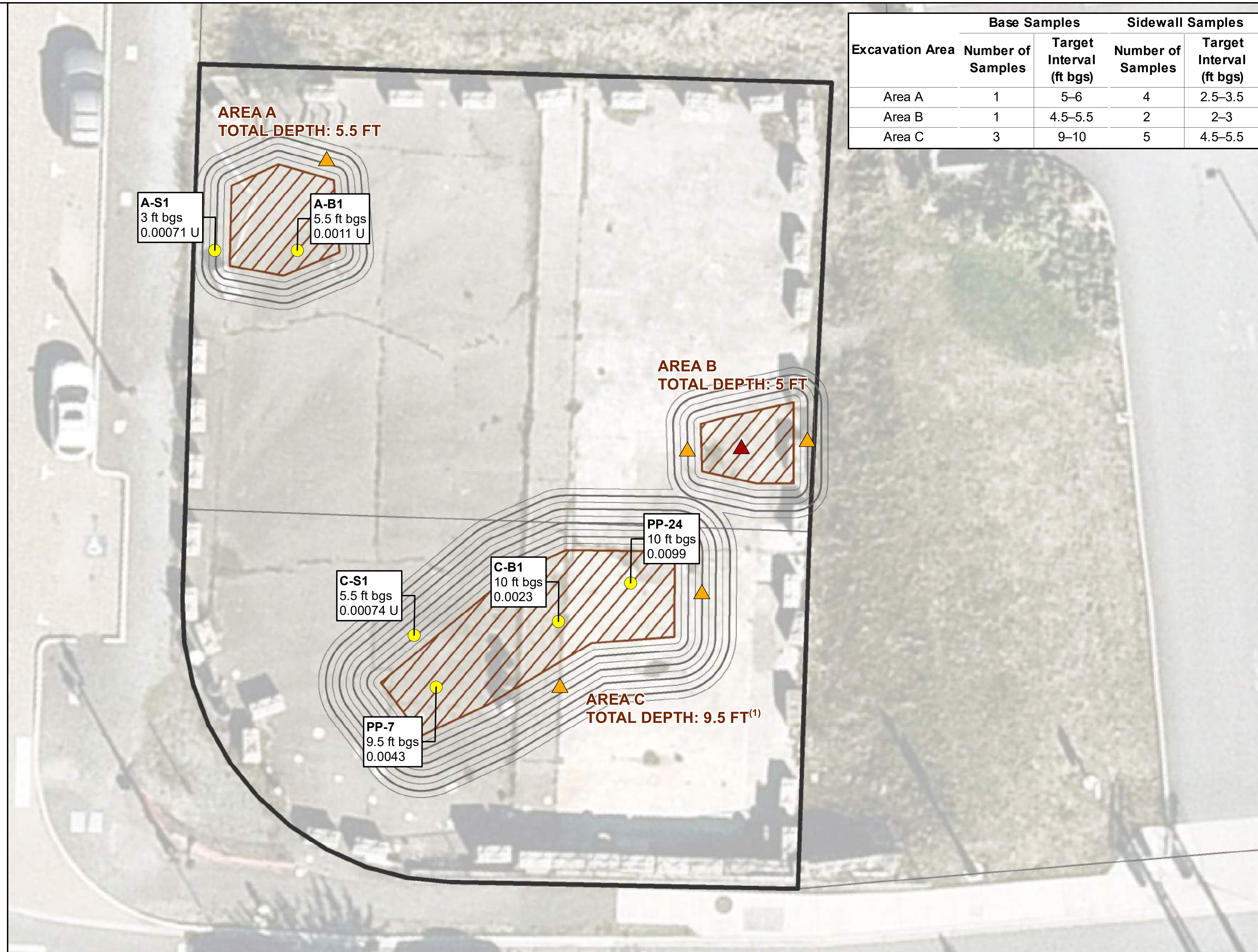
Other Features

- Source Area Soil Excavation
- SIDEWALL ELEVATION CONTOUR
- Ultra Custom Care Cleaners Source Property
- Parcel Boundary

Location Labels

Location ID → **EA1b-B19**
Sample Depth → 4 ft bgs
0.025 U ← Concentration (mg/kg) and Qualifier

Soil Cleanup Level
PCE: 0.050 mg/kg



Excavation Area	Base Samples: Number of Samples	Base Samples: Target Interval (ft bgs)	Sidewall Samples: Number of Samples	Sidewall Samples: Target Interval (ft bgs)
Area A	1	5–6	4	2.5–3.5
Area B	1	4.5–5.5	2	2–3
Area C	3	9–10	5	4.5–5.5

Notes:
1. A portion of area C is located on a 0.5-foot tall concrete pad above the surrounding asphalt ground surface. The required excavation depth is relative to the surrounding asphalt surface
- Parcel data obtained from City of Bothell Geospatial Information System Services Section, 2020.
- Aerial imagery obtained from Nearmap, 2020.

Abbreviations:
bgs = Below ground surface
ft = Feet
mg/kg = Milligrams per kilogram
PCE = Tetrachloroethene

Qualifier:
U = The analyte was not detected at the given reporting limit.

0 7.5 15 30
Scale in Feet

N

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Figure 6.1
Soil Confirmation Sample Plan for Source Property Excavation

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7/12/2023

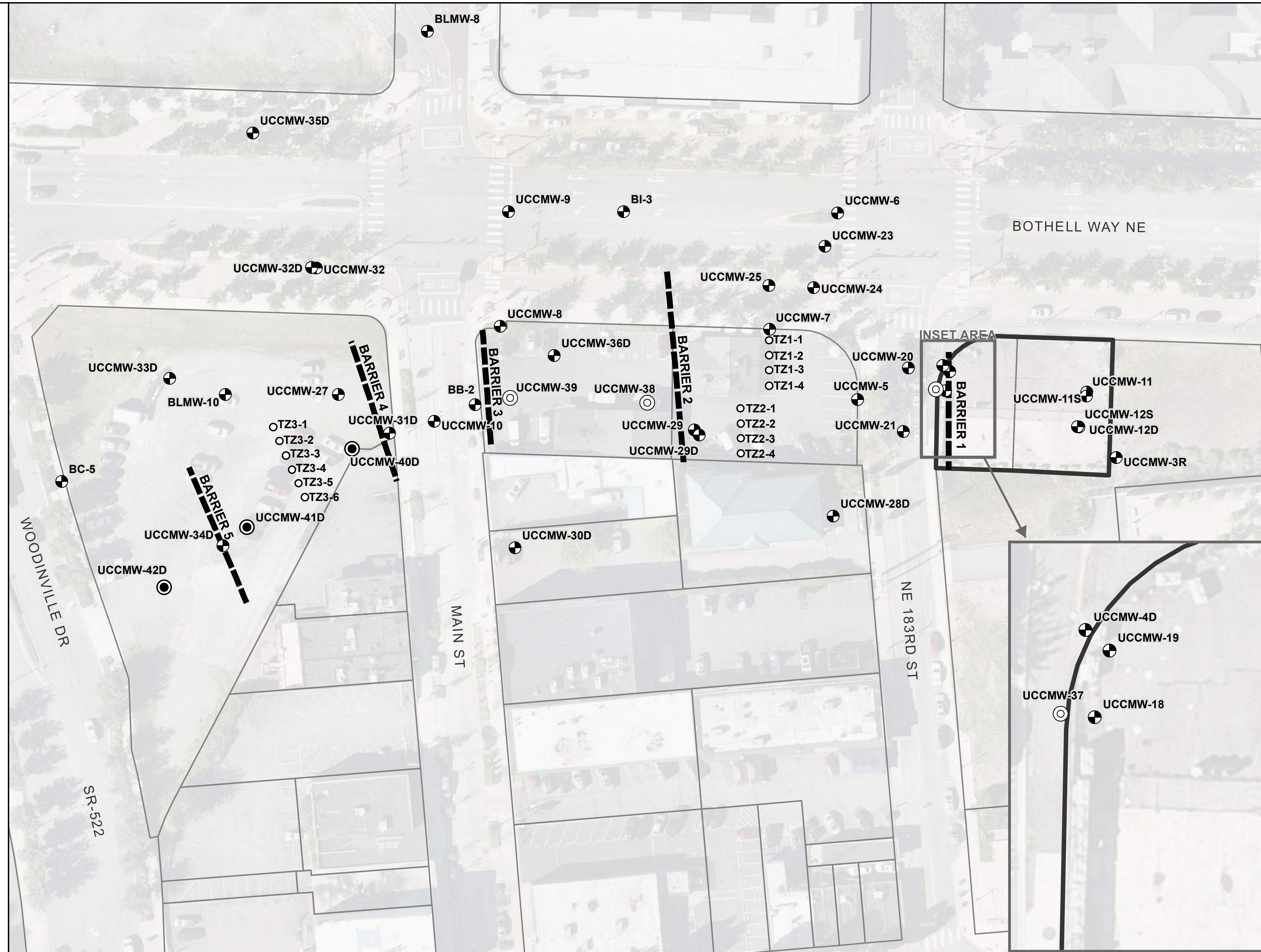
LEGEND

MONITORING WELLS

- EXISTING WELL
- DEEP WELL TO BE INSTALLED(1)
- SHALLOW WELL TO BE INSTALLED(1)

OTHER FEATURES

- SUPPLEMENTAL TREATMENT ZONE INJECTION POINT
- IN SITU TREATMENT BARRIER
- ULTRA CUSTOM CARE CLEANERS SOURCE PROPERTY
- PARCEL BOUNDARY



NOTES:

1. WELL LOCATION PLACEMENT AND WELL SCREEN INTERVALS WILL BE DIRECTED BY THE FIELD TECHNICIAN. SCREEN INTERVALS IN WELLS ADJACENT TO IN SITU TREATMENT BARRIERS WILL BE SET TO MEASURE GROUNDWATER QUALITY IN THE APPROXIMATE VERTICAL TREATMENT ZONE OF THE BARRIER.

- EXISTING WELL LOCATIONS WERE SURVEYED BY FLOYD|SNIDER IN 2020; OTHER LOCATIONS WERE OBTAINED FROM DOCUMENTS REFERENCED IN APPENDIX A.
- PARCEL DATA OBTAINED FROM CITY OF BOTHELL GEOSPATIAL INFORMATION SYSTEM SERVICES SECTION, 2020.
- ORTHOIMAGERY OBTAINED FROM NEARMAP, 2020.

0 35 70 140

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Bothell, Washington

Figure 7.1
Performance Monitoring Well Installation Plan

LEGEND

MONITORING WELL

- DEEP WELL
- SHALLOW WELL
- WELL TO SAMPLE FOR CVOCS
- WELL TO GAUGE

CVOCS IN GROUNDWATER EXCEEDING CULS

- SHALLOW GROUNDWATER PLUME
- DEEP GROUNDWATER PLUME

OTHER FEATURES

- IN SITU TREATMENT BARRIER ROW
- GROUNDWATER FLOW DIRECTION
- ULTRA CUSTOM CARE CLEANERS SOURCE PROPERTY
- PARCEL BOUNDARY

NOTES:

- WELL SCREEN INTERVALS WILL BE DIRECTED BY THE FIELD TECHNICIAN. SCREEN INTERVALS IN WELLS ADJACENT TO IN SITU TREATMENT BARRIERS WILL BE SET TO MEASURE GROUNDWATER QUALITY IN THE APPROXIMATE VERTICAL TREATMENT AREA OF THE BARRIER.
- THE CVOC PLUME EXTENTS SHOWN ENCOMPASS THE EXTENT OF GROUNDWATER CONTAMINATION THAT IS GREATER THAN THE CULS.
- SHALLOW WELLS ARE SCREENED OR PLANNED TO BE SCREENED BETWEEN APPROXIMATELY 5–25 FEET BGS AND DEEP WELLS SCREENED OR PLANNED TO BE SCREENED ARE DEEPER THAN APPROXIMATELY 25 FEET BGS.
- WELLS NOT DESIGNATED FOR GAUGING OR SAMPLING WILL BE RETAINED AS SENTINELS.
- EXISTING WELL LOCATIONS WERE SURVEYED BY FLOYD|SNIDER IN 2020; OTHER LOCATIONS WERE OBTAINED FROM DOCUMENTS REFERENCED IN APPENDIX A.
- PARCEL DATA OBTAINED FROM CITY OF BOTHELL GEOSPATIAL INFORMATION SYSTEM SERVICES SECTION, 2020.
- ORTHOIMAGERY OBTAINED FROM NEARMAP, 2020.

ABBREVIATIONS:
BGS = BELOW GROUND SURFACE
CUL = CLEANUP LEVEL
CVOC = CHLORINATED VOLATILE ORGANIC COMPOUND

0 35 70 140
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Figure 7.2
Groundwater Performance Monitoring Plan

I:\GIS\Projects\COBothell-Ultra\MXD\Engineering Design Report\Figure 7.2 Groundwater Performance Monitoring Plan.mxd
7/13/2023

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix A
Pre-Design Investigation Data

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PROJECT: COB-Ultra	**SITE ADDRESS:** 18304 Bothell Way NE		**BORING ID:** **B2**
LOGGED BY: M. Talaia-Murray	**BORING LOCATION:** Barrier 2		
DRILLED BY: Holocene	**NORTHING:**	**EASTING:**	
DRILLING EQUIPMENT: Geoprobe 7800	**GROUND SURFACE ELEVATION:**	**COORDINATE SYSTEM:**	
DRILLING METHOD: Direct push	**TOTAL DEPTH (ft bgs):** 20	**DEPTH TO WATER (ft bgs):** ~5	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" disposable poly liner	**BORING DIAMETER:** 2"	**DRILL DATE:** 2/27/2023	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	PID (ppm)	Sample ID
0	Fill	Ground surface: Street paver		
0.5–5	GW-GM	Gray-brown, subangular **GRAVEL** with silt and fine to coarse sand; moist (FILL).		
5–7.7	GW-GM	Gray-brown, subangular **GRAVEL** with silt and fine to coarse sand; moist to wet.		
7.7–8.7	ML	**SANDY SILT** at 7.7-8.7 ft bgs.		
8.7–9.7	GW	Loose to medium denes **SANDY GRAVEL** at 8.7-9.7 ft bgs, round gravel <1.5".		
9.7–12	SW	Loose, fine to medium **SAND** with trace silt and gravel.	0.1 (11)	B2-11-12
12–16	SM	Fine to medium **SILTY SAND** with trace rounded gravel. Fines downward and increases density from medium dense to dense.	0.1 (12)	B2-12-13
		2.5" subangular gravel	0.1 (13)	B2-13-14
			0.1 (14)	B2-14-15
16–19	SP	Interbeds of fine **SAND** and medium to coarse sand with trace gravel; dense.	0.1 (16)	B2-16-17
			0.1 (17)	B2-17-18
			0.1 (18)	B2-18-19
19–20	SM	Medium **SAND** with silt; wet to saturated.	0.1 (19)	B2-19-20
20		Bottom of boring at 20 ft bgs.	0.1 (20)	

ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES:

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PROJECT: COB-Ultra	**SITE ADDRESS:** 18304 Bothell Way NE		**BORING ID:** **B4**
LOGGED BY: M. Talaia-Murray	**BORING LOCATION:** Barrier 4		
DRILLED BY: Holocene	**NORTHING:**	**EASTING:**	
DRILLING EQUIPMENT: Geoprobe 7800	**GROUND SURFACE ELEVATION:**	**COORDINATE SYSTEM:**	
DRILLING METHOD: Direct push	**TOTAL DEPTH (ft bgs):** 35	**DEPTH TO WATER (ft bgs):** ~8	
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" disposable poly liner	**BORING DIAMETER:** 2"	**DRILL DATE:** 2/27/2023	

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	Fill	Gravel ground surface			
2, 4, 6	GW-GM	Dark brown/gray, loose to medium dense **SANDY GRAVEL** with silt and fragments of brick; no odor (FILL).			
8	GM	Dark brown, medium dense to dense **SILTY GRAVEL** with sand.			
10, 12, 14	SM	Interbeds of medium dense **SILT** and gray, fine to medium **SAND**; saturated; no odor.			
		Gray, medium dense to dense, fine to medium **SAND** with silt; saturated.			
16		Gray, medium dense to dense, fine to medium **SILTY SAND**; saturated		0.1	B4-16-17
				0.1	B4-17-18
18	SW	Lens of medium to coarse **SAND** with gravel.		0.1	B4-18-19
	SM	Gray sand grades down to brown, fine **SILTY SAND**		0.0	B4-19-20
20					

ABBREVIATIONS:
ft bgs = feet below ground surface   USCS = Unified Soil Classification System
ppm = parts per million   ▼ = denotes groundwater table

NOTES:

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PROJECT: COB-Ultra	**SITE ADDRESS:** 18304 Bothell Way NE	**BORING ID:** **B4**	
LOGGED BY: M. Talaia-Murray	**BORING LOCATION:** Barrier 4		
DRILLED BY: Holocene		**NORTHING:**	**EASTING:**
DRILLING EQUIPMENT: Geoprobe 7800		**GROUND SURFACE ELEVATION:**	**COORDINATE SYSTEM:**
DRILLING METHOD: Direct push		**TOTAL DEPTH (ft bgs):** 35	**DEPTH TO WATER (ft bgs):** ~8
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" disposable poly liner		**BORING DIAMETER:** 2"	**DRILL DATE:** 2/27/2023

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
20	SW-SM	Brown-orange, medium dense to dense, fine to medium **SILTY SAND**; saturated.		0.2	B4-20-21
				0.1	B4-21-22
22				0.1	B4-22-23
				0.1	B4-23-24
24				0.1	B4-24-25
				0.1	B4-25-26
26	SM	Orange-brown **SILTY SAND** with interbeds of medium to coarse sand. Density decreases to medium dense to soft to 30 ft bgs.		0.1	B4-26-27
				0.1	B4-27-28
28				0.1	B4-28-29
				0.1	B4-29-30
30		Orange-brown **SILTY SAND**. Sand is dense, medium-grained to 31 ft bgs and grades to fine sand.		0.1	B4-30-31
				0.1	B4-31-32
32				0.1	B4-32-33
				0.1	B4-33-34
34		Bottom of boring at 35 ft bgs.		0.1	B4-34-35

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

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	LOGGED BY: M. Talaia-Murray	BORING LOCATION: Barrier 5	

DRILLED BY: Holocene	**NORTHING:**	**EASTING:**
DRILLING EQUIPMENT: Geoprobe 7800	**GROUND SURFACE ELEVATION:**	**COORDINATE SYSTEM:**
DRILLING METHOD: Direct push	**TOTAL DEPTH (ft bgs):** 35	**DEPTH TO WATER (ft bgs):** ~6.5
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" disposable poly liner	**BORING DIAMETER:** 2"	**DRILL DATE:** 2/27/2023

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	Fill	Gravel ground surface			
	GM	Gray-brown **SILTY GRAVEL** with sand; moist; gravel is angular to subangular; no odor [FILL].			
4	SW	Grades to well-graded **SAND** with gravel.			
6.8	SM-OL	At 6.8 ft bgs- Dark brown organic **SILTY SAND**; saturated.			
	OL	Organic **SILT** with sand and woody debris throughout.			
10		No recovery			
14	SW-SM	Dark brown/gray silty, gravelly sand [SLOUGH?].			
		No recovery			
	SW	Dark brown/gray **SAND** with gravel and silt; saturated.			
		Reddish gray, medium dense, fine to medium **SAND** with trace silt; moist to wet.			

ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES:

FLOYD | SNIDER strategy • science • engineering	PROJECT: COB-Ultra	SITE ADDRESS: 18304 Bothell Way NE	BORING ID: **B5**
	LOGGED BY: M. Talaia-Murray	BORING LOCATION: Barrier 5	

DRILLED BY: Holocene	**NORTHING:**	**EASTING:**
DRILLING EQUIPMENT: Geoprobe 7800	**GROUND SURFACE ELEVATION:**	**COORDINATE SYSTEM:**
DRILLING METHOD: Direct push	**TOTAL DEPTH (ft bgs):** 35	**DEPTH TO WATER (ft bgs):** ~6.5
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" disposable poly liner	**BORING DIAMETER:** 2"	**DRILL DATE:** 2/27/2023

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, **MAJOR CONSTITUENT**, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
20		Reddish gray, medium dense, fine to medium **SAND** with trace silt; moist to wet.			
	SM	Grades to mottled, fine **SILTY SAND**.			
22					
24					
25	SW-SM	Brown/gray, loose, fine to medium **SAND** with silt; moist to wet; pockets of oxidized sand.		0.1	B5-25-26
26				0.1	B5-26-27
27				0.1	B5-27-28
28	SM	At 28 ft bgs, grades to **SILTY SAND**.		0.1	B5-28-29
29				0.2	B5-29-30
30	SW	Gray, loose, fine to medium **SAND** with silt; moist to wet.		0.1	B5-30-31
31				0.0	B5-31-32
32		Grades to medium dense to dense.		0.1	B5-32-33
33				0.1	B5-33-34
34				0.0	B5-34-35
35		Bottom of boring at 35 feet bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
= denotes groundwater table

NOTES:

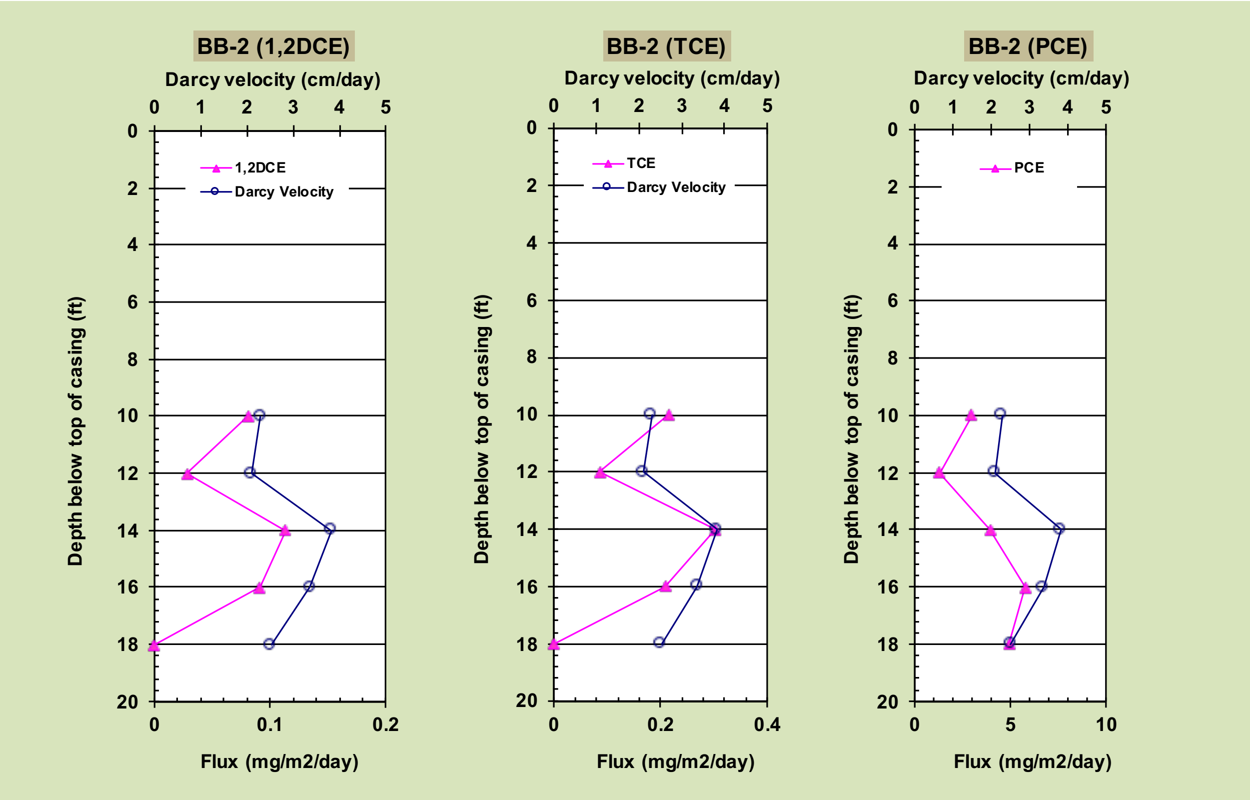
Floyd-Snider		Installation Date	2/8/23
Project name:	COB Ultra	Sampling Date	2/27/23
Project Manager	Kristin Anderson	Reporting Date	3/24/23

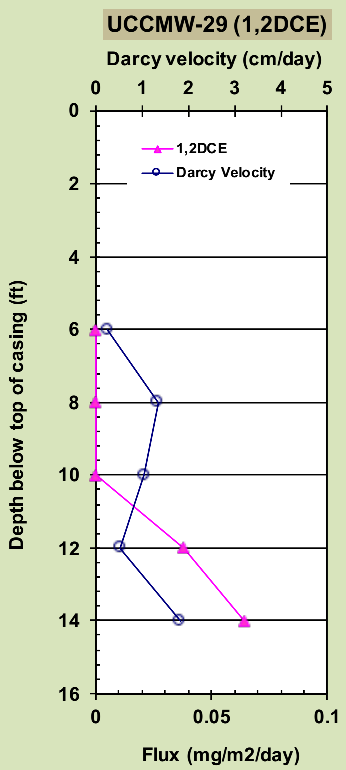
Table1. Summary of flux values for each well

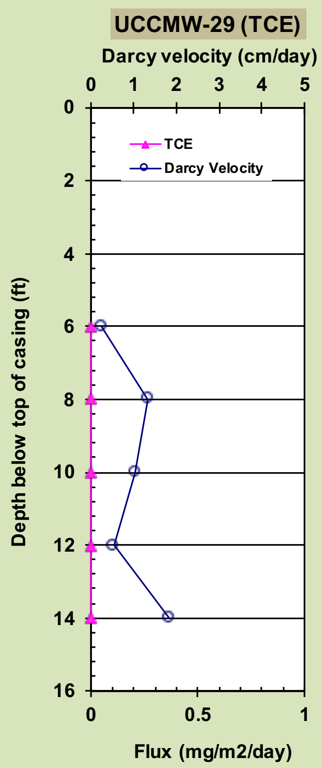
Well_ID	Sample_ID	Depth below top of well casing (ft)	Darcy Velocity (cm/day)	cis-1,2DCE (mg/m^2/day)	TCE (mg/m^2/day)	PCE (mg/m^2/day)
BB-2	BB-2-9-11-022723	10.0	2.3	0.08	0.21	2.99
	BB-2-11-13-022723	12.0	2.1	0.03	0.09	1.31
	BB-2-13-15-022723	14.0	3.8	0.11	0.30	3.92
	BB-2-15-17-022723	16.0	3.4	0.09	0.21	5.77
	BB-2-17-19-022723	18.0	2.5	0.00	0.00	4.93
UCCMW-29	UCCMW-29-5-7-022723	6.0	0.2	0.00	0.00	0.36
	UCCMW-29-7-9-022723	8.0	1.3	0.00	0.00	0.23
	UCCMW-29-9-11-022723	10.0	1.0	0.00	0.00	0.52
	UCCMW-29-11-13-022723	12.0	0.5	0.04	0.00	0.65
	UCCMW-29-13-15-022723	14.0	1.8	0.06	0.00	0.75
UCCMW-34D	UCCMW-34D-35-37-022723	36.0	4.0	0.00	0.00	0.02
	UCCMW-34D-37-39-022723	38.0	4.4	0.00	0.00	2.15
	UCCMW-34D-39-41-022723	40.0	6.9	0.00	0.00	3.23
	UCCMW-34D-41-43-022723	42.0	5.3	0.00	0.00	2.62
	UCCMW-34D-43-45-022723	44.0	7.6	0.00	0.00	2.03
	UCCMW-34D-45-47-022723	46.0	10.1	0.00	0.00	4.42
	UCCMW-34D-47-49-022723	48.0	8.3	0.00	0.00	2.77
	UCCMW-34D-49-50-022723	49.5	9.8	0.00	0.00	1.51

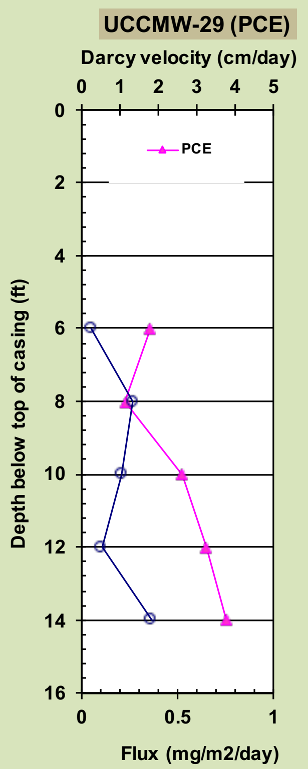
Table2. Summary of flux average contaminant concentration

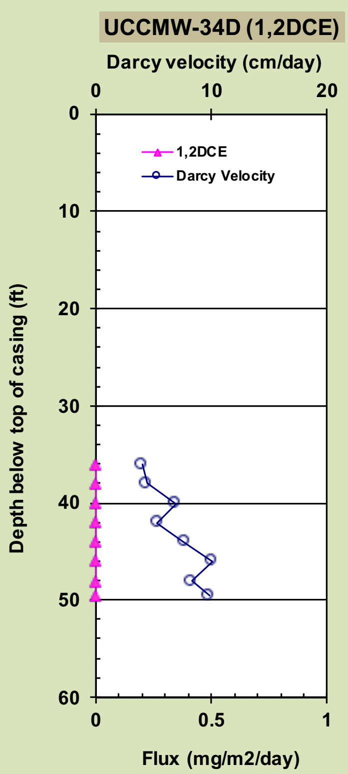
Well_ID	Sample_ID	Depth below top of well casing (ft)	Darcy Velocity (cm/day)	cis-1,2DCE (ug/L)	TCE (ug/L)	PCE (ug/L)
BB-2	BB-2-9-11-022723	10.0	2.3	4	9	131
	BB-2-11-13-022723	12.0	2.1	1	4	62
	BB-2-13-15-022723	14.0	3.8	3	8	102
	BB-2-15-17-022723	16.0	3.4	3	6	172
	BB-2-17-19-022723	18.0	2.5	0	0	196
UCCMW-29	UCCMW-29-5-7-022723	6.0	0.2	0	0	144
	UCCMW-29-7-9-022723	8.0	1.3	0	0	17
	UCCMW-29-9-11-022723	10.0	1.0	0	0	50
	UCCMW-29-11-13-022723	12.0	0.5	7	0	122
	UCCMW-29-13-15-022723	14.0	1.8	4	0	41
UCCMW-34D	UCCMW-34D-35-37-022723	36.0	4.0	0	0	0
	UCCMW-34D-37-39-022723	38.0	4.4	0	0	48
	UCCMW-34D-39-41-022723	40.0	6.9	0	0	47
	UCCMW-34D-41-43-022723	42.0	5.3	0	0	49
	UCCMW-34D-43-45-022723	44.0	7.6	0	0	27
	UCCMW-34D-45-47-022723	46.0	10.1	0	0	44
	UCCMW-34D-47-49-022723	48.0	8.3	0	0	34
	UCCMW-34D-49-50-022723	49.5	9.8	0	0	15

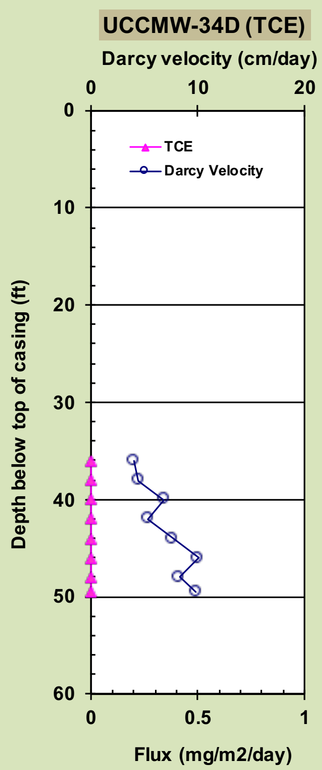



UCCMW-29 (1,2DCE)
Darcy velocity (cm/day)
1,2DCE
Darcy Velocity
Depth below top of casing (ft)
Flux (mg/m2/day)


UCCMW-29 (TCE)
Darcy velocity (cm/day)
TCE
Darcy Velocity
Depth below top of casing (ft)
Flux (mg/m2/day)


UCCMW-29 (PCE)
Darcy velocity (cm/day)
PCE
Depth below top of casing (ft)
Flux (mg/m2/day)


UCCMW-34D (1,2DCE)
Darcy velocity (cm/day)
1,2DCE
Darcy Velocity
Depth below top of casing (ft)
Flux (mg/m2/day)


UCCMW-34D (TCE)
Darcy velocity (cm/day)
TCE
Darcy Velocity
Depth below top of casing (ft)
Flux (mg/m2/day)

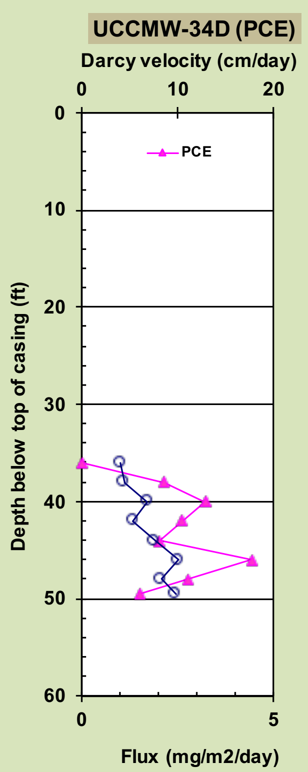

UCCMW-34D (PCE)
Darcy velocity (cm/day)
PCE
Depth below top of casing (ft)
Flux (mg/m2/day)

Table 3. Mass discharge per unit width for aquifer of each well

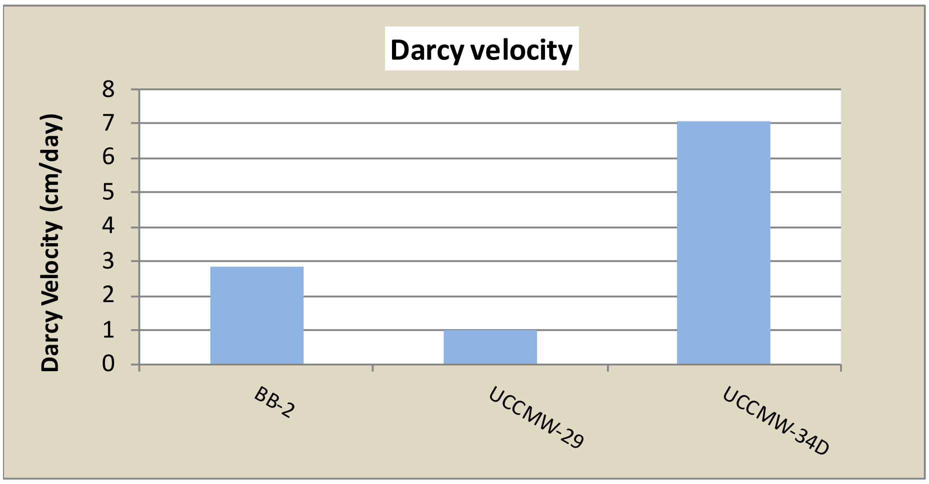
Well	Darcy Velocity (cm/day)	cis-1,2DCE (mg/m/day)	TCE (mg/m/day)	PCE (mg/m/day)
BB-2	2.8	0.19	0.5	11.5
UCCMW-29	1.0	0.06	0.0	1.5
UCCMW-34D	7.1	0.0	0.0	0.0

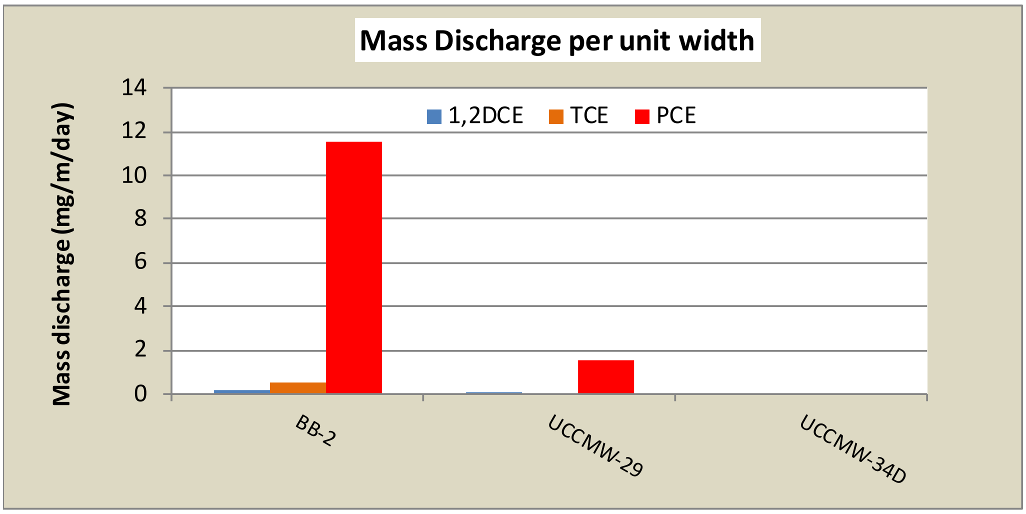
Table 4. Well average values of mass flux based on PFMs

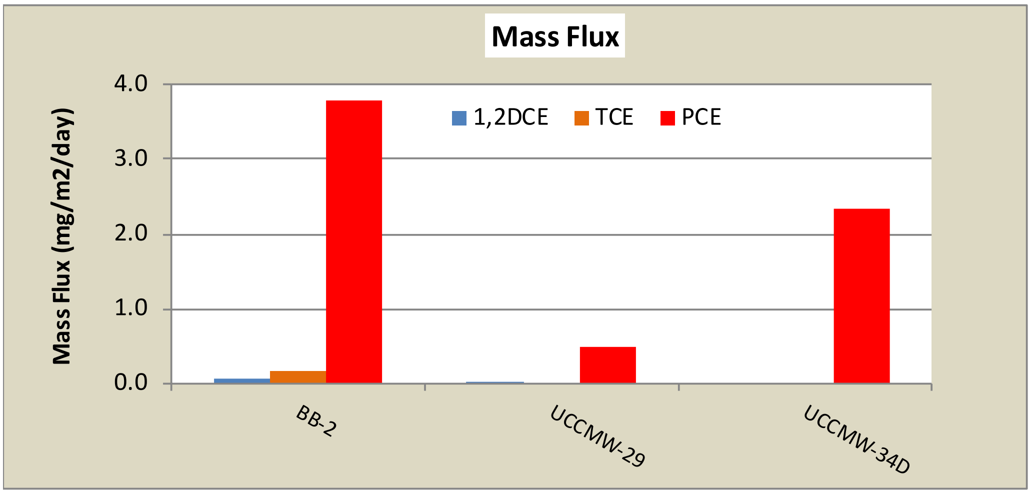
Well	Darcy Velocity (cm/day)	cis-1,2DCE (mg/m^2/day)	TCE (mg/m^2/day)	PCE (mg/m^2/day)
BB-2	2.8	0.06	0.16	3.78
UCCMW-29	1.0	0.02	0.00	0.50
UCCMW-34D	7.1	0.00	0.00	2.34

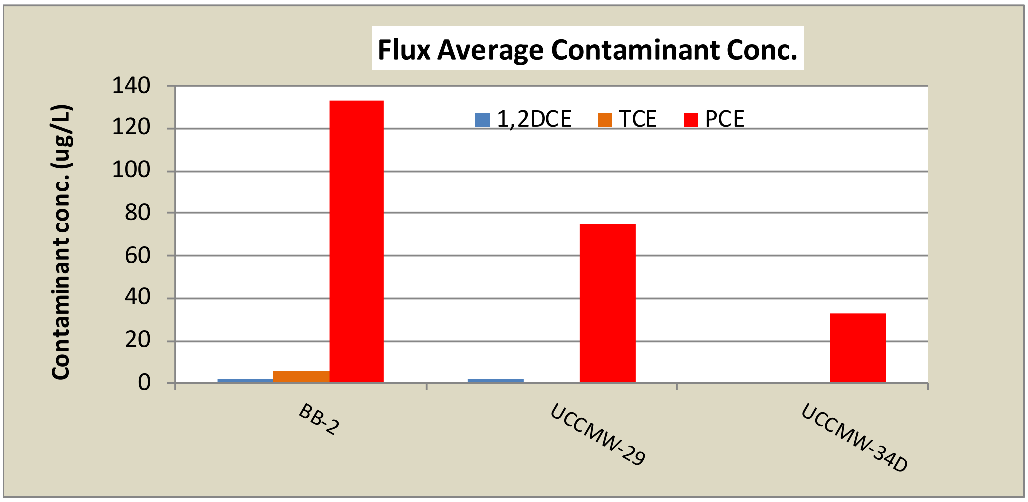
Table 5. Flux average contaminant concentration on PFMs

Well	Darcy Velocity (cm/day)	cis-1,2DCE (ug/L)	TCE (ug/L)	PCE (ug/L)
BB-2	2.8	2	6	133
UCCMW-29	1.0	2	0	75
UCCMW-34D	7.1	0	0	33




Mass Discharge per unit width
Mass discharge (mg/m/day)
14
12
10
8
6
4
2
0
1,2DCE
TCE
PCE
BB-2
UCCMW-29
UCCMW-34D


Mass Flux
Mass Flux (mg/m2/day)
4.0
3.0
2.0
1.0
0.0
1,2DCE
TCE
PCE
BB-2
UCCMW-29
UCCMW-34D


Flux Average Contaminant Conc.
Contaminant conc. (ug/L)
140
120
100
80
60
40
20
0
1,2DCE
TCE
PCE
BB-2
UCCMW-29
UCCMW-34D

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

February 17, 2023

Kristin Anderson
Floyd & Snider
601 Union Street, Suite 600
Seattle, WA 98101

Re: Analytical Data for Project COB Ultra
Laboratory Reference No. 2302-100

Dear Kristin:

Enclosed are the analytical results and associated quality control data for samples submitted on February 8, 2023.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: February 17, 2023
Samples Submitted: February 8, 2023
Laboratory Reference: 2302-100
Project: COB Ultra

Case Narrative

Samples were collected on February 8, 2023 and received by the laboratory on February 8, 2023. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: February 17, 2023
Samples Submitted: February 8, 2023
Laboratory Reference: 2302-100
Project: COB Ultra

TOTAL METALS
EPA 200.8/200.7

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UCCMW-29-020823**					
Laboratory ID:	02-100-01					
Arsenic	**ND**	3.3	EPA 200.8	2-17-23	2-17-23	
Calcium	**28000**	1000	EPA 200.7	2-10-23	2-10-23	
Iron	**250**	50	EPA 200.7	2-10-23	2-10-23	
Magnesium	**8200**	1000	EPA 200.7	2-10-23	2-10-23	
Client ID:	**BB-2-020823**					
Laboratory ID:	02-100-02					
Arsenic	**ND**	3.3	EPA 200.8	2-17-23	2-17-23	
Calcium	**21000**	1000	EPA 200.7	2-10-23	2-10-23	
Iron	**ND**	50	EPA 200.7	2-10-23	2-10-23	
Magnesium	**10000**	1000	EPA 200.7	2-10-23	2-10-23	
Client ID:	**UCCMW-34D-020823**					
Laboratory ID:	02-100-03					
Arsenic	**ND**	3.3	EPA 200.8	2-17-23	2-17-23	
Calcium	**25000**	1000	EPA 200.7	2-10-23	2-10-23	
Iron	**1400**	50	EPA 200.7	2-10-23	2-10-23	
Magnesium	**12000**	1000	EPA 200.7	2-10-23	2-10-23	

Date of Report: February 17, 2023
Samples Submitted: February 8, 2023
Laboratory Reference: 2302-100
Project: COB Ultra

TOTAL METALS
EPA 200.8/200.7
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0210WH1					
Calcium	**ND**	1000	EPA 200.7	2-10-23	2-10-23	
Iron	**ND**	50	EPA 200.7	2-10-23	2-10-23	
Magnesium	**ND**	1000	EPA 200.7	2-10-23	2-10-23	
Laboratory ID:	MB0217WM1					
Arsenic	**ND**	3.3	EPA 200.8	2-17-23	2-17-23	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	01-173-03										
	ORIG	DUP									
Calcium	**22200**	**22400**	NA	NA		NA		NA	1	20	
Iron	**481**	**490**	NA	NA		NA		NA	2	20	
Magnesium	**12800**	**12900**	NA	NA		NA		NA	1	20	
Laboratory ID:	02-174-08										
	ORIG	DUP									
Arsenic	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	01-173-03										
	MS	MSD	MS	MSD		MS	MSD				
Calcium	**40900**	**42000**	20000	20000	22200	**93**	**99**	75-125	3	20	
Iron	**19700**	**20900**	20000	20000	481	**96**	**102**	75-125	6	20	
Magnesium	**31100**	**32700**	20000	20000	12800	**92**	**100**	75-125	5	20	
Laboratory ID:	02-174-08										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**122**	**114**	111	111	ND	**110**	**102**	75-125	7	20	

Date of Report: February 17, 2023
Samples Submitted: February 8, 2023
Laboratory Reference: 2302-100
Project: COB Ultra

DISSOLVED METALS
EPA 6010D

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UCCMW-29-020823**					
Laboratory ID:	02-100-01					
Calcium	**26000**	1100	EPA 6010D		2-9-23	
Iron	**ND**	56	EPA 6010D		2-9-23	
Magnesium	**8800**	1100	EPA 6010D		2-9-23	
Client ID:	**BB-2-020823**					
Laboratory ID:	02-100-02					
Calcium	**19000**	1100	EPA 6010D		2-9-23	
Iron	**ND**	56	EPA 6010D		2-9-23	
Magnesium	**11000**	1100	EPA 6010D		2-9-23	
Client ID:	**UCCMW-34D-020823**					
Laboratory ID:	02-100-03					
Calcium	**22000**	1100	EPA 6010D		2-9-23	
Iron	**ND**	56	EPA 6010D		2-9-23	
Magnesium	**13000**	1100	EPA 6010D		2-9-23	

Date of Report: February 17, 2023
Samples Submitted: February 8, 2023
Laboratory Reference: 2302-100
Project: COB Ultra

DISSOLVED METALS
EPA 6010D
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0209D1					
Calcium	**ND**	1100	EPA 6010D		2-9-23	
Iron	**ND**	56	EPA 6010D		2-9-23	
Magnesium	**ND**	1100	EPA 6010D		2-9-23	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	02-100-03										
	ORIG	DUP									
Calcium	**22500**	**22400**	NA	NA		NA		NA	0	20	
Iron	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Magnesium	**12600**	**12600**	NA	NA		NA		NA	0	20	
MATRIX SPIKES											
Laboratory ID:	02-100-03										
	MS	MSD	MS	MSD		MS	MSD				
Calcium	**42000**	**41900**	22200	22200	22500	**88**	**88**	75-125	0	20	
Iron	**22200**	**22200**	22200	22200	ND	**100**	**100**	75-125	0	20	
Magnesium	**35700**	**35600**	22200	22200	12600	**104**	**104**	75-125	0	20	

Date of Report: February 17, 2023
Samples Submitted: February 8, 2023
Laboratory Reference: 2302-100
Project: COB Ultra

SULFATE
ASTM D516-11

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UCCMW-29-020823**					
Laboratory ID:	02-100-01					
Sulfate	**12**	5.0	ASTM D516-11	2-10-23	2-10-23	
Client ID:	**BB-2-020823**					
Laboratory ID:	02-100-02					
Sulfate	**9.9**	5.0	ASTM D516-11	2-10-23	2-10-23	
Client ID:	**UCCMW-34D-020823**					
Laboratory ID:	02-100-03					
Sulfate	**21**	5.0	ASTM D516-11	2-10-23	2-10-23	

Date of Report: February 17, 2023
Samples Submitted: February 8, 2023
Laboratory Reference: 2302-100
Project: COB Ultra

SULFATE
ASTM D516-11
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0210W1					
Sulfate	**ND**	5.0	ASTM D516-11	2-10-23	2-10-23	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-100-02								
	ORIG	DUP							
Sulfate	**9.93**	**10.2**	NA	NA	NA	NA	3	10	
MATRIX SPIKE									
Laboratory ID:	02-100-02								
	MS		MS		MS				
Sulfate	**19.9**		10.0	9.93	100	72-128	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0210W1								
	SB		SB		SB				
Sulfate	**9.27**		10.0	NA	93	85-114	NA	NA	

Date of Report: February 17, 2023
Samples Submitted: February 8, 2023
Laboratory Reference: 2302-100
Project: COB Ultra

NITRATE (as Nitrogen)
EPA 353.2

Matrix: Water
Units: mg/L-N

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UCCMW-29-020823**					
Laboratory ID:	02-100-01					
Nitrate	**0.94**	0.050	EPA 353.2	2-9-23	2-9-23	
Client ID:	**BB-2-020823**					
Laboratory ID:	02-100-02					
Nitrate	**1.3**	0.050	EPA 353.2	2-9-23	2-9-23	
Client ID:	**UCCMW-34D-020823**					
Laboratory ID:	02-100-03					
Nitrate	**0.96**	0.050	EPA 353.2	2-9-23	2-9-23	

Date of Report: February 17, 2023
Samples Submitted: February 8, 2023
Laboratory Reference: 2302-100
Project: COB Ultra

NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
Units: mg/L-N

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0209W1					
Nitrate	**ND**	0.050	EPA 353.2	2-9-23	2-9-23	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-100-01								
	ORIG	DUP							
Nitrate	**0.935**	**0.951**	NA	NA	NA	NA	2	10	
MATRIX SPIKE									
Laboratory ID:	02-100-01								
	MS		MS		MS				
Nitrate	**3.17**		2.00	0.935	112	88-125	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0209W1								
	SB		SB		SB				
Nitrate	**2.20**		2.00	NA	110	90-120	NA	NA	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1 - Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

X2 - Sample extract treated with a silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Page 1 of 1

Company: Floyd | Snider
Project Number:
Project Name: COB Ultra
Project Manager: Kristin Anderson
Sampled by: Jake Lamb & Meg McCann

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days)
☐ ____ (other)

Laboratory Number: 02-100

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	* Total Metals 200.7/6010D	** Diss. Metals 200.7/6010D	Sulfate ASTM D516-11	Nitrate USEPA 353.2	% Moisture
1	UCCMW-29-020823	2/8/23	10:00	W	4																		X	X	X	X	
2	BB-2-020823	2/8/23	12:00	W	4																		X	X	X	X	
3	UCCMW-34D-020823	2/8/23	13:45	W	4																		X	X	X	X	

	Signature	Company	Date	Time
Relinquished	[signature]	Floyd/Snider	2/8/23	15:19
Received	[signature]	OSE	2/8/23	1519
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

* TOTAL METALS: As, Ca, Fe, Mg
** - DISSOLVED METALS: Ca, Fe, Mg

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

March 15, 2023

Kristin Anderson
Floyd & Snider
601 Union Street, Suite 600
Seattle, WA 98101

Re:	Analytical Data for Project COB Ultra
	Laboratory Reference No. 2302-317

Dear Kristin:

Enclosed are the analytical results and associated quality control data for samples submitted on February 28, 2023.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: March 15, 2023
Samples Submitted: February 28, 2023
Laboratory Reference: 2302-317
Project: COB Ultra

Case Narrative

Samples were collected on February 27, 2023 and received by the laboratory on February 28, 2023. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: March 15, 2023
Samples Submitted: February 28, 2023
Laboratory Reference: 2302-317
Project: COB Ultra

VOLATILE ORGANICS EPA 8260D/SIM

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**A-S1-3**					
Laboratory ID:	02-317-09					
Vinyl Chloride	ND	0.000036	EPA 8260D/SIM	3-8-23	3-8-23	
(trans) 1,2-Dichloroethene	ND	0.00071	EPA 8260D	3-8-23	3-8-23	
(cis) 1,2-Dichloroethene	ND	0.00071	EPA 8260D	3-8-23	3-8-23	
Trichloroethene	ND	0.00071	EPA 8260D	3-8-23	3-8-23	
Tetrachloroethene	ND	0.00071	EPA 8260D	3-8-23	3-8-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*125*	*75-130*				
Toluene-d8	*108*	*78-128*				
4-Bromofluorobenzene	*103*	*71-130*				
Client ID:	**A-B1-5.5**					
Laboratory ID:	02-317-10					
Vinyl Chloride	ND	0.000056	EPA 8260D/SIM	3-8-23	3-8-23	
(trans) 1,2-Dichloroethene	ND	0.0011	EPA 8260D	3-8-23	3-8-23	
(cis) 1,2-Dichloroethene	ND	0.0011	EPA 8260D	3-8-23	3-8-23	
Trichloroethene	ND	0.0011	EPA 8260D	3-8-23	3-8-23	
Tetrachloroethene	ND	0.0011	EPA 8260D	3-8-23	3-8-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*112*	*75-130*				
Toluene-d8	*103*	*78-128*				
4-Bromofluorobenzene	*98*	*71-130*				
Client ID:	**A-B101-5.5**					
Laboratory ID:	02-317-11					
Vinyl Chloride	ND	0.000053	EPA 8260D/SIM	3-8-23	3-8-23	
(trans) 1,2-Dichloroethene	ND	0.0011	EPA 8260D	3-8-23	3-8-23	
(cis) 1,2-Dichloroethene	ND	0.0011	EPA 8260D	3-8-23	3-8-23	
Trichloroethene	ND	0.0011	EPA 8260D	3-8-23	3-8-23	
Tetrachloroethene	ND	0.0011	EPA 8260D	3-8-23	3-8-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*107*	*75-130*				
Toluene-d8	*103*	*78-128*				
4-Bromofluorobenzene	*97*	*71-130*				

Date of Report: March 15, 2023
Samples Submitted: February 28, 2023
Laboratory Reference: 2302-317
Project: COB Ultra

VOLATILE ORGANICS EPA 8260D/SIM

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**A-S2-3**					
Laboratory ID:	02-317-12					
Vinyl Chloride	ND	0.000040	EPA 8260D/SIM	3-8-23	3-8-23	
(trans) 1,2-Dichloroethene	ND	0.00079	EPA 8260D	3-8-23	3-8-23	
(cis) 1,2-Dichloroethene	ND	0.00079	EPA 8260D	3-8-23	3-8-23	
Trichloroethene	ND	0.00079	EPA 8260D	3-8-23	3-8-23	
Tetrachloroethene	ND	0.00079	EPA 8260D	3-8-23	3-8-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*114*	*75-130*				
Toluene-d8	*106*	*78-128*				
4-Bromofluorobenzene	*94*	*71-130*				
Client ID:	**C-S1-5.5**					
Laboratory ID:	02-317-13					
Vinyl Chloride	ND	0.000037	EPA 8260D/SIM	3-8-23	3-8-23	
(trans) 1,2-Dichloroethene	ND	0.00074	EPA 8260D	3-8-23	3-8-23	
(cis) 1,2-Dichloroethene	ND	0.00074	EPA 8260D	3-8-23	3-8-23	
Trichloroethene	ND	0.00074	EPA 8260D	3-8-23	3-8-23	
Tetrachloroethene	ND	0.00074	EPA 8260D	3-8-23	3-8-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*113*	*75-130*				
Toluene-d8	*104*	*78-128*				
4-Bromofluorobenzene	*102*	*71-130*				
Client ID:	**C-B1-10**					
Laboratory ID:	02-317-14					
Vinyl Chloride	ND	0.000047	EPA 8260D/SIM	3-8-23	3-8-23	
(trans) 1,2-Dichloroethene	ND	0.00094	EPA 8260D	3-8-23	3-8-23	
(cis) 1,2-Dichloroethene	0.0079	0.00094	EPA 8260D	3-8-23	3-8-23	
Trichloroethene	ND	0.00094	EPA 8260D	3-8-23	3-8-23	
Tetrachloroethene	0.0023	0.00094	EPA 8260D	3-8-23	3-8-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*111*	*75-130*				
Toluene-d8	*106*	*78-128*				
4-Bromofluorobenzene	*97*	*71-130*				

Date of Report: March 15, 2023
Samples Submitted: February 28, 2023
Laboratory Reference: 2302-317
Project: COB Ultra

VOLATILE ORGANICS EPA 8260D/SIM
QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0308S2					
Vinyl Chloride	ND	0.000050	EPA 8260D/SIM	3-8-23	3-8-23	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260D	3-8-23	3-8-23	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260D	3-8-23	3-8-23	
Trichloroethene	ND	0.0010	EPA 8260D	3-8-23	3-8-23	
Tetrachloroethene	ND	0.0010	EPA 8260D	3-8-23	3-8-23	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*108*	*75-130*				
Toluene-d8	*103*	*78-128*				
4-Bromofluorobenzene	*106*	*71-130*				

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0308S2									
	SB	SBD	SB	SBD	SB	SBD				
Vinyl Chloride	**0.0435**	**0.0437**	0.0500	0.0500	87	87	68-136	0	23	
(trans) 1,2-Dichloroethene	**0.0547**	**0.0561**	0.0500	0.0500	109	112	79-133	3	15	
(cis) 1,2-Dichloroethene	**0.0575**	**0.0582**	0.0500	0.0500	115	116	75-131	1	15	
Trichloroethene	**0.0486**	**0.0508**	0.0500	0.0500	97	102	80-129	4	18	
Tetrachloroethene	**0.0504**	**0.0470**	0.0500	0.0500	101	94	77-126	7	15	
Surrogate:										
Dibromofluoromethane					*113*	*117*	*75-130*			
Toluene-d8					*104*	*99*	*78-128*			
4-Bromofluorobenzene					*103*	*104*	*71-130*			

Date of Report: March 15, 2023
Samples Submitted: February 28, 2023
Laboratory Reference: 2302-317
Project: COB Ultra

% MOISTURE

Client ID	Lab ID	% Moisture	Date Analyzed
A-S1-3	02-317-09	**6**	3-6-23
A-B1-5.5	02-317-10	**8**	3-6-23
A-B101-5.5	02-317-11	**6**	3-6-23
A-S2-3	02-317-12	**5**	3-6-23
C-S1-5.5	02-317-13	**5**	3-6-23
C-B1-10	02-317-14	**15**	3-6-23

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1 - Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

X2 - Sample extract treated with a silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Mar 15 2023
On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister

Dear David Baumeister:

Enclosed please find the analytical data for your COB ULTRA project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
B5-28-30	Soil	23-A003690	Grain Size, CONV
B5-33-35	Soil	23-A003691	Grain Size, CONV
B4-18-20	Soil	23-A003692	Grain Size, CONV
B4-23-25	Soil	23-A003693	Grain Size, CONV
B4-28-30	Soil	23-A003694	Grain Size, CONV
B4-33-35	Soil	23-A003695	Grain Size, CONV
B2-12-15	Soil	23-A003696	Grain Size, CONV
B2-18-20	Soil	23-A003697	Grain Size, CONV

Your samples were received on Tuesday, February 28, 2023. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W. Young

Aaron W. Young
Vice President

SDG #: 2328470
PO Number: 02-317

BACT = Bacteriological
CONV = Conventionals
MET = Metals
ORG = Organics
NUT=Nutrients
DEM=Demand
MIN=Minerals

Am Test Inc.
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www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister
Project Name: COB ULTRA
SDG Number: 2328470
PO Number: 02-317
All results reported on a dry weight basis.

Date Received: 02/28/23
Date Reported: 3/15/23

AMTEST Identification Number	**23-A003690**
Client Identification	**B5-28-30**
Sampling Date	**02/27/23, 10:10**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Solids	79.1	%		0.1	SM 2540G	SF	03/01/23

Grain Size Distribution

PHI	OPENING (mm)	% RETENTION	FRACTION	PERCENT	METHOD	ANALYST	DATE
-2.25	4.75	< 0.1 %	GRAVEL	0.30	ASTM D422	SF	03/09/23
- 2	4.00	0.20 %			ASTM D422	SF	03/09/23
-1	2.00	0.10 %			ASTM D422	SF	03/09/23
0	1.00	0.10 %	SAND	46.0	ASTM D422	SF	03/09/23
+1	0.50	0.10 %			ASTM D422	SF	03/09/23
+ 2	0.25	1.10 %			ASTM D422	SF	03/09/23
+ 3	0.125	10.6 %			ASTM D422	SF	03/09/23
+ 4	0.063	34.1 %			ASTM D422	SF	03/09/23
+ 5	0.032	12.7 %	SILT	45.3	ASTM D422	SF	03/09/23
+ 6	0.016	21.9 %			ASTM D422	SF	03/09/23
+ 7	0.008	8.60 %			ASTM D422	SF	03/09/23
+ 8	0.004	2.10 %			ASTM D422	SF	03/09/23
+ 9	0.002	1.50 %	CLAY	8.20	ASTM D422	SF	03/09/23
+ 10	0.001	0.90 %			ASTM D422	SF	03/09/23
> + 10	< 0.001	5.80 %			ASTM D422	SF	03/09/23

Am Test Inc.
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(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister
Project Name: COB ULTRA
SDG Number: 2328470
PO Number: 02-317
All results reported on a dry weight basis.

Date Received: 02/28/23
Date Reported: 3/15/23

AMTEST Identification Number **23-A003691**
Client Identification **B5-33-35**
Sampling Date **02/27/23, 11:10**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Solids	77.7	%		0.1	SM 2540G	SF	03/01/23

Grain Size Distribution

PHI	OPENING (mm)	% RETENTION	FRACTION	PERCENT	METHOD	ANALYST	DATE
-2.25	4.75	< 0.1 %	GRAVEL	0.00	ASTM D422	SF	03/09/23
- 2	4.00	< 0.1 %			ASTM D422	SF	03/09/23
-1	2.00	< 0.1 %			ASTM D422	SF	03/09/23
0	1.00	0.10 %	SAND	41.3	ASTM D422	SF	03/09/23
+1	0.50	0.10 %			ASTM D422	SF	03/09/23
+ 2	0.25	0.10 %			ASTM D422	SF	03/09/23
+ 3	0.125	9.20 %			ASTM D422	SF	03/09/23
+ 4	0.063	31.8 %			ASTM D422	SF	03/09/23
+ 5	0.032	11.2 %	SILT	50.1	ASTM D422	SF	03/09/23
+ 6	0.016	24.8 %			ASTM D422	SF	03/09/23
+ 7	0.008	11.6 %			ASTM D422	SF	03/09/23
+ 8	0.004	2.50 %			ASTM D422	SF	03/09/23
+ 9	0.002	2.60 %	CLAY	8.70	ASTM D422	SF	03/09/23
+ 10	0.001	1.60 %			ASTM D422	SF	03/09/23
> + 10	< 0.001	4.50 %			ASTM D422	SF	03/09/23

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Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister
Project Name: COB ULTRA
SDG Number: 2328470
PO Number: 02-317
All results reported on a dry weight basis.

Date Received: 02/28/23
Date Reported: 3/15/23

AMTEST Identification Number **23-A003692**
Client Identification **B4-18-20**
Sampling Date **02/27/23, 12:00**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Solids	79.4	%		0.1	SM 2540G	SF	03/01/23

Grain Size Distribution

PHI	OPENING (mm)	% RETENTION	FRACTION	PERCENT	METHOD	ANALYST	DATE
-2.25	4.75	< 0.1 %	GRAVEL	0.00	ASTM D422	SF	03/09/23
- 2	4.00	< 0.1 %			ASTM D422	SF	03/09/23
-1	2.00	< 0.1 %			ASTM D422	SF	03/09/23
0	1.00	0.10 %	SAND	50.4	ASTM D422	SF	03/09/23
+1	0.50	0.80 %			ASTM D422	SF	03/09/23
+ 2	0.25	1.80 %			ASTM D422	SF	03/09/23
+ 3	0.125	30.0 %			ASTM D422	SF	03/09/23
+ 4	0.063	17.7 %			ASTM D422	SF	03/09/23
+ 5	0.032	19.2 %	SILT	43.0	ASTM D422	SF	03/09/23
+ 6	0.016	15.1 %			ASTM D422	SF	03/09/23
+ 7	0.008	6.30 %			ASTM D422	SF	03/09/23
+ 8	0.004	2.40 %			ASTM D422	SF	03/09/23
+ 9	0.002	1.20 %	CLAY	6.50	ASTM D422	SF	03/09/23
+ 10	0.001	0.50 %			ASTM D422	SF	03/09/23
> + 10	< 0.001	4.80 %			ASTM D422	SF	03/09/23

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Professional Analytical Services

ANALYSIS REPORT

On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister
Project Name: COB ULTRA
SDG Number: 2328470
PO Number: 02-317
All results reported on a dry weight basis.

Date Received: 02/28/23
Date Reported: 3/15/23

AMTEST Identification Number **23-A003693**
Client Identification **B4-23-25**
Sampling Date **02/27/23, 12:10**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Solids	79.3	%		0.1	SM 2540G	SF	03/01/23

Grain Size Distribution

PHI	OPENING (mm)	% RETENTION	FRACTION	PERCENT	METHOD	ANALYST	DATE
-2.25	4.75	< 0.1 %	GRAVEL	0.00	ASTM D422	SF	03/09/23
- 2	4.00	< 0.1 %			ASTM D422	SF	03/09/23
-1	2.00	< 0.1 %			ASTM D422	SF	03/09/23
0	1.00	< 0.1 %	SAND	71.6	ASTM D422	SF	03/09/23
+1	0.50	0.10 %			ASTM D422	SF	03/09/23
+ 2	0.25	9.80 %			ASTM D422	SF	03/09/23
+ 3	0.125	35.7 %			ASTM D422	SF	03/09/23
+ 4	0.063	26.0 %			ASTM D422	SF	03/09/23
+ 5	0.032	5.80 %	SILT	21.4	ASTM D422	SF	03/09/23
+ 6	0.016	10.5 %			ASTM D422	SF	03/09/23
+ 7	0.008	4.10 %			ASTM D422	SF	03/09/23
+ 8	0.004	1.00 %			ASTM D422	SF	03/09/23
+ 9	0.002	1.40 %	CLAY	6.90	ASTM D422	SF	03/09/23
+ 10	0.001	0.90 %			ASTM D422	SF	03/09/23
> + 10	< 0.001	4.60 %			ASTM D422	SF	03/09/23

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Professional Analytical Services

ANALYSIS REPORT

On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister
Project Name: COB ULTRA
SDG Number: 2328470
PO Number: 02-317
All results reported on a dry weight basis.

Date Received: 02/28/23
Date Reported: 3/15/23

AMTEST Identification Number **23-A003694**
Client Identification **B4-28-30**
Sampling Date **02/27/23, 12:45**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Solids	76.4	%		0.1	SM 2540G	SF	03/01/23

Grain Size Distribution

PHI	OPENING (mm)	% RETENTION	FRACTION	PERCENT	METHOD	ANALYST	DATE
-2.25	4.75	< 0.1 %	GRAVEL	0.20	ASTM D422	SF	03/09/23
- 2	4.00	< 0.1 %			ASTM D422	SF	03/09/23
-1	2.00	0.20 %			ASTM D422	SF	03/09/23
0	1.00	< 0.1 %	SAND	44.6	ASTM D422	SF	03/09/23
+1	0.50	0.10 %			ASTM D422	SF	03/09/23
+ 2	0.25	0.10 %			ASTM D422	SF	03/09/23
+ 3	0.125	0.90 %			ASTM D422	SF	03/09/23
+ 4	0.063	43.5 %			ASTM D422	SF	03/09/23
+ 5	0.032	14.9 %	SILT	47.2	ASTM D422	SF	03/09/23
+ 6	0.016	22.2 %			ASTM D422	SF	03/09/23
+ 7	0.008	7.70 %			ASTM D422	SF	03/09/23
+ 8	0.004	2.40 %			ASTM D422	SF	03/09/23
+ 9	0.002	2.10 %	CLAY	7.90	ASTM D422	SF	03/09/23
+ 10	0.001	1.30 %			ASTM D422	SF	03/09/23
> + 10	< 0.001	4.50 %			ASTM D422	SF	03/09/23

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Professional Analytical Services

ANALYSIS REPORT

On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister
Project Name: COB ULTRA
SDG Number: 2328470
PO Number: 02-317
All results reported on a dry weight basis.

Date Received: 02/28/23
Date Reported: 3/15/23

AMTEST Identification Number	**23-A003695**
Client Identification	**B4-33-35**
Sampling Date	**02/27/23, 13:20**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Solids	83.4	%		0.1	SM 2540G	SF	03/01/23

Grain Size Distribution

PHI	OPENING (mm)	% RETENTION	FRACTION	PERCENT	METHOD	ANALYST	DATE
-2.25	4.75	1.70 %	GRAVEL	2.80	ASTM D422	SF	03/09/23
- 2	4.00	0.10 %			ASTM D422	SF	03/09/23
-1	2.00	1.00 %			ASTM D422	SF	03/09/23
0	1.00	0.90 %	SAND	59.6	ASTM D422	SF	03/09/23
+1	0.50	3.90 %			ASTM D422	SF	03/09/23
+ 2	0.25	34.7 %			ASTM D422	SF	03/09/23
+ 3	0.125	13.9 %			ASTM D422	SF	03/09/23
+ 4	0.063	6.20 %			ASTM D422	SF	03/09/23
+ 5	0.032	15.3 %	SILT	30.9	ASTM D422	SF	03/09/23
+ 6	0.016	10.7 %			ASTM D422	SF	03/09/23
+ 7	0.008	3.20 %			ASTM D422	SF	03/09/23
+ 8	0.004	1.70 %			ASTM D422	SF	03/09/23
+ 9	0.002	1.00 %	CLAY	6.60	ASTM D422	SF	03/09/23
+ 10	0.001	0.60 %			ASTM D422	SF	03/09/23
> + 10	< 0.001	5.00 %			ASTM D422	SF	03/09/23

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AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister
Project Name: COB ULTRA
SDG Number: 2328470
PO Number: 02-317
All results reported on a dry weight basis.

Date Received: 02/28/23
Date Reported: 3/15/23

AMTEST Identification Number **23-A003696**
Client Identification **B2-12-15**
Sampling Date **02/27/23, 14:10**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Solids	83.1	%		0.1	SM 2540G	SF	03/01/23

Grain Size Distribution

PHI	OPENING (mm)	% RETENTION	FRACTION	PERCENT	METHOD	ANALYST	DATE
-2.25	4.75	0.20 %	GRAVEL	0.70	ASTM D422	SF	03/09/23
- 2	4.00	0.20 %			ASTM D422	SF	03/09/23
-1	2.00	0.30 %			ASTM D422	SF	03/09/23
0	1.00	0.30 %	SAND	62.0	ASTM D422	SF	03/09/23
+1	0.50	3.40 %			ASTM D422	SF	03/09/23
+ 2	0.25	28.6 %			ASTM D422	SF	03/09/23
+ 3	0.125	11.9 %			ASTM D422	SF	03/09/23
+ 4	0.063	17.8 %			ASTM D422	SF	03/09/23
+ 5	0.032	15.2 %	SILT	30.5	ASTM D422	SF	03/09/23
+ 6	0.016	10.6 %			ASTM D422	SF	03/09/23
+ 7	0.008	2.90 %			ASTM D422	SF	03/09/23
+ 8	0.004	1.80 %			ASTM D422	SF	03/09/23
+ 9	0.002	1.50 %	CLAY	6.80	ASTM D422	SF	03/09/23
+ 10	0.001	0.90 %			ASTM D422	SF	03/09/23
> + 10	< 0.001	4.40 %			ASTM D422	SF	03/09/23

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Professional Analytical Services

ANALYSIS REPORT

On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister
Project Name: COB ULTRA
SDG Number: 2328470
PO Number: 02-317
All results reported on a dry weight basis.

Date Received: 02/28/23
Date Reported: 3/15/23

AMTEST Identification Number	**23-A003697**
Client Identification	**B2-18-20**
Sampling Date	**02/27/23, 14:20**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Solids	82.6	%		0.1	SM 2540G	SF	03/01/23

Grain Size Distribution

PHI	OPENING (mm)	% RETENTION	FRACTION	PERCENT	METHOD	ANALYST	DATE
-2.25	4.75	10.1 %	GRAVEL	11.6	ASTM D422	SF	03/09/23
- 2	4.00	0.10 %			ASTM D422	SF	03/09/23
-1	2.00	1.40 %			ASTM D422	SF	03/09/23
0	1.00	1.90 %	SAND	65.0	ASTM D422	SF	03/09/23
+1	0.50	5.00 %			ASTM D422	SF	03/09/23
+ 2	0.25	28.2 %			ASTM D422	SF	03/09/23
+ 3	0.125	10.7 %			ASTM D422	SF	03/09/23
+ 4	0.063	19.2 %			ASTM D422	SF	03/09/23
+ 5	0.032	6.50 %	SILT	17.7	ASTM D422	SF	03/09/23
+ 6	0.016	6.10 %			ASTM D422	SF	03/09/23
+ 7	0.008	3.10 %			ASTM D422	SF	03/09/23
+ 8	0.004	2.00 %			ASTM D422	SF	03/09/23
+ 9	0.002	0.70 %	CLAY	5.70	ASTM D422	SF	03/09/23
+ 10	0.001	0.30 %			ASTM D422	SF	03/09/23
> + 10	< 0.001	4.70 %			ASTM D422	SF	03/09/23

Aaron W. Young
Vice President

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Professional Analytical Services

QC Summary for sample numbers: 23-A003690 to 23-A003697

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
23-A003691	Total Solids	%	77.7	77.9	0.26
23-A003691	Total Solids	%	77.7	77.9	0.26
23-A003691	Gravel	%	0.00	0.00	
23-A003691	Gravel	%	0.00	0.10	200
23-A003691	Sand	%	41.3	41.5	0.48
23-A003691	Sand	%	41.3	40.3	2.5
23-A003691	Silt	%	50.1	49.9	0.40
23-A003691	Silt	%	50.1	51.2	2.2
23-A003691	Clay	%	8.70	8.70	0.00
23-A003691	Clay	%	8.70	8.50	2.3

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 · (425) 883-3881

Laboratory Reference #: 02-317

Laboratory: AmTest Laboratories
Attention: Aaron Young
13600 NE 126th Pl Kirkland, WA 98034
Phone Number: (425) 885-1664

Turnaround Request
1 Day 2 Day 3 Day
Standard
Other:

Project Manager: David Baumeister
email: dbaumeister@onsite-env.com
Project Number: COB Ultra
Project Name:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	Requested Analyses
3690	B5-28-30	2/27/23	10:10	S	1	Grain Size ASTM D422
3691	B5-33-35	2/27/23	11:10	S	1	Grain Size ASTM D422
3692	B4-18-20	2/27/23	12:00	S	1	Grain Size ASTM D422
3693	B4-23-25	2/27/23	12:10	S	1	Grain Size ASTM D422
3694	B4-28-30	2/27/23	12:45	S	1	Grain Size ASTM D422
3695	B4-33-35	2/27/23	13:20	S	1	Grain Size ASTM D422
3696	B2-13-15	2/27/23	14:10	S	1	Grain Size ASTM D422
3697	B2-18-20	2/27/23	14:20	S	1	Grain Size ASTM D422

	Company	Date	Time	Comments/Special Instructions
Relinquished by:	OSE	2/28/23	4:45p	T=2.3°C
Received by: KH	Amtest	2/28/23	1645	TIER 3 MOD
Relinquished by:				REPORT SB
Received by:				
Relinquished by:				
Received by:				

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Analytical Laboratory Testing Services
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Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 02-317

Company: Floyd|Snider
Project Number:
Project Name: CoB Ultra
Project Manager: Kristin Anderson
Sampled by: Jake Lamb (Kristin.Anderson@floydsnider.com)

Turnaround Request (in working days)
(Check One)
- ☐ Same Day
- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☑ Standard (7 Days)
- ☐ ________ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers
1	B5-28-30	2/27/23	10:10	Soil	1
2	B5-33-35	↓	11:10	↓	1
3	B4-18-20	↓	12:00	↓	1
4	B4-23-25	↓	12:10	↓	1
5	B4-28-30	↓	12:45	↓	1
6	B4-33-35	↓	13:20	↓	1
7	B2-13-15	↓	14:10	↓	1
8	B2-18-20	↓	14:20	↓	1
9	A-S1-3	2/27/23	15:00	Soil	4
10	A-B1-5.5	↓	15:10	↓	4

Lab ID	NWTPH-HCID	NWTPH-Gx/BTEX (8021☐ 8260☐)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up☐)	Volatiles 8260 8260D	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Grain Size ~~ASTM~~ D422				% Moisture
1																		X				X
2																		X				
3																		X				
4																		X				
5																		X				
6																		X				
7																		X				
8																		X				
9					X																	X
10					X																	|

	Signature	Company	Date	Time
Relinquished	[signature]	Floyd/Snider	2/28/23	11:14
Received	[signature]	OSE	2/28/23	1114
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

For VOCs, only PCE, TCE, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and Vinyl chloride w/ % moisture included under 8260D

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

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Analytical Laboratory Testing Services
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Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 02-317

Company: Floyd|Snider
Project Number:
Project Name: COB Ultra
Project Manager: Kristin Anderson
Sampled by: Jake Lamb (Kristin.Anderson@floydsnider.com)

Turnaround Request (in working days)
(Check One)
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days)
- [ ] ____ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (8021 8260)	NWTPH-Gx	NWTPH-Dx (Acid / SG Clean-up)	Volatiles 8260 (8260D)	Halogenated Volatiles 8260	EDB EPA 8011 (Waters Only)	Semivolatiles 8270/SIM (with low-level PAHs)	PAHs 8270/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081	Organophosphorus Pesticides 8270/SIM	Chlorinated Acid Herbicides 8151	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664					% Moisture
11	A-B101-5.5	2/27/23	15:15	Soil	4					X																	X
12	A-S2-3	↓	15:30	↓	4					X																	↓
13	C-S1-5.5	↓	15:45	↓	4					X																	↓
14	C-B1-10	↓	16:00	↓	4					X																	↓

	Signature	Company	Date	Time
Relinquished	[signature]	Floyd|Snider	2/28/23	11:14
Received	[signature]	OSE	2/28/23	1114
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
For VOCs, only PCE, TCE, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride w/ % moisture included under 8260D

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

Sample/Cooler Receipt and Acceptance Checklist

Client: FLS

Client Project Name/Number: COB Ultra

OnSite Project Number: 02-317

Initiated by: [signature]

Date Initiated: 2/28/23

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	Yes	No	N/A	1 2 3 4
1.2 Were the custody seals intact?	Yes	No	N/A	1 2 3 4
1.3 Were the custody seals signed and dated by last custodian?	Yes	No	N/A	1 2 3 4
1.4 Were the samples delivered on ice or blue ice?	Yes	No	N/A	1 2 3 4
1.5 Were samples received between 0-6 degrees Celsius?	Yes	No	N/A	Temperature: 0
1.6 Have shipping bills (if any) been attached to the back of this form?	Yes	N/A		
1.7 How were the samples delivered?	Client	Courier	UPS/FedEx	OSE Pickup Other

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	Yes	No	1 2 3 4
2.2 Was the COC legible and written in permanent ink?	Yes	No	1 2 3 4
2.3 Have samples been relinquished and accepted by each custodian?	Yes	No	1 2 3 4
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	Yes	No	1 2 3 4
2.5 Were all of the samples listed on the COC submitted?	Yes	No	1 2 3 4
2.6 Were any of the samples submitted omitted from the COC?	Yes	No	1 2 3 4

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	Yes	No		1 2 3 4
3.2 Were any sample labels missing or illegible?	Yes	No		1 2 3 4
3.3 Have the correct containers been used for each analysis requested?	Yes	No		1 2 3 4
3.4 Have the samples been correctly preserved?	Yes	No	N/A	1 2 3 4
3.5 Are volatiles samples free from headspace and bubbles greater than 6mm?	Yes	No	N/A	1 2 3 4
3.6 Is there sufficient sample submitted to perform requested analyses?	Yes	No		1 2 3 4
3.7 Have any holding times already expired or will expire in 24 hours?	Yes	No		1 2 3 4
3.8 Was method 5035A used?	Yes	No	N/A	1 2 3 4
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	#	1	N/A	1 2 3 4

Explain any discrepancies:

1 - Discuss issue in Case Narrative

2 - Process Sample As-is

3 - Client contacted to discuss problem

4 - Sample cannot be analyzed or client does not wish to proceed

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix B
PlumeStop Basis of Design

April 21, 2023

Kristen Anderson, Floyd Snider

Jake Lamb, Floyd Snider

RE: Design Verification Testing (DVT) Technical Memo -Ultra Customer Care Cleaners

The DVT data has been reviewed and summarized in this document. The results of the DVT, which are presented below, are being incorporated into the final design adjustments. The design adjustments will be presented in a separate document which is forthcoming.

<u>Passive Flux Meter Data</u>

The contaminant mass flux measured at Ultra Customer Care Cleaners is generally low as compared to most sites. Contaminant flux < 10 mg/m2/day is considered low. The highest recorded flux at the site is 6.07 mg/m2/day. Within each well, the contaminant mass fluxes were generally uniform, indicating the plume doesn't appear to have any clear transport zones and is dispersing in a generally even pattern throughout the geology. Based on this data we do not recommend the need to preferentially dose specific treatment intervals.

Table1. Summary of flux values for each well

Well_ID	Sample_ID	Depth below top of well casing (ft)	Darcy Velocity (cm/day)	cis-1,2DCE (mg/m^2/day)	TCE (mg/m^2/day)	PCE (mg/m^2/day)	Groudwater Velocity (ft/year)	Sum CVOC Flux (mg/m^2/day)
UCCMW-29	UCCMW-29-5-7-022723	6.0	0.2	0.00	0.00	0.36	13	0.36
	UCCMW-29-7-9-022723	8.0	1.3	0.00	0.00	0.23	70	0.23
	UCCMW-29-9-11-022723	10.0	1.0	0.00	0.00	0.52	54	0.52
	UCCMW-29-11-13-022723	12.0	0.5	0.04	0.00	0.65	28	0.69
	UCCMW-29-13-15-022723	14.0	1.8	0.06	0.00	0.75	95	0.82
BB-2	BB-2-9-11-022723	10.0	2.3	0.08	0.21	2.99	119	3.29
	BB-2-11-13-022723	12.0	2.1	0.03	0.09	1.31	109	1.42
	BB-2-13-15-022723	14.0	3.8	0.11	0.30	3.92	199	4.33
	BB-2-15-17-022723	16.0	3.4	0.09	0.21	5.77	175	6.07
	BB-2-17-19-022723	18.0	2.5	0.00	0.00	4.93	131	4.93
UCCMW-34D	UCCMW-34D-35-37-022723	36.0	4.0	0.00	0.00	0.02	210	0.02
	UCCMW-34D-37-39-022723	38.0	4.4	0.00	0.00	2.15	231	2.15
	UCCMW-34D-39-41-022723	40.0	6.9	0.00	0.00	3.23	358	3.23
	UCCMW-34D-41-43-022723	42.0	5.3	0.00	0.00	2.62	278	2.62
	UCCMW-34D-43-45-022723	44.0	7.6	0.00	0.00	2.03	398	2.03
	UCCMW-34D-45-47-022723	46.0	10.1	0.00	0.00	4.42	526	4.42
	UCCMW-34D-47-49-022723	48.0	8.3	0.00	0.00	2.77	431	2.77
	UCCMW-34D-49-50-022723	49.5	9.8	0.00	0.00	1.51	512	1.51

Table2. Summary of flux average contaminant concentration

Well_ID	Sample_ID	Depth below top of well casing (ft)	Darcy Velocity (cm/day)	cis-1,2DCE (ug/L)	TCE (ug/L)	PCE (ug/L)	Groudwater Velocity (ft/year)	Sum CVOC Conc. (ug/L)
UCCMW-29	UCCMW-29-5-7-022723	6.0	0.2	0	0	144	13	144
	UCCMW-29-7-9-022723	8.0	1.3	0	0	17	70	17
	UCCMW-29-9-11-022723	10.0	1.0	0	0	50	54	50
	UCCMW-29-11-13-022723	12.0	0.5	7	0	122	28	129
	UCCMW-29-13-15-022723	14.0	1.8	4	0	41	95	45
BB-2	BB-2-9-11-022723	10.0	2.3	4	9	131	119	144
	BB-2-11-13-022723	12.0	2.1	1	4	62	109	68
	BB-2-13-15-022723	14.0	3.8	3	8	102	199	113
	BB-2-15-17-022723	16.0	3.4	3	6	172	175	180
	BB-2-17-19-022723	18.0	2.5	0	0	196	131	196
UCCMW-34D	UCCMW-34D-35-37-022723	36.0	4.0	0	0	0	210	0
	UCCMW-34D-37-39-022723	38.0	4.4	0	0	48	231	48
	UCCMW-34D-39-41-022723	40.0	6.9	0	0	47	358	47
	UCCMW-34D-41-43-022723	42.0	5.3	0	0	49	278	49
	UCCMW-34D-43-45-022723	44.0	7.6	0	0	27	398	27
	UCCMW-34D-45-47-022723	46.0	10.1	0	0	44	526	44
	UCCMW-34D-47-49-022723	48.0	8.3	0	0	34	431	34
	UCCMW-34D-49-50-022723	49.5	9.8	0	0	15	512	15

Groundwater velocity was calculated from the Darcy Velocity using an effective porosity of 23% which is an average porosity used in the designs. The groundwater velocity does show significant contrast depending upon depth. Flow velocities ranged from as low as 13 feet per year high as 526 feet per year. These groundwater velocity estimates are significantly less than the 1,000 ft per year velocity used in the preliminary level design. Groundwater velocities measured below 100 feet per year have less certainty in the accuracy of their measurements and should be regarded as slow-moving groundwater. The only slow-moving zones appear to consistently be in well MW-29 where velocities ranged from 13 to 95 feet per year. Also, the lowest contaminant fluxes were recorded at MW-29 as well; however, contaminant flux measured in slow moving zones is accurate and unaffected by the Darcy Velocity measurements. Well BB-2 measured groundwater velocities in the 109 to 199 range indicating the geology and flow is quite uniform across the well screen interval. Well MW-34D had higher groundwater velocities ranging from 210 feet per year to 526 feet per year. These higher velocities do not appear to cause a significant concern because there is no increase in contaminant flux as a result.

The flux meter data was reorganized with the shallowest well on top and the deepest on the bottom as shown on the previous page. Viewing the data, it's quite clear there is an increase in groundwater velocity with depth, although it should be noted that the interval from 20-35 feet was not measured with flux meters. Samples beneath 35 feet were not analyzed for grain size analysis; but one would expect the increase in groundwater velocity in MW-34D could be related to a grain size increase. Considering that contamination is spread vertically over a 45 ft zone, there could also be a change in gradient with depth that induces greater flow velocities.

Based on the flux meter data, Regenesis will need to remodel the site using slow groundwater velocities to see how the clean-up time between barriers is affected. We will model using a range of representative velocities for shallow and deeper zones, so we can obtain an estimated range for cleanup timeframe. Currently it would appear that a velocity range of 75 to 200 feet per year is representative of the shallow zone and 300 to 500 feet per year is representative of the deeper zone. The zone that is missing from the flux meter study, from 20 to 35 feet, we estimate that the groundwater velocity is likely around 200 feet per year.

Metals Analysis

Metals analysis was performed for total and dissolved metals. Total metals are shown below which has the higher concentrations as compared to the dissolved metals. Cations like Calcium and Magnesium, if present in groundwater at concentrations above 500 mg/L, can begin to limit the radius of influence of PlumeStop. Collectively these cations do not exceed 40 mg/L at the site; therefore, the groundwater chemistry will not hinder the distribution of PlumeStop.

TOTAL METALS
EPA 200.8/200.7

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UCCMW-29-020823**					
Laboratory ID:	02-100-01					
Arsenic	**ND**	3.3	EPA 200.8	2-17-23	2-17-23	
Calcium	**28000**	1000	EPA 200.7	2-10-23	2-10-23	
Iron	**250**	50	EPA 200.7	2-10-23	2-10-23	
Magnesium	**8200**	1000	EPA 200.7	2-10-23	2-10-23	
Client ID:	**BB-2-020823**					
Laboratory ID:	02-100-02					
Arsenic	**ND**	3.3	EPA 200.8	2-17-23	2-17-23	
Calcium	**21000**	1000	EPA 200.7	2-10-23	2-10-23	
Iron	**ND**	50	EPA 200.7	2-10-23	2-10-23	
Magnesium	**10000**	1000	EPA 200.7	2-10-23	2-10-23	
Client ID:	**UCCMW-34D-020823**					
Laboratory ID:	02-100-03					
Arsenic	**ND**	3.3	EPA 200.8	2-17-23	2-17-23	
Calcium	**25000**	1000	EPA 200.7	2-10-23	2-10-23	
Iron	**1400**	50	EPA 200.7	2-10-23	2-10-23	
Magnesium	**12000**	1000	EPA 200.7	2-10-23	2-10-23	

Grain Size Analysis

Grain size analysis was performed via two methods. Samples were collected by Floyd Snider and submitted to Regenesis for grain size analysis using a simple in-house analysis method, and samples were also submitted to AMTEST Laboratories for select sample intervals. Regenesis also performed adhesion rate analysis on the samples to help determine how PlumeStop will distribute during and after the application. What we learn from the grain size analysis are the following:

1. A more detailed understand of the site geology
2. Grain size distribution which could help identified preferred pathway intervals for contaminants or injectates during the application
3. Understanding the limits for injectate volumes and ideal injection spacing for the application

Regarding the site geology, the site appears to be dominated by fine grained materials to a depth of 35 feet. In particular, we looked at the combined percentage of clays, silts and very fine sands. At each location tested via the AMTEST Lab method, the minimum total fines percentage was 53%, but most samples were 90% or above. There are a few intervals that have higher amounts of coarse-grained materials and a lower percentage of fines. These intervals were: B2-11.5 ft, B2-12.5 ft, B2-19.5 ft, B4-33.5 ft and B5-25.5 to 27.5 feet. Aside from B2-11.5 ft, which looks like aquarium sand, the other intervals identified as coarser-grained still plotted on the finer side of the sand distribution. In summary, there appears to be minor gradational shifts between silts, very fine sands and fine sands at this site that define the grain size composition of each interval as shown on the data below for B2 and for B4 and B5 as well.

Design Verification Grain Size Analysis-Ultra Care Drycleaners

		Regenesis Distribution									AMTEST Lab Distribution								
	Depth	Clays	Silts	Very Fine Sand	Fine Sand	Medium Sand	Coarse Sand	Gravel	Sum Percentage	V. Fine Sand + Silt+Clay	>2 mm Gravel	1-2 mm Coarse Sand	0.5-1 mm Medium Sand	0.25-0.5 mm Fine Sand	0.063 to 0.25 mm Very Fine Sand	0.004 to 0.063 mm Silt	0.001 to 0.004 mm Clay	Sum Percentage	Percent Fines
B2	11.5	1	9			90			100	10									
	12.5	1	9	10	80				100	20	0.7	0.3	3.4	28.6	29.7	30.5	6.8	100	67
	13.5	1	9	90					100	100	0.7	0.3	3.4	28.6	29.7	30.5	6.8	100	67
	14.5	1	89	10					100	100	0.7	0.3	3.4	28.6	29.7	30.5	6.8	100	67
	16.5	1	99						100	100									
	17.5	1	99						100	100									
	18.5	1	99						100	100	11.6	1.9	5	28.2	29.9	17.7	5.7	100	53.3
	19.5	1	3	1	95				100	5	11.6	1.9	5	28.2	29.9	17.7	5.7	100	53.3

As it is applied to the PlumeStop application, aside from B2-11.5 interval, PlumeStop distribution will be limited to the projected radius near the direct push injection point. Based on the amount of fine grain materials present, an application of PlumeStop in this geology will do best on tighter spacing using a higher concentration and modest volumes. In addition, due to the relatively high fines content, we see no need to park the PlumeStop with Calcium Chloride, which is sometimes used at sites to keep the PlumeStop stationary.

Lastly, Regenesis tested the soil samples for PlumeStop adhesion. The soils at the site appear to have a normal adhesion rate as compared to other sites with similar fines content. Considering the design verification testing as whole, efforts should be made to minimize the injection spacing to attain overlapping radius of influence and optimal distribution of PlumeStop.

		Regenesis Distribution									AMTEST Lab Distribution								
	Depth	Clays	Silts	V Fine Sand	Fine Sand	Medium Sand	Coarse Sand	Gravel	Sum Percentage	V. Fine Sand + Silt+Clay	>2 mm Gravel	1-2 mm Coarse Sand	0.5-1 mm Medium Sand	0.25-0.5 mm Fine Sand	0.063 to 0.25 mm Very Fine Sand	0.004 to 0.063 mm Silt	0.001 to 0.004 mm Clay	Sum Percentage	Percent Fines
	25.5	1	9	5	85				100	15									
	26.5	5	10	5	80				100	20									
	27.5	5	13	10	72				100	28									
	28.5	5	95						100	100	0.3	0.1	0.1	1.1	44.7	45.3	8.2	99.8	98.2
B5	29.5		100						100	100	0.3	0.1	0.1	1.1	44.7	45.3	8.2	99.8	98.2
	30.5		100						100	100									
	31.5		100						100	100									
	32.5		100						100	100									
	33.5		100						100	100	0	0.1	0.1	0.1	41	50.1	8.7	100	99.8
	34.5	1	99						100	100	0	0.1	0.1	0.1	41	50.1	8.7	100	99.8

		Regenesis Distribution									AMTEST Lab Distribution								
	Depth	Clays	Silts	V Fine Sand	Fine Sand	Medium Sand	Coarse Sand	Gravel	Sum Percentage	V. Fine Sand + Silt+Clay	>2 mm Gravel	1-2 mm Coarse Sand	0.5-1 mm Medium Sand	0.25-0.5 mm Fine Sand	0.063 to 0.25 mm Very Fine Sand	0.004 to 0.063 mm Silt	0.001 to 0.004 mm Clay	Sum Percentage	Percent Fines
	16.5	1	14	85					100	100									
	17.5	1	14	85					100	100									
	18.5	1	9	90					100	100	0	0.1	0.8	1.8	47.7	43	6.5	99.9	97.2
	19.5	4	96						100	100	0	0.1	0.8	1.8	47.7	43	6.5	99.9	97.2
	20.5	2	98						100	100									
	21.5	1	99						100	100									
	22.5		10	90					100	100									
	23.5		100						100	100	0	0.1	0.1	9.8	61.7	21.4	6.9	100	90
	24.5		100						100	100	0	0.1	0.1	9.8	61.7	21.4	6.9	100	90
B4	25.5		100						100	100									
	26.5		100						100	100									
	27.5		100						100	100									
	28.5		100						100	100	0.2	0.1	0.1	0.1	44.4	47.2	7.9	100	99.5
	29.5		100						100	100	0.2	0.1	0.1	0.1	44.4	47.2	7.9	100	99.5
	30.5		100						100	100									
	31.5		100						100	100									
	32.5		100						100	100									
	33.5		15		85				100	15	2.8	0.9	3.9	34.7	20.1	30.9	6.6	99.9	57.6
	34.5		5	90					95	95	2.8	0.9	3.9	34.7	20.1	30.9	6.6	99.9	57.6

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix C
Well Logs

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. **RE10886**

Construction/Decommission

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Consulting Firm **HWA Geosciences**

Property Owner **Ultra Custom Care Cleaners**

Site Address **18304 Bothell Way NE**

City **Bothell** County **King**

Unique Ecology Well ID Tag No. BJA-503

Location 1/4 **NE** 1/4 **NE** Sec **7** TWN **26N** R **5E** EWM or WWM

Lat/Long (s,t,r still Required) Lat Deg x Lat Min/Sec x
Long Deg x Long Min/Sec x

Tax Parcel No. ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards Materials used and the information reported above are true to my best knowledge and belief

[X] Driller [ ] Trainee Name (Print) **James Goble**

Driller/Trainee Signature ______

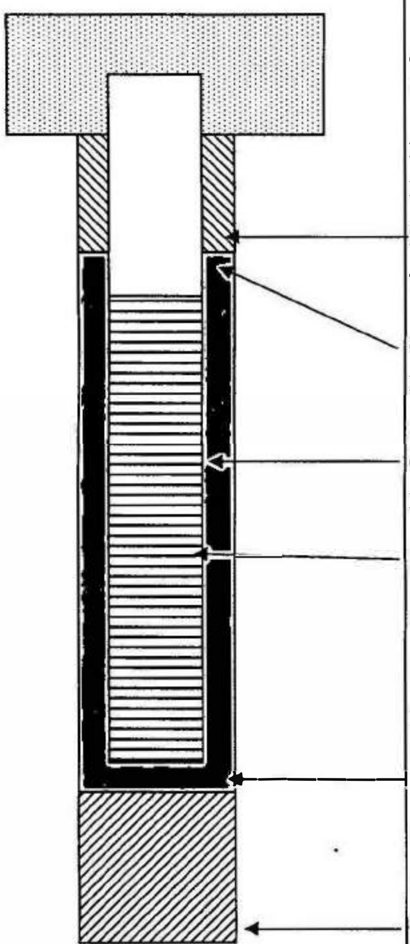
Driller/Trainee License No. **3131**

If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter 10" Static Level 12'

Work/Decommision Start Date 1-29-15

Work/Decommision End Date 1-29-15

Construction/Design	Well Data 103-15-0629		Formation Description
	Concrete Surface Seal Depth	3' FT	0 - 4' FT (Fill) Sand & gravel Some Debris & rock
	Blank Casing (dia x dep)	4"x 8'	
	Material	Sch-40, PVC	
	Backfill	4' FT	
	Type	Bent. chips	4' - 23' FT Fine To Med Brown Sand
	Seal	X	
	Material	X	
	Gravel Pack	16' FT	
	Material	8/12 Sand	0 - FT
	Screen (dia x dep)	4" x 15'	
	Slot Size	020	RECEIVED
	Material	Sch. 40, PVC	APR 22 2015
	Well Depth	23' FT	DEPT OF ECOLOGY NWRO - WR
	Backfill	X	
	Material	X	
	Total Hole Depth	23' FT	

Scale 1" = ______ Page ______ of ______

Ultra Site Well ID: INJ-01

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. **RE10886**

Construction/Decommission

[X] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well
[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner **Ultra Custom Care Cleaners**
Site Address **18304 Bothell Way NE**
City **Bothell** County **King**

Consulting Firm **HWA Geosciences**

Unique Ecology Well ID Tag No. BJA. 504

Location 1/4 **NE** 1/4 **NE** Sec **7** TWN **26N** R **5E** EWM or WWM

Lat/Long (s,t,r still Required) Lat Deg x Lat Min/Sec x
Long Deg x Long Min/Sec x

Tax Parcel No. ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards Materials used and the information reported above are true to my best knowledge and belief

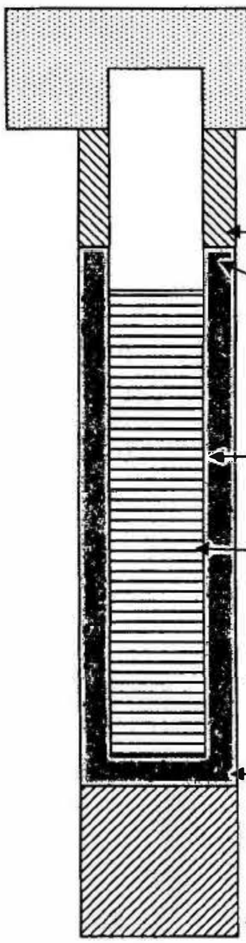
[X] Driller [ ] Trainee Name (Print) **James Goble**
Driller/Trainee Signature
Driller/Trainee License No. **3131**

If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter 10" Static Level 12'

Work/Decommission Start Date 1-29-15

Work/Decommision End Date 1-29-15

Construction/Design	Well Data 103-15-0629			Formation Description
	Concrete Surface Seal Depth	3'	FT	**0** - 4' **FT** (Fill) Sand & gravel Some Debris & rock
	Blank Casing (dia x dep)	4" x 8'		
	Material	Sch-40, PVC		
	Backfill	4'	FT	
	Type	Bent. chips		**0** 4' - 23' **FT** Fine To Med Brown Sand
	Seal	X		
	Material	X		
	Gravel Pack	16'	FT	
	Material	8/12 Sand		**0** - **FT**
	Screen (dia x dep)	4" x 15'		
	Slot Size	020		
	Material	Sch. 40, PVC		RECEIVED APR 22 2015 DEPT OF ECOLOGY NWRO - WR
	Well Depth	23'	FT	
	Backfill	X		
	Material	X		
	Total Hole Depth	23'	FT	

Scale 1" = ______ Page ______ of ______

ECY 050-12 (Rec=v 2/01)

Ultra Site Well ID: INJ-02

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT

Notice of Intent No. RE10886

Construction/Decommission

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Property Owner: **Ultra Custom Care Cleaners**

Site Address: **18304 Bothell Way NE**

Consulting Firm: **HWA Geosciences**

City: **Bothell** County: **King**

EWM

Unique Ecology Well ID Tag No. BJA 505

Location 1/4 **NE** 1/4 **NE** Sec **7** TWN **26N** R **5E** or WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards Materials used and the information reported above are true to my best knowledge and belief

Lat/Long (s,t,r still Required) Lat Deg x Lat Min/Sec x

Long Deg x Long Min/Sec x

Tax Parcel No. ______

[X] Driller [ ] Trainee Name (Print) **James Goble**

Driller/Trainee Signature ______

Driller/Trainee License No. **3131**

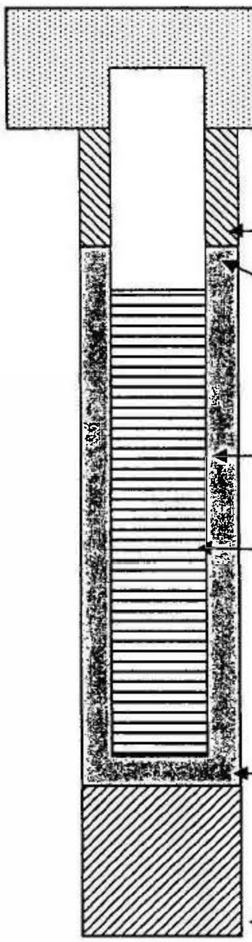
Cased or Uncased Diameter 10" Static Level 12'

Work/Decommision Start Date 1-29-15

If trainee, licensed driller's Signature and License No. ______

Work/Decommision End Date 1-29-15

Construction/Design | Well Data 103-15-0629 | Formation Description



Well Data		
Concrete Surface Seal Depth	3'	FT
Blank Casing (dia x dep)	4" x 8'	
Material	Sch-40, PVC	
Backfill	4'	FT
Type	Bent. chips	
Seal	X	
Material	X	
Gravel Pack	16'	FT
Material	8/12 Sand	
Screen (dia x dep)	4" x 15'	
Slot Size	020	
Material	Sch. 40, PVC	
Well Depth	23'	FT
Backfill	X	
Material	X	
Total Hole Depth	23'	FT

Formation Description

0 - 4' FT
(Fill) Sand & gravel
Some Debris & rock

0 4' - 23' FT
Fine To Med
Brown Sand

0 - FT

APR 22 2015
DEPT OF ECOLOGY
NWRO - WR

Scale 1" = ______ Page ____ of ____ ECY 050-12 (Rec=v 2/01)

Ultra Site Well ID: INJ-03

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. **RE10886**

Construction/Decommission

[X] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well
[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: **Ultra Custom Care Cleaners**
Site Address: **18304 Bothell Way NE**
City: **Bothell** County: **King**

Consulting Firm: **HWA Geosciences**

Unique Ecology Well ID Tag No. BJA.506

Location: 1/4 **NE** 1/4 **NE** Sec **7** TWN **26N** R **5E** [EWM] or WWM

Lat/Long (s,t,r still Required): Lat Deg x; Lat Min/Sec x; Long Deg x; Long Min/Sec x

Tax Parcel No. ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards Materials used and the information reported above are true to my best knowledge and belief

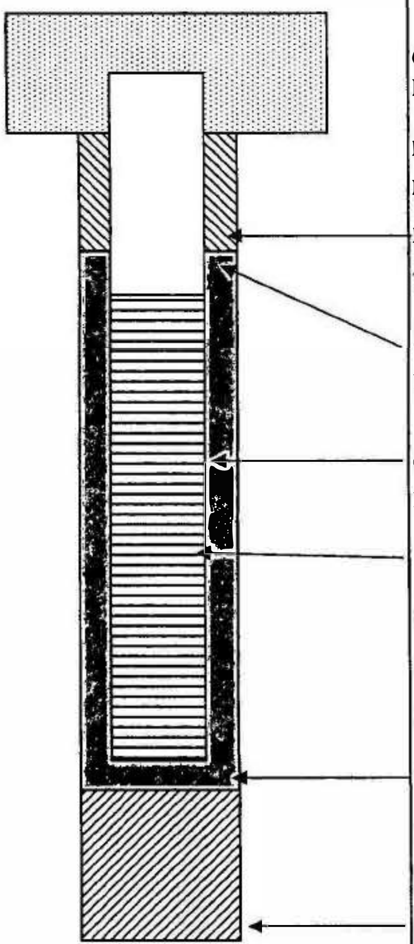
[X] Driller [ ] Trainee Name (Print) **James Goble**
Driller/Trainee Signature ______
Driller/Trainee License No. **3131**

If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter 10" Static Level 12'

Work/Decommission Start Date 1-29-15
Work/Decommision End Date 1-29-15

Construction/Design | Well Data 103-15-0629 | Formation Description



Well Data		
Concrete Surface Seal Depth	3'	FT
Blank Casing (dia x dep)	4" x 8'	
Material	Sch-40, PVC	
Backfill	4'	FT
Type	Bent. chips	
Seal	X	
Material	X	
Gravel Pack	16'	FT
Material	8/12 Sand	
Screen (dia x dep)	4" x 15'	
Slot Size	020	
Material	Sch. 40, PVC	
Well Depth	23'	FT
Backfill	X	
Material	X	
Total Hole Depth	23'	FT

Formation Description:

0 - 4' FT
(Fill) Sand & gravel
Some Debris & rock

0 4' - 23' FT
Fine To Med
Brown Sand

0 - FT

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APR 22 2015
DEPT OF ECOLOGY
NWRO - WR

Scale 1" = ______ Page ______ of ______

ECY 050-12 (Rec=v 2/01)

Ultra Site Well ID: INJ-04

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT

Notice of Intent No. **RE10886**

Construction/Decommission

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Property Owner **Ultra Custom Care Cleaners**

Site Address **18304 Bothell Way NE**

City **Bothell** County **King**

Consulting Firm **HWA Geosciences**

Unique Ecology Well ID Tag No. BJA-503

Location 1/4 **NE** 1/4 **NE** Sec **7** TWN **26N** R **5E** or [EWM] WWM

Lat/Long (s,t,r still Required) Lat Deg x Lat Min/Sec x

Long Deg x Long Min/Sec x

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards Materials used and the information reported above are true to my best knowledge and belief

Tax Parcel No. ______

[X] Driller [ ] Trainee Name (Print) ~~James Gobel~~ Aaron Ochetree

Driller/Trainee Signature

Driller/Trainee License No. ~~3131~~ 3141

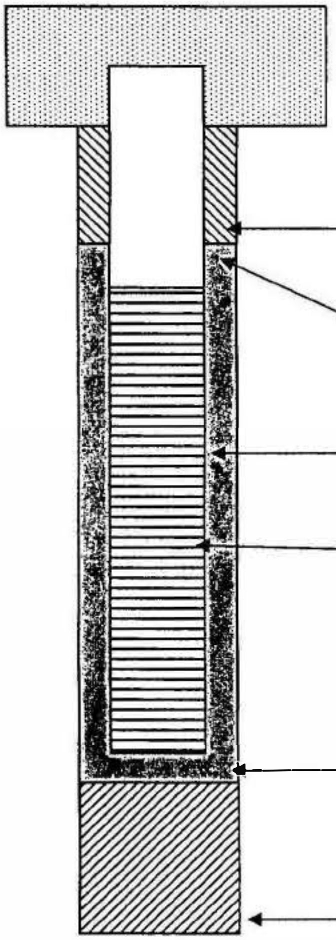
Cased or Uncased Diameter 10 1/4 Static Level 12'

If trainee, licensed driller's Signature and License No. ______

Work/Decommision Start Date 1-30-15

Work/Decommision End Date 1-30-15

Construction/Design | Well Data 103-15-0629 | Formation Description



Well Data		
Concrete Surface Seal Depth	3	FT
Blank Casing (dia x dep)	4" x 8'	
Material	PVC	
Backfill	4	FT
Type	—	
Seal	—	
Material	Bent Chip	
Gravel Pack	16	FT
Material	10/20 Sand	
Screen (dia x dep)	4" x 15'	
Slot Size	.020	
Material	PVC	
Well Depth	23	FT
Backfill	—	
Material	—	
Total Hole Depth	23	FT

Formation Description

0 0 - 4 FT
Light Brown Medium Sand with Small Cobbles

0 4 - 23 FT
Medium light Brown to grey Sand

0 - FT

APR 22 2015
DEPT OF ECOLOGY
NWRO - WR

Scale 1" = ______ Page ______ of ______

ECY 050-12 (Rev 2/01)

Ultra Site Well ID: INJ-05

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. **RE10886**

Construction/Decommission

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Consulting Firm **HWA Geosciences**

Property Owner **Ultra Custom Care Cleaners**

Site Address **18304 Bothell Way NE**

City **Bothell** County **King**

Unique Ecology Well ID Tag No. BJA-508

Location 1/4 **NE** 1/4 **NE** Sec **7** TWN **26N** R **5E** [EWM] or WWM

Lat/Long (s,t,r still Required) Lat Deg x Lat Min/Sec x

Long Deg x Long Min/Sec x

Tax Parcel No. ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards Materials used and the information reported above are true to my best knowledge and belief

[X] Driller [ ] Trainee Name (Print) ~~[illegible]~~ Aaron Ochelltree

Driller/Trainee Signature [signature]

Driller/Trainee License No. ~~3131~~ 3141

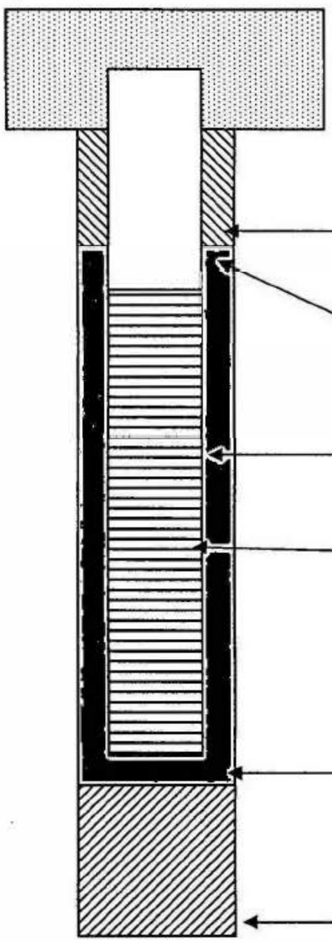
If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter 10 1/4 Static Level 12'

Work/Decommision Start Date 1-30-15

Work/Decommision End Date 1-30-15

Construction/Design | Well Data 103-15-0629 | Formation Description



Well Data		
Concrete Surface Seal Depth	3	FT
Blank Casing (dia x dep)	4" x 8'	
Material	PVC	
Backfill	4	FT
Type	—	
Seal	—	
Material	Bent Chip	
Gravel Pack	16	FT
Material	10/20 Sand	
Screen (dia x dep)	4" x 15'	
Slot Size	.020	
Material	PVC	
Well Depth	23	FT
Backfill	—	
Material	—	
Total Hole Depth	23	FT

Formation Description

0 - 4 FT
Light Brown Medium Sand with Small Cobbles

4 - 23 FT
Medium light Brown to grey Sand

0 - FT

RECEIVED
APR 22 2015
DEPT OF ECOLOGY
NWRO - WR

Scale 1" = ______ Page ______ of ______

ECY 050-12 (Rev 2/01)

Ultra Site Well ID: INJ-06

RESOURCE PROTECTION WELL REPORT
(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE10886

Construction/Decommission
[X] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well
[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: Ultra Custom Care Cleaners
Site Address: 18304 Bothell Way NE
City: Bothell   County: 17-King

Consulting Firm: HWA Geosciences

Unique Ecology Well ID Tag No.: BJA-551

Location: 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E EWM or WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Lat/Long (s,t,r still Required): Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

Tax Parcel No. ______

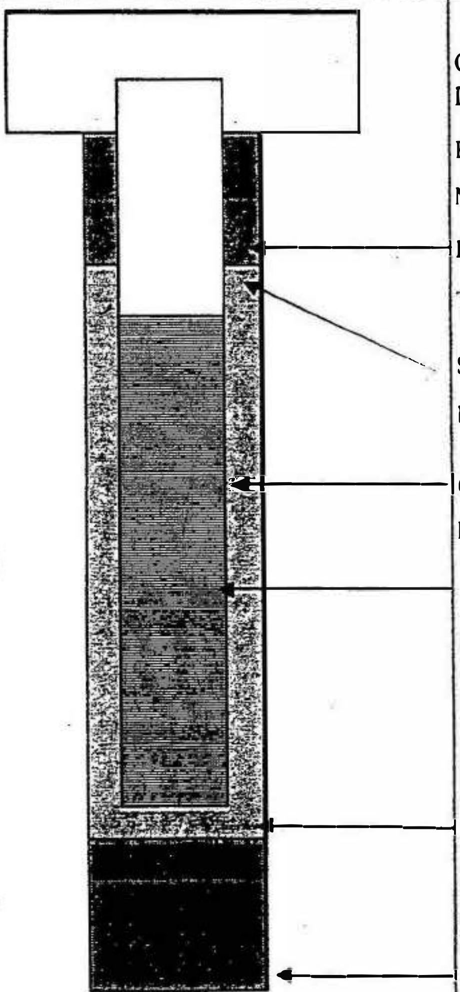
[ ] Driller [ ] Trainee Name (Print): Kasey Goble
Driller/Trainee Signature: [signature]
Driller/Trainee License No.: 2501

If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter: 2¼"   Static Level: 8'

Work/Decommission Start Date: 1/28/2015
Work/Decommission End Date: 2/12/2015

Construction/Design | Well Data 103-15-0629 | Formation Description



Well Data		
Concrete Surface Seal Depth	2	FT
Blank Casing (dia x dep)	1" x 8'	
Material	PVC	
Backfill	6	FT
Type	—	
Seal	Bentonite	
Material	chips	
Gravel Pack	5	FT
Material	2/12 Sand	
Screen (dia x dep)	1" x 5'	
Slot Size	010	
Material	PVC	
Well Depth	13	FT
Backfill	—	
Material	—	
Total Hole Depth	13	FT

Formation Description:
0 - 13 FT
Did not log soil

0 - ______ FT

0 - ______ FT

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Scale 1" = ______   Page ______ of ______   ECY 050-12 (Rev 2/01)

Ultra Site Well ID: INJ-07

RESOURCE PROTECTION WELL REPORT
SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE10886

Construction/Decommission
[ ] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well
[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: Ultra Custom Care Cleaners
Site Address: 18304 Bothell Way NE
City: Bothell County: 17-King

Consulting Firm: HWA Geosciences

Unique Ecology Well ID Tag No.: BJA-552

Location: 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E EWM or WWM

Lat/Long (s,t,r still Required): Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Tax Parcel No. ______

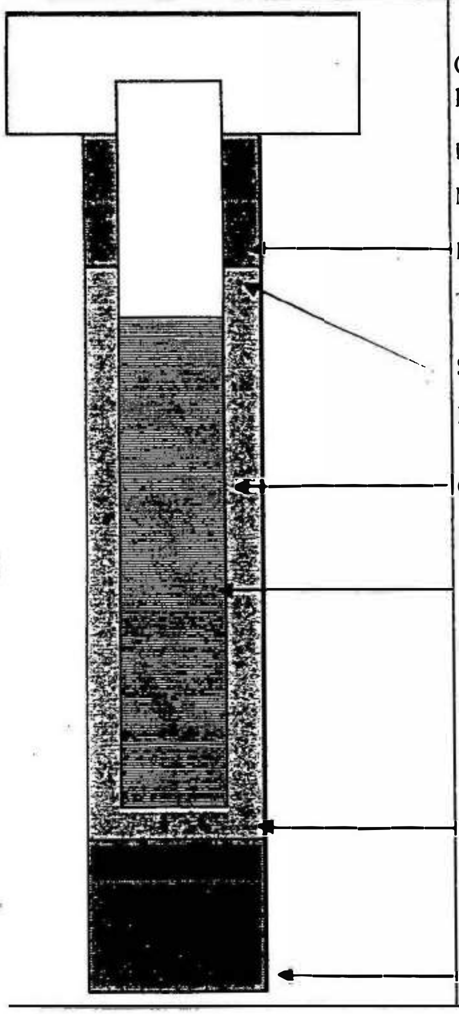
[ ] Driller [ ] Trainee Name (Print): Kasey Goble
Driller/Trainee Signature: [signature]
Driller/Trainee License No.: 2501

Cased or Uncased Diameter: 2 1/4" Static Level: 8'

If trainee, licensed driller's Signature and License No. ______

Work/Decommission Start Date: 1/28/2015
Work/Decommission End Date: 2/12/2015

Construction/Design | Well Data 103-15-0629 | Formation Description



Well Data		
Concrete Surface Seal Depth	2	FT
Blank Casing (dia x dep)	1" x 8'	
Material	PVC	
Backfill	6	FT
Type	—	
Seal Material	Bentonite chips	
Gravel Pack	5	FT
Material	2/12 Sand	
Screen (dia x dep)	1" x 5'	
Slot Size	010	
Material	PVC	
Well Depth	13	FT
Backfill	—	
Material	—	
Total Hole Depth	13	FT

Formation Description

0 - 13 FT
Did not log soil

0 - FT

0 - FT

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Scale 1" = ______ Page ______ of ______

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Ultra Site Well ID: INJ-08

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE10886

Construction/Decommission

[✓] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Property Owner: Ultra Custom Care Cleaners

Site Address: 18304 Bothell Way NE

City: Bothell   County: 17-King

Consulting Firm: HWA Geosciences

Unique Ecology Well ID Tag No.: BJA-553

Location: 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E EWM or WWM

Lat/Long (s,t,r still Required): Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

Tax Parcel No. ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[ ] Driller [ ] Trainee Name (Print): Kasey Goble

Driller/Trainee Signature: [signature]

Driller/Trainee License No.: 2501

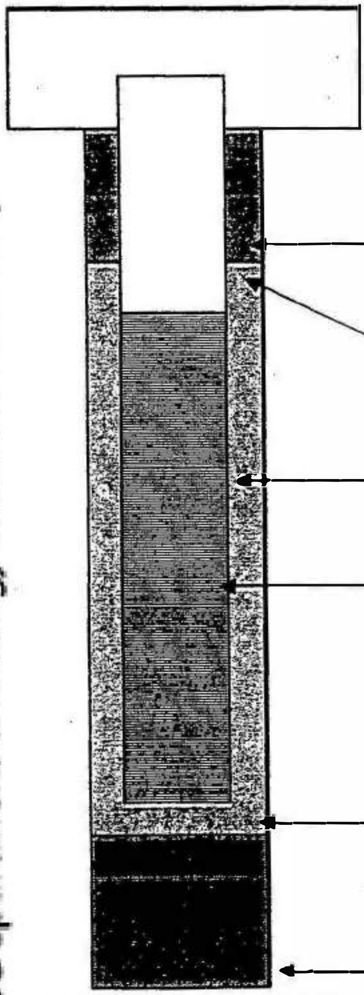
If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter: 2¼"   Static Level: 8'

Work/Decommission Start Date: 1/28/2015

Work/Decommission End Date: 2/12/2015

Construction/Design   Well Data 103-15-0629   Formation Description



Well Data	
Concrete Surface Seal Depth	2 FT
Blank Casing (dia x dep)	1" x 8'
Material	PVC
Backfill	6 FT
Type	—
Seal	Bentonite
Material	chips
Gravel Pack	5 FT
Material	2/12 Sand
Screen (dia x dep)	1" x 5'
Slot Size	010
Material	PVC
Well Depth	13 FT
Backfill	—
Material	—
Total Hole Depth	13 FT

Formation Description:

0 - 13 FT
Did not log soil

0 - ______ FT

0 - ______ FT

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DEPT OF ECOLOGY
NWRO - WR

Scale 1" = ______   Page ______ of ______

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Ultra Site Well ID: INJ-09

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE10886

Construction/Decommission

[✓] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ____

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Property Owner: Ultra Custom Care Cleaners

Site Address: 18304 Bothell Way NE

City: Bothell   County: 17-King

Consulting Firm: HWA Geosciences

Unique Ecology Well ID Tag No.: BJA-554

Location: 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E   EWM or WWM

Lat/Long (s,t,r still Required): Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Tax Parcel No. ____

[ ] Driller [ ] Trainee Name (Print): Kasey Goble

Driller/Trainee Signature: [signature]

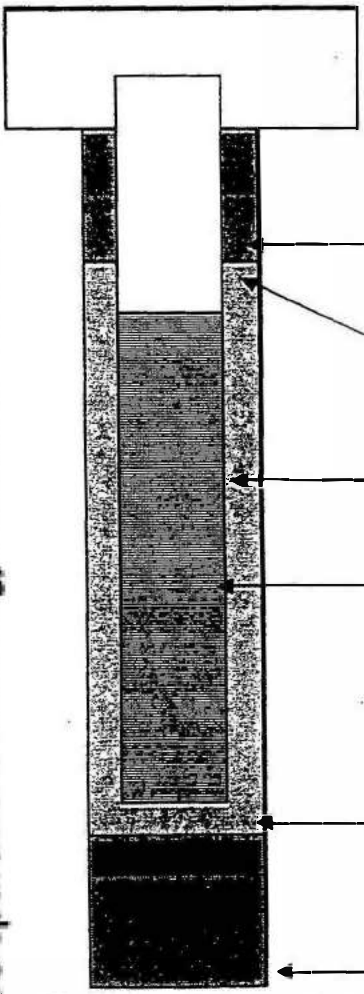
Driller/Trainee License No.: 2501

Cased or Uncased Diameter: 2¼"   Static Level: 8'

If trainee, licensed driller's Signature and License No. ____

Work/Decommission Start Date: 1/28/2015

Work/Decommission End Date: 2/12/2015

Construction/Design	Well Data 103-15-0629		Formation Description
	Concrete Surface Seal Depth	2 FT	0 - 13 FT DID NOT LOG SOIL
	Blank Casing (dia x dep)	1" x 8'	
	Material	PVC	
	Backfill	6 FT	
	Type	—	
	Seal	BENTONITE	0 - FT
	Material	CHIPS	
	Gravel Pack	5 FT	
	Material	2/12 SAND	
	Screen (dia x dep)	1" x 5'	0 - FT
	Slot Size	010	
	Material	PVC	RECEIVED APR 22 2015 DEPT OF ECOLOGY NWRO - WR
	Well Depth	13 FT	
	Backfill	—	
	Material	—	
	Total Hole Depth	13 FT	

Scale 1" = ____   Page ____ of ____

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Ultra Site Well ID: INJ-10

RESOURCE PROTECTION WELL REPORT

SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT

Notice of Intent No. RE10886

Construction/Decommission

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Property Owner: Ultra Custom Care Cleaners

Site Address: 18304 Bothell Way NE

City: Bothell County: 17-King

Consulting Firm: HWA Geosciences

Unique Ecology Well ID Tag No.: BJA-555

Location: 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E EWM or WWM

Lat/Long (s,t,r still Required): Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Tax Parcel No. ______

[ ] Driller [ ] Trainee Name (Print): Kasey Goble

Driller/Trainee Signature: [signature]

Driller/Trainee License No.: 2501

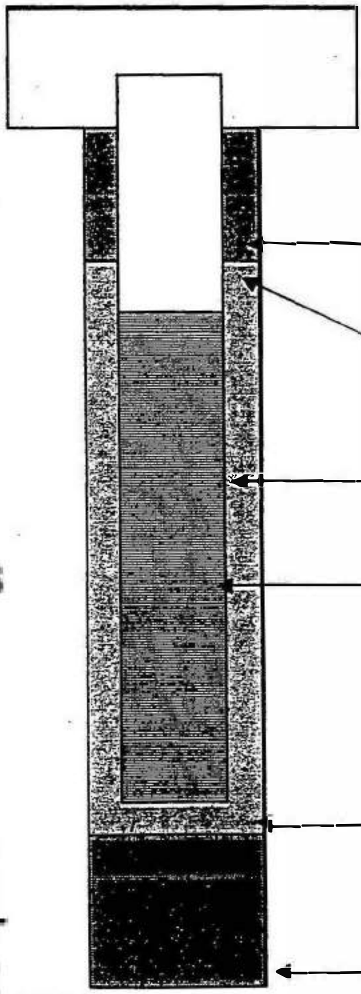
If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter: 2¼" Static Level: 8'

Work/Decommission Start Date: 1/28/2015

Work/Decommission End Date: 2/12/2015

Construction/Design | Well Data 103-15-0629 | Formation Description



Well Data		
Concrete Surface Seal Depth	2	FT
Blank Casing (dia x dep)	1" x 8'	
Material	PVC	
Backfill	6	FT
Type	—	
Seal	Bentonite	
Material	Chips	
Gravel Pack	5	FT
Material	2/12 Sand	
Screen (dia x dep)	1" x 5'	
Slot Size	010	
Material	PVC	
Well Depth	13	FT
Backfill	—	
Material	—	
Total Hole Depth	13	FT

Formation Description

0 - 13 FT

Did not log soil

0 - ______ FT

0 - ______ FT

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Ultra Site Well ID: INJ-11

RESOURCE PROTECTION WELL REPORT

SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT

Notice of Intent No. RE10886

Construction/Decommission

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Consulting Firm HWA Geosciences

Unique Ecology Well ID Tag No. BJA- 556

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[ ] Driller [ ] Trainee Name (Print) Kasey Goble

Driller/Trainee Signature [signature]

Driller/Trainee License No. 2501

If trainee, licensed driller's Signature and License No. ______

Property Owner Ultra Custom Care Cleaners

Site Address 18304 Bothell Way NE

City Bothell County 17-King

Location 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E EWM or WWM

Lat/Long (s,t,r still Required) Lat Deg ______ Lat Min/Sec ______

Long Deg ______ Long Min/Sec ______

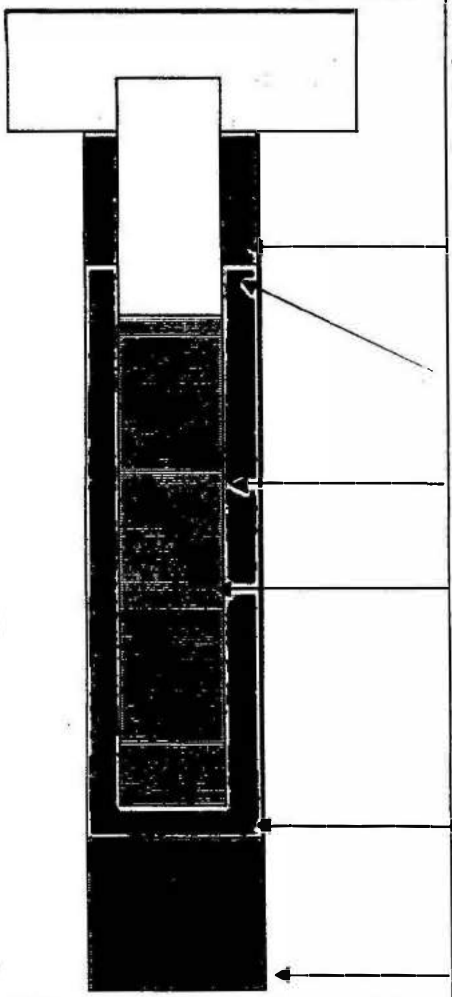
Tax Parcel No. ______

Cased or Uncased Diameter 2¼" Static Level 8'

Work/Decommission Start Date 1/28/2015

Work/Decommission End Date 2/ 122015

Construction/Design | Well Data 103-15-0629 | Formation Description



Concrete Surface Seal Depth	2	FT
Blank Casing (dia x dep)	3/4" x 8'	
Material	PVC	
Backfill	6	FT
Type	—	
Seal	BENTONITE	
Material	CHIPS	
Gravel Pack	5	FT
Material	2/12 SAND	
Screen (dia x dep)	3/4" x 5'	
Slot Size	010	
Material	PVC	
Well Depth	13	FT
Backfill	—	
Material	—	
Total Hole Depth	13	FT

0 - 13 FT

DID NOT LOG SOIL

0 - ______ FT

0 - ______ FT

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ECY 050-12 (Rev 2/01)

Ultra Site Well ID: INJ-12

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE10886

Construction/Decommission

[✓] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Property Owner: Ultra Custom Care Cleaners

Site Address: 18304 Bothell Way NE

City: Bothell   County: 17-King

Consulting Firm: HWA Geosciences

Unique Ecology Well ID Tag No.: BJA-557

Location: 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E EWM [X] or WWM [ ]

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Lat/Long (s,t,r still Required): Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

Tax Parcel No. ______

[ ] Driller [ ] Trainee Name (Print): Kasey Goble

Driller/Trainee Signature: [signature]

Driller/Trainee License No.: 2501

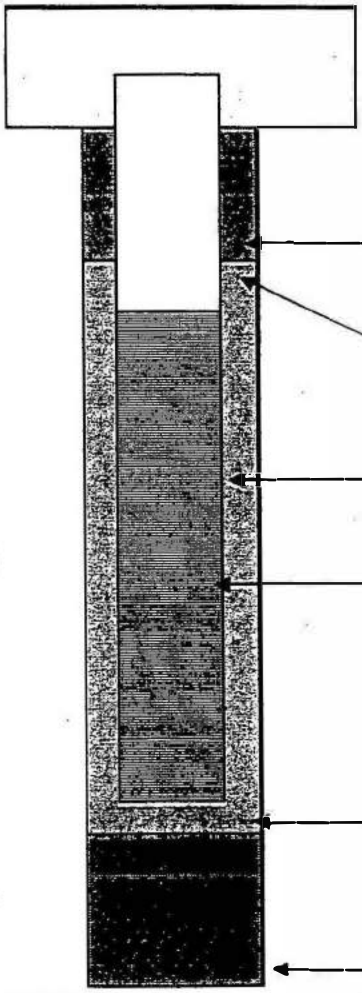
If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter: 2¼"   Static Level: 8'

Work/Decommission Start Date: 1/28/2015

Work/Decommission End Date: 2/12/2015

Construction/Design   Well Data 103-15-0629   Formation Description



Well Data		
Concrete Surface Seal Depth	2	FT
Blank Casing (dia x dep)	1" x 8'	
Material	PVC	
Backfill	6	FT
Type	—	
Seal	Bentonite	
Material	Chips	
Gravel Pack	5	FT
Material	2/12 Sand	
Screen (dia x dep)	1" x 5'	
Slot Size	010	
Material	PVC	
Well Depth	13	FT
Backfill	—	
Material	—	
Total Hole Depth	13	FT

Formation Description

0 - 13 FT
Did not log soil

0 - ______ FT

0 - ______ FT

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APR 22 2015
DEPT OF ECOLOGY
NWRO - WR

Scale 1" = ______   Page ______ of ______   ECY 050-12 (Rev 2/01)

Ultra Site Well ID: INJ-13

RESOURCE PROTECTION WELL REPORT
(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE10886

Construction/Decommission
[X] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well
[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: Ultra Custom Care Cleaners
Site Address: 18304 Bothell Way NE
City: Bothell County: 17-King

Consulting Firm: HWA Geosciences

Unique Ecology Well ID Tag No. BJA-558

Location: 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E [EWM] or WWM

Lat/Long (s,t,r still Required): Lat Deg ______ Lat Min/Sec ______
Long Deg ______ Long Min/Sec ______

Tax Parcel No. ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

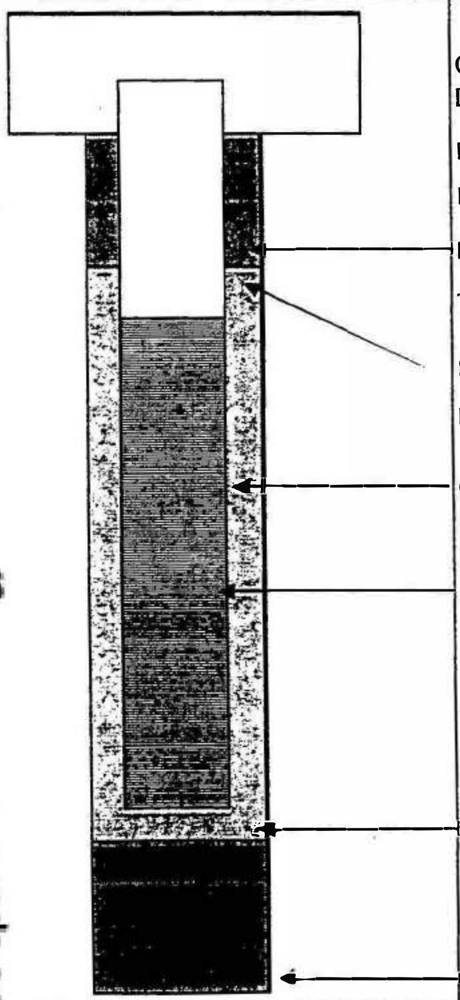
[ ] Driller [ ] Trainee Name (Print): Kasey Goble
Driller/Trainee Signature: [signature]
Driller/Trainee License No.: 2501

If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter: 2¼" Static Level: 8'

Work/Decommission Start Date: 1/28/2015
Work/Decommission End Date: 2/12/2015

Construction/Design — Well Data 103-15-0629 — Formation Description



Well Data		
Concrete Surface Seal Depth	2	FT
Blank Casing (dia x dep)	1" x 8'	
Material	PVC	
Backfill	6	FT
Type	—	
Seal	BENTONITE	
Material	CHIPS	
Gravel Pack	5	FT
Material	2/12 SAND	
Screen (dia x dep)	1" x 5'	
Slot Size	010	
Material	PVC	
Well Depth	13	FT
Backfill	—	
Material	—	
Total Hole Depth	13	FT

Formation Description

0 - 13 FT
DID NOT LOG SOIL

0 - ______ FT

0 - ______ FT

Scale 1" = ______ Page ______ of ______ ECY 050-12 (Rev 2/01)

Ultra Site Well ID: INJ-14

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE10886

Construction/Decommission

[X] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ________

Type of Well
[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: Ultra Custom Care Cleaners
Site Address: 18304 Bothell Way NE
City: Bothell
County: 17-King

Consulting Firm: HWA Geosciences

Unique Ecology Well ID Tag No.: BJA-559

Location: 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E EWM or WWM

Lat/Long (s,t,r still Required): Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

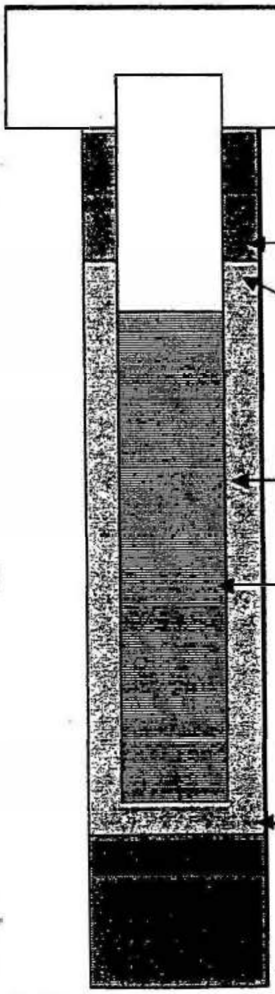
Tax Parcel No. ______

[ ] Driller [ ] Trainee Name (Print): Kasey Goble
Driller/Trainee Signature: [signature]
Driller/Trainee License No.: 2501

If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter: 2¼"
Static Level: 8'
Work/Decommission Start Date: 1/28/2015
Work/Decommission End Date: 2/12/2015

Construction/Design | Well Data 103-15-0629 | Formation Description



Well Data		
Concrete Surface Seal Depth	2	FT
Blank Casing (dia x dep)	1" x 8'	
Material	PVC	
Backfill	6	FT
Type	—	
Seal	BENTONITE	
Material	CHIPS	
Gravel Pack	5	FT
Material	2/12 SAND	
Screen (dia x dep)	1" x 5'	
Slot Size	010	
Material	PVC	
Well Depth	13	FT
Backfill	—	
Material	—	
Total Hole Depth	13	FT

Formation Description:

0 - 13 FT
DID NOT LOG SOIL

0 - FT

0 - FT

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Scale 1" = ______

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ECY 050-12 (Rev 2/01)

Ultra Site Well ID: INJ-15

RESOURCE PROTECTION WELL REPORT
SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE10886

Construction/Decommission
[X] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well
[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: Ultra Custom Care Cleaners
Site Address: 18304 Bothell Way NE
City: Bothell County: 17-King

Consulting Firm: HWA Geosciences

Unique Ecology Well ID Tag No.: BJA-560

Location: 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E EWM or WWM

ELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Lat/Long (s,t,r still Required): Lat Deg ______ Lat Min/Sec ______
Long Deg ______ Long Min/Sec ______

Tax Parcel No. ______

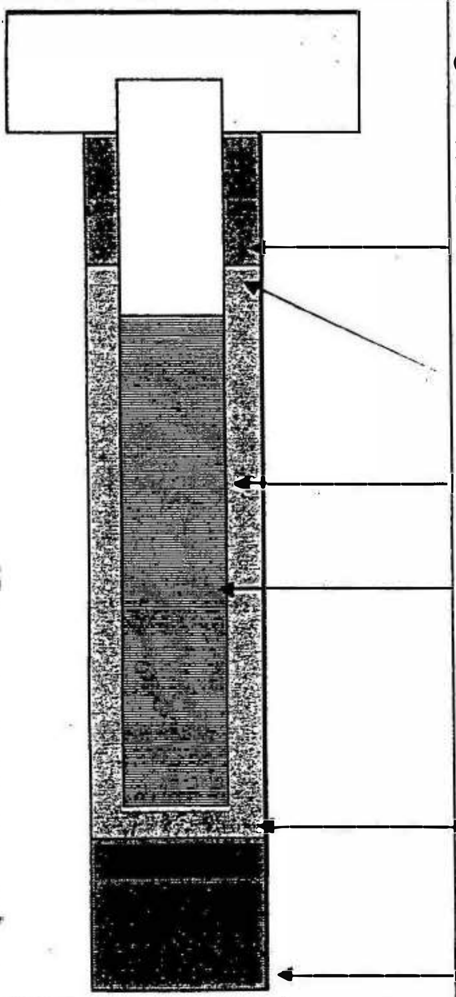
[ ] Driller [ ] Trainee Name (Print): Kasey Goble
Driller/Trainee Signature: [signature]
Driller/Trainee License No.: 2501

If trainee, licensed driller's Signature and License No.: ______

Cased or Uncased Diameter: 2¼" Static Level: 8'

Work/Decommission Start Date: 1/28/2015
Work/Decommission End Date: 2/12/2015

Construction/Design Well Data 103-15-0629 Formation Description



Well Data		
Concrete Surface Seal Depth	2	FT
Blank Casing (dia x dep)	1" x 8'	
Material	PVC	
Backfill	6	FT
Type	—	
Seal	BENTONITE	
Material	CHIPS	
Gravel Pack	5	FT
Material	2/12 SAND	
Screen (dia x dep)	1" x 5'	
Slot Size	010	
Material	PVC	
Well Depth	13	FT
Backfill	—	
Material	—	
Total Hole Depth	13	FT

Formation Description

0 - 13 FT
DID NOT LOG SOIL

0 - FT

0 - FT

RECEIVED
APR 22 2015
DEPT OF ECOLOGY
NWRO - VR

Scale 1" = ______ Page ______ of ______ ECY 050-12 (Rev 2/01)

Ultra Site Well ID: INJ-16

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE 10886

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report

Construction/Decommission

[x] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Property Owner: Ultra Custom Care Cleaners

Site Address: 18304 Bothell Way NE

City: Bothell   County: 17-King

Consulting Firm: HWA Geosciences

Unique Ecology Well ID Tag No. BJA-561

Location: 1/4 NE 1/4 NE Sec 7 Twn 26N R 5E EWM or WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Lat/Long (s,t,r still Required): Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

Tax Parcel No. ______

[ ] Driller [ ] Trainee Name (Print) Kasey Goble

Driller/Trainee Signature [signature]

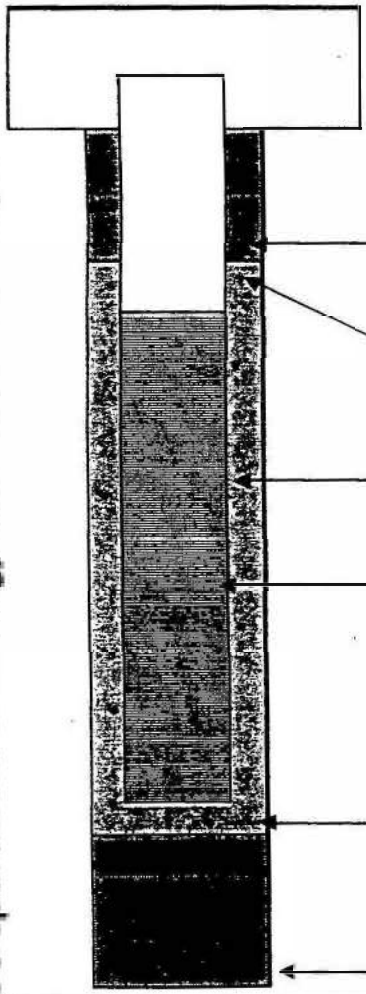
Driller/Trainee License No. 2501

If trainee, licensed driller's Signature and License No. ______

Cased or Uncased Diameter 2¼"   Static Level 8'

Work/Decommission Start Date 1/28/2015

Work/Decommission End Date 2/12/2015

Construction/Design	Well Data 103-15-0629			Formation Description
	Concrete Surface Seal Depth	2	FT	0 - 13 FT
	Blank Casing (dia x dep)	1" x 8'		DID NOT LOG SOIL
	Material	PVC		
	Backfill	6	FT	
	Type	—		
	Seal	BENTONITE		0 - FT
	Material	CHIPS		
	Gravel Pack	5	FT	
	Material	2/12 SAND		
				0 - FT
	Screen (dia x dep)	1" x 5'		
	Slot Size	010		RECEIVED
	Material	PVC		APR 22 2015
	Well Depth	13	FT	DEPT OF ECOLOGY NWRO - WR
	Backfill	—		
	Material	—		
	Total Hole Depth	13	FT	

Scale 1" = ______   Page ______ of ______

ECY 050-12 (Rev 2/01)

Ultra Site Well ID: INJ-17

Please print, sign and return to the Department of Ecology

ESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. RE09945

UBMIT ONE WELL REPORT PER WELL INSTALLED)

nstruction/Decommission *("x" in box)*
Construction
Decommission

IGINAL INSTALLATION Notice of Intent Number:

nsulting Firm
ique Ecology Well IDTag No. BIE 817

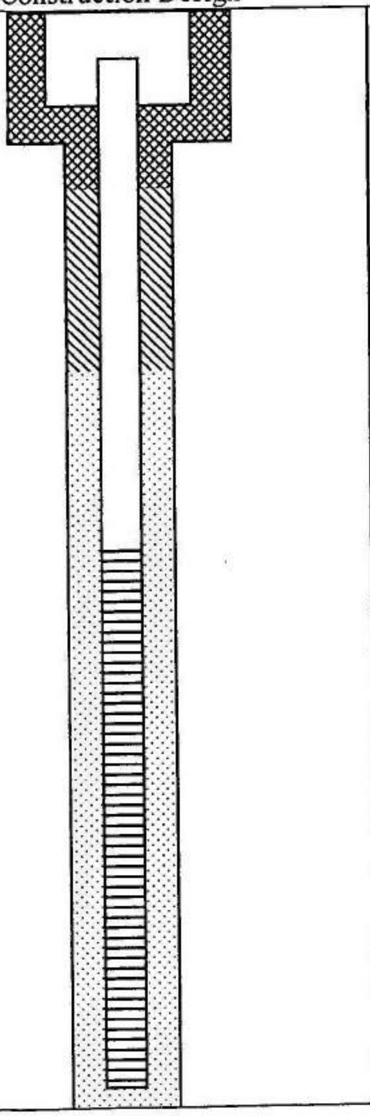
ELL CONSTRUCTION CERTIFICATION: I constructed and/or ept responsibility for construction of this well, and its compliance with all shington well construction standards. Materials used and the information orted above are true to my best knowledge and belief.

Driller ☐ Engineer ☐ Trainee
me (Print Last, First Name) Harnden, Don
iller/Engineer /Trainee Signature
iller or Trainee License No. 2914

trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*
☒ Resource Protection
☐ Geotech Soil Boring

Property Owner City of Bothell
Site Address 18304 Bothell Way NE
City Bothell County King
Location NE1/4-1/4 NE1/4 Sec 07 Twn 26 R 05
EWM ☒ or WWM ☐
Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____
Long Deg ____ Min ____ Sec ____
Tax Parcel No. 0726059003
Cased or Uncased Diameter 3 1/2" Static Level 7'
Work/Decommission Start Date 5/07/14
Work/Decommission Completed Date 5/07/14

Construction Design	Well Data	Formation Description
	MONUMENT TYPE: 8" Flush CONCRETE SURFACE SEAL: 0-2 ANNULAR SPACE: N/A BACKFILL: 2-7' TYPE: Bentonite Chips PVC BLANK: 0-9' SCREEN: 9-19' SLOT SIZE: .010 TYPE: sch 80, 1" PVC SAND PACK: 7-19' MATERIAL: 10/20 Silica Sand DRILLING METHOD: D.P WELL DEPTH: 19' BORING DIAMETER: 3 1/2"	Silty Sand w/ trace gravel RECEIVED JUN 16 2014 DEPT OF ECOLOGY NWRO - WR DH-03-05074

SCALE: 1"= N/A PAGE 5 OF 19

ECY 050-12 (Rev. 7/06)

Ecology is an Equal Opportunity Employer

Ultra Site Well ID: UCCMW-15

Please print, sign and return to the Department of Ecology

ESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. RE09945

UBMIT ONE WELL REPORT PER WELL INSTALLED)

onstruction/Decommission (*"x" in box*)
] Construction
] Decommission

RIGINAL INSTALLATION Notice of Intent Number:

onsulting Firm

nique Ecology Well IDTag No. BIE 811

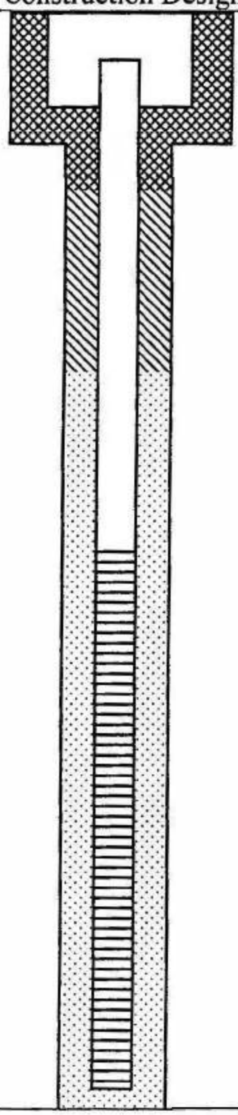
ELL CONSTRUCTION CERTIFICATION: I constructed and/or ccept responsibility for construction of this well, and its compliance with all ashington well construction standards. Materials used and the information orted above are true to my best knowledge and belief.

Driller ☐ Engineer ☐ Trainee
me (Print Last, First Name) Hamden, Don
riller/Engineer /Trainee Signature
riller or Trainee License No. 2914

trainee, licensed driller's Signature and License Number:

Type of Well (*"x in box*)
☒ Resource Protection
☐ Geotech Soil Boring

Property Owner City of Bothell
Site Address 18304 Bothell Way NE
City Bothell County King
Location NE1/4-1/4 NE1/4 Sec 07 Twn 26 R 05
EWM ☒ or WWM ☐
Lat/Long (s, t, r still REQUIRED) Lat Deg ___ Min ___ Sec ___
Long Deg ___ Min ___ Sec ___
Tax Parcel No. 0726059003
Cased or Uncased Diameter 3 1/2" Static Level 8'
Work/Decommission Start Date 5/6/14
Work/Decommission Completed Date 5/6/14

Construction Design	Well Data	Formation Description
	MONUMENT TYPE: 8" Flush CONCRETE SURFACE SEAL: 0-2' ANNULAR SPACE: N/A BACKFILL: 2-8 TYPE: Bentonite Chips PVC BLANK: 0-10' SCREEN: 10-20' SLOT SIZE: .010 TYPE: Sch 80, 1" PVC SAND PACK: 8-20' MATERIAL: 10/20 Silica Sand DRILLING METHOD: D.P. WELL DEPTH: 20' BORING DIAMETER: 3 1/2"	Silty Sand w/ trace gravel RECEIVED JUN 16 2014 DEPT OF ECOLOGY NWRO - WR DH-01-050614

SCALE: 1"= NA PAGE 1 OF 19

ECY 050-12 (Rev. 7/06)

Ecology is an Equal Opportunity Employer

Ultra Site Well ID: UCCMW-16

Please print, sign and return to the Department of Ecology

ESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. RE09945

UBMIT ONE WELL REPORT PER WELL INSTALLED)

nstruction/Decommission (*"x" in box*)

| Construction

| Decommission

RIGINAL INSTALLATION Notice of Intent Number:

nsulting Firm

nique Ecology Well IDTag No. BIE 612

ELL CONSTRUCTION CERTIFICATION: I constructed and/or cept responsibility for construction of this well, and its compliance with all ashington well construction standards. Materials used and the information ported above are true to my best knowledge and belief.

Driller ☐ Engineer ☐ Trainee

me (Print Last, First Name) Hamden, Don

iller/Engineer /Trainee Signature

iller or Trainee License No. 2914

trainee, licensed driller's Signature and License Number:

Type of Well (*"x in box*)

☒ Resource Protection

☐ Geotech Soil Boring

Property Owner City of Bothell

Site Address 18304 Bothell Way NE

City Bothell County King

Location NE1/4-1/4 NE1/4 Sec 07 Twn 26 R 05

EWM ☒ or WWM ☐

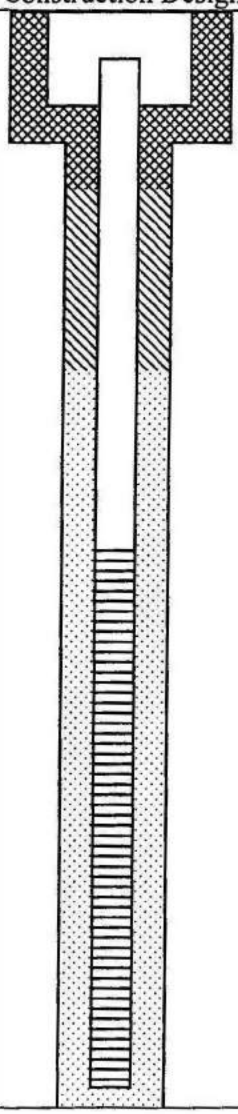
Lat/Long (s, t, r still REQUIRED) Lat Deg ___ Min ___ Sec ___ Long Deg ___ Min ___ Sec ___

Tax Parcel No. 0726059003

Cased or Uncased Diameter 3 1/2" Static Level 7'

Work/Decommission Start Date 5/6/14

Work/Decommission Completed Date 5/6/14

Construction Design	Well Data	Formation Description
	MONUMENT TYPE: 8" Flush CONCRETE SURFACE SEAL: 0-2' ANNULAR SPACE: N/A BACKFILL: 2-7' TYPE: Bentonite Chips PVC BLANK: 0-9 SCREEN: 9-19' SLOT SIZE: .010 TYPE: Sch. 80, 1" PVC SAND PACK: 7-19' MATERIAL: 10/20 Silica Sand DRILLING METHOD: D.P. WELL DEPTH: 19' BORING DIAMETER: 3 1/2"	Silty Sand w/ trace gravel RECEIVED JUN 16 2014 DEPT OF ECOLOGY NWRO - WR DH-02-050614

SCALE: 1"=N/A PAGE 2 OF 19

ECY 050-12 (Rev. 7/06)

Ultra Site Well ID: UCCMW-17

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix D
Spill Prevention and Emergency Countermeasure Plan

Ultra Custom Care Cleaners Site

Spill Prevention and Emergency Countermeasure Plan

Prepared for

City of Bothell

18415 101st Avenue NE

Bothell, Washington 98011

Prepared by

FLOYD | SNIDER

601 Union Street

Suite 600

Seattle, Washington 98101

July 2023

Table of Contents

List of Attachments

List of Abbreviations

Abbreviation	Definition
BMP	Best management practice
CFR	Code of Federal Regulations
EDR	Engineering Design Report
HAZWOPER	Hazardous Waste Operations and Emergency Response
SPECP	Spill Prevention and Emergency Countermeasure Plan
Site	Ultra Custom Care Cleaners Site
S-mZVI	Sulfidated micro-zero valent iron

Contact Information

Responsible Personnel

Contact Name	Work Phone	Cell Phone
Kristin Anderson, Project Manager	(206) 292-2078	(206) 552-4241
Emily Jones, Project Engineer	(206) 292-2078	(206) 719-6993
Lynn Grochala, Principal-in-Charge	(206) 292-2078	(603) 491-3952
Scott Adamek, City of Bothell Site Environmental Coordinator	(425) 806-6824	(425) 409-4278
Prime Contractor Field Superintendent	TBD	TBD

Spill Reporting

Spills into waters of the State (including ponds, ditches, seasonally dry streams, and wetlands)
Immediately call all of the following:
The National Response Center: 1 (800) 424-8802
Washington State Department of Ecology (Ecology) Northwest Regional Office: 1 (206) 594-000
Spill to Soil (including encounters of pre-existing contamination)
Report immediately if threatening to health or environment (i.e., explosive, flammable, toxic vapors, shallow groundwater, nearby creek), otherwise within 90 days
Ecology Northwest Regional Office: 1 (206) 594-000
Notify public works department if spill enters sanitary sewer; call the spill hotline if spills enter the stormwater system, streets, ditches, streams, and/or wetlands
City of Port Angeles Public Works Spill Reporting: 1 (425) 806-6750
Underground Storage Tank
Report within 24 hours if confirmed release of material
Ecology Northwest Regional Office: 1 (206) 594-000 **Sunny Becker, Ecology Site Manager: 1 (425) 457-3842**
Washington Emergency Management Division: 1 (800) 258-5990 or 1 (800) OILS-911

1.0 Introduction

1.1 PURPOSE

This Spill Prevention and Emergency Countermeasure Plan (SPECP) has been prepared as an appendix to the Engineering Design Report (EDR) for the cleanup action selected by the Washington State Department of Ecology for the Ultra Custom Care Cleaners Site (Site) located in the downtown corridor of Bothell, Washington, as detailed in the Cleanup Action Plan for the Site. The purpose of the SPECP is to prevent spills from occurring during the cleanup action, and to perform safe, efficient, and timely response in the event of a spill or leak (both referred to as "spills" herein). Although the scope of the cleanup action does not meet the definition of a "facility" under 40 Code of Federal Regulations (CFR) 112.2 because there is no aboveground oil storage capacity of more than 1,320 U.S. gallons, the SPECP is prepared to be consistent with the substantive requirements of 40 CFR 112 but does not need certification.

This SPECP presents the minimum requirements for spill prevention, control, and countermeasures to be fulfilled by the selected contractor during the cleanup action. It may be amended or superseded entirely by a SPECP prepared by the contractor, so long as the contractor's plan contains the basic elements included in this plan, or their equivalents.

The SPECP should be a working document to be used during the cleanup action and a copy of the plan, including any necessary updates as work progresses, should be maintained at the Site. The plan should be used frequently in the following ways:

- As a reference for oil storage and containment system information
- As a reference for contractors performing work at the Site
- As a guide for site inspections
- As a resource during an emergency response

Additionally, in the event that the project is extended beyond the estimated schedule, the SPECP must be reviewed at least once every month.

1.2 FACILITY DESCRIPTION

Facility Name	Ultra Custom Care Cleaners Site
Facility Location	18304 Bothell Way NE, Bothell, Washington, 98011
Facility Type	Environmental Cleanup Site (currently vacant)
Date of Initial Operation	October 2023 (anticipated)
Designated Site Environmental Coordinator	Scott Adamek, City of Bothell

1.2.1 General Facility Layout

Site boundaries and cleanup areas are shown on Figure 2.1 and 2.2 of the EDR. Site features including utilities and access routes are shown on Figures 5.1, 5.2, and 5.3 of the EDR.

1.2.1 Stormwater

The scope of work of primary concern for stormwater erosion and sediment control is excavation on the source property, which will include removal of pavement and soil handling activities. The total potential disturbed area of ground surface on the source property is less than 1 acre; therefore, a Construction Stormwater General Permit is not required for construction. However, work will implement best management practices (BMPs) consistent with the permit requirements to protect stormwater quality, as described in the site controls presented in this EDR. The total disturbed area when installing a direct-push injection point is approximately 2 inches in diameter and therefore of minimal concern for stormwater run-on and run-off during injection activities.

2.0 Potential Spill Sources and Spill Prevention Control and Countermeasure Features

The purpose of this SPECP is to present BMPs and response procedures for releases of chemicals used during implementation of the cleanup action. These substances primarily include fuels and hydraulic oils used in construction and drilling equipment. The chemical components of the in situ treatment barriers, consisting of liquid activated carbon and sulfidated micro-zero valent iron (S-mZVI) are not considered hazardous to human health or the environment but may create nuisance conditions or cause public concern if spills or accidental discharges occur.

2.2 DISCHARGE PREVENTION

The potential use of petroleum products during the project will be gasoline or diesel fuel used to power machinery and hydraulic oil used in excavation and hauling equipment. While the procedures for equipment fueling will be specific to the selected contractor, it is anticipated that mobile fueling of equipment will occur. The total oil to be stored on-site is anticipated to be minimal.

Mixing of other reagents, including liquid activated carbon and S-mZVI, will be conducted within an enclosed trailer. Discharges may be possible during injection if preferential pathways (such as utility corridors) in a given area allow injected materials to travel to the ground surface (also known as daylighting).

2.2.1 Spill Prevention Control and Countermeasure Features and Operating Procedures

Employees will be trained to implement spill prevention practices. Personnel will use common sense and rely on spill prevention practices to minimize the potential for a release. Fueling and oil storage procedures will be determined by the contractor.

2.2.2 Tests and Inspections

The contractor is responsible for performing maintenance of the equipment and equipment fueling systems to keep it performing in an efficient and environmentally sound manner. The equipment will be observed to ensure that no leaks are occurring.

Observation results will be recorded on a Weekly Visual Inspection Checklist; an example checklist is included in Attachment D.1. Spill response kits will be kept near all areas where equipment is being used, fueled, or stored, and will be restocked as necessary. Inspections include observations of the exterior of the equipment for signs of deterioration or spills (leaks), and inventory of spill response kit materials.

2.2.3 Training

Personnel will be trained in Hazardous Waste Operations and Emergency Response (HAZWOPER) and will be knowledgeable in the operation and maintenance of oil pollution prevention equipment and pollution control laws and regulations. The contractor will also be knowledgeable in the operation and maintenance of oil pollution spill/prevention equipment.

2.2.4 Site Security

The work area will be secured with a chain link fence, or by temporary barriers, when working on private properties and City rights-of-way.

2.3 SPILL RESPONSE PROCEDURES

It is essential to prevent spills from spreading. Releases of petroleum products or toxic chemicals during the proposed cleanup will warrant immediate response and cleanup. It is expected that most spills will be minor spills of fuel or hydraulic oil that will occur on paved areas, which will prevent them from contaminating the underlying ground surface.

Spill response and notification procedures for spills, leaks, or uncontrolled releases of hazardous materials during proposed construction are provided in Attachment D.2. Floyd|Snider personnel responsible for the handling, storage, and disposal of oil or chemicals are trained in these methods and procedures. A copy of the spill response and notification procedures is kept with each spill response kit.

Because the level of petroleum spill notification is dependent on the volume of the material released, spills are defined below.

For this project:

- All spills greater than approximately 1 gallon to land shall be reported.
- Spills of any quantity to water shall be reported.

The Project Manager, Field Lead, or designate is responsible for completing the Spill Notification Form (refer to Attachment D.3 for an example spill notification form) and notifying the relevant external agencies (refer to Contact Information on Page C-ii of this appendix). Completed spill notification forms will be kept by the Site Environmental Coordinator.

If spills meet any of the following conditions, the U.S. Environmental Protection Agency Regional Administrator will be notified:

- Discharge from a single oil spill event exceeding 1,000 gallons.
- Discharge from two spill events within a 12-month period greater than 42 gallons.

If daylighting of the liquid activated carbon and S-mZVI mixture occurs during injection, procedures will be implemented to contain and absorb the material in accordance with this plan to prevent nuisance conditions. Reporting is not required for occurrences of daylighting.

2.4 SPILL RESPONSE KITS

Spill kits will be kept near all areas where equipment is used, fueled, or stored. This spill kit will contain the following, at minimum:

- Oil-absorbent pads, berms, blankets, or granules
- Oil-resistant gloves
- Detergent
- Compact first-aid kit

Spill kits can be used for initial control of spills from equipment reservoir failures, or incidental spill/leaks associated with the storing/handling of containerized fuel and lubricants.

In the event of a release from any storage tank or vehicle, the emphasis of initial spill response is isolation and containment with diking materials until fully cleaned up or a response contractor can be summoned.

2.5 FUELING PROCEDURES

Fueling procedures, whether on- or off-site, will be determined by the contractor. The contractor will maintain a spill kit wherever fueling occurs and will continually monitor fueling operations. In the event that a spill occurs, the contractor will follow the spill handling, cleanup, and reporting procedures, as outlined herein.

2.6 OPERATIONAL SPILL PROCEDURES

If a spill occurs during operational procedures associated with this project, the contractor will stop working and employ BMPs to stop the spill source, contain the spill, and proceed with cleanup and reporting protocols outlined in this SPECP. The contractor will maintain spill kits onsite and the materials identified herein will be used to stop, contain, and clean up leaks or spills.

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix D

Attachment D.1
Weekly Visual Inspection Checklist

Attachment D.1
Weekly Visual Inspection Checklist

Pollution Sources or Oil-Filled Operational Equipment	**Structural Integrity** (Note visible cracks, holes, excessive rust, pitting in exterior surface or supports)	**Visible Leaks/ Spills/Petroleum Sheens** (Yes/No)

Spill Kit Location	Spill Kit Contents	Date Checked
	___ Oil-Absorbent Materials (pads, berms, blankets, or granules) ___ Detergent ___ Pair of Nitrile Gloves ___ First Aid Kit	
	___ Oil-Absorbent Materials (pads, berms, blankets, or granules) ___ Detergent ___ Pair of Nitrile Gloves ___ First Aid Kit	
	___ Oil-Absorbent Materials (pads, berms, blankets, or granules) ___ Detergent ___ Pair of Nitrile Gloves ___ First Aid Kit	
	___ Oil-Absorbent Materials (pads, berms, blankets, or granules) ___ Detergent ___ Pair of Nitrile Gloves ___ First Aid Kit	
	___ Oil-Absorbent Materials (pads, berms, blankets, or granules) ___ Detergent ___ Pair of Nitrile Gloves ___ First Aid Kit	

Additional Comments:____

____

____

____

Inspected By: ________________________________ Date: __________ Time: ________

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix D

Attachment D.2
Spill Response Procedures

Attachment D.2
Spill Response Procedures

PERSONNEL SAFETY

When an uncontrolled release of a hazardous substances occurs (associated with proposed construction), address the safety of all personnel and the public. Until the spilled material has been identified and controlled, do the following:

- Ensure that no one is smoking in or near the area.
- Evacuate all nonessential personnel.
- If a fire is involved or appears imminent, call for fire department for assistance: 911.
- Wear the appropriate level of personal protective equipment (oil-resistant gloves, goggles, rubber boots, and/or Tyvek coveralls) when responding to spills.

SPILLS

Aboveground Storage Tanks and Containerized Oil/Lubricant

- Quickly contain spilled fuel/oil as close to source as possible using absorbent booms and blankets provided in the spill kit located inside the loading/unloading area.
- Prevent the spilled fuel/oil from entering the stormwater catch basins by placing oil-absorbent booms around threatened inlets until all spilled fuel/oil can be cleaned up. If necessary, cover the threatened inlets with the rubber drain covers found in the spill kit.
- Place barricades, cones, or flagging a safe distance around the area. Post a watch (Floyd|Snider or contractor employee or construction flagger) at the scene (upwind) to prevent entry to the area.
- Contact the Site Environmental Coordinator or designate (refer below) to inform them of the situation within 15 minutes of any spill greater than 10 gallons.
- Once the spilled oil has been contained, quickly clean up the spilled liquid using the absorbent blankets or granules found in the spill kit.
- Collect spent absorbent material in sealed plastic garbage bags and place in nearby Dumpster. Keep Dumpster lid closed except when adding waste materials into the receptacle.
- In the event an oil spill enters one of the stormwater catch basins, remove the metal grate and insert absorbent boom and/or blankets and notify the Site Environmental Coordinator.
- The Site Environmental Coordinator or designate is responsible for making the required notifications (refer to Notification Procedures).

NOTIFICATION PROCEDURES

In case of either a minor spill (i.e., greater than 10 gallons and less than 42 gallons) or major spill (greater than 42 gallons) of oil or other hazardous substance, immediately contact one of the following (in preferred order):

Contact Name	Work Phone	Cell Phone
Kristin Anderson	(206) 292-2078	(206) 552-4241
Lynn Grochala	(206) 292-2078	(603) 491-3952
Scott Adamek	(425) 806-6824	(425) 409-4278
Ryan Roberts	(360) 417-3422	NA

One of these persons shall be available for spill emergencies at the facility either by being at the Site (during business hours) or available on an on-call basis (after business hours). These persons are responsible for coordinating all of the emergency response measures detailed in this plan. Contact information for additional Agencies required to be notified of spills to waters of the state or soils, or confirmed releases from underground storage tanks, are provided in the Contact Information section of this appendix (Spill Prevention, Control, and Countermeasures Plan).

Site Environmental Coordinator/Designate

Regulatory Agency/Spill Response Contractor	Normal Business Hours Phone
Sunny Becker, Ecology	(425) 457-3842

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix D

Attachment D.3
Spill Notification Form

Attachment D.3
Spill Notification Form

Part A: Basic Spill Data	
Type of Spilled Substance:	Notification Person:
Quantity Released:	Spill Date and Time:
Location of Spill:	Discovery Date and Time:
	Spill Duration:
Facility Name and Location:	Release to: [ ] Outdoor Pavement [ ] Stormwater Catch Basin [ ] Soil [ ] Containment [ ] Other: _________________
Nature of spill and any environmental or health effects: [ ] Injuries [ ] Fatalities	

Part B: Notification Checklist		
Spill Type:	Notification Date and Time:	Name of Person that Received Call:
All measurable spills		
Ecology:		
Additional contact if spill enters the sanitary sewer		
City of Bothell		
Additional contact if spill enters waters of the State		
National Response Center 1-800-424-8802		

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix E
Health and Safety Plan

Table of Contents

List of Tables

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List of Abbreviations

Abbreviation	Definition
ANSI	American National Standards Institute
APP	Accident Prevention Plan
cis-1,2-DCE	*cis*-1,2-Dichloroethene
City	City of Bothell
COC	Contaminant of concern
HASP	Health and Safety Plan
HSO/SS	Health and Safety Officer/Site Supervisor
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Act
PCE	Tetrachloroethylene
PEL	Permissible Exposure Level
PID	Photoionization detector
PM	Project Manager
PPE	Personal protective equipment
REL	Recommended exposure limit
ROW	Right-of-way
Site	Ultra Custom Care Cleaners Site
SSO	Site Safety Officer
TCE	Trichloroethylene
TWA	Time-weighted average

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.

The purpose of this HASP is to establish site-specific protection standards and mandatory safe practices and procedures for all personnel involved with site cleanup and monitoring activities including soil excavation, direct push injection, monitoring well installation, water level measurements and sampling, utility location, survey, and soil and groundwater sampling at the Ultra Custom Care Cleaners Site (Site) located in downtown Bothell, Washington. It has been prepared as a supplement to Floyd|Snider's Accident Prevention Plan (APP; Attachment E.1).

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

The provisions and procedures outlined in this HASP apply to all Floyd|Snider personnel onsite. 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 or Job Safety Analysis but must also comply with the requirements of this HASP on job sites managed by Floyd|Snider. 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 prior to conducting field work activities. A copy of this plan must be maintained on site at all times by the HSO/SS.

This HASP is based on information that was available as of the date indicated on the title page. Additional hazards not specifically addressed by this HASP may exist at the work site or may be created as a result of site activities. Should project personnel identify a site condition that is not addressed by this HASP and 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 HASP adequately protects worker health and safety and is properly implemented. In this capacity, the HSO/SS will conduct regular site inspections and has the authority to make health and safety decisions that may not be specifically outlined in this HASP based on site conditions. 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 the APP.

This HASP was reviewed by the Project Manager (PM) and the HSO/SS prior to commencement of work activities.

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2.0 Background Information

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 E.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 E.1
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.

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 (Lot E,F,G) and more commercial properties including Baskin-Robbins. The Sammamish River is located approximately 1,145 feet south of the source property. The contaminants of concern (COCs) at the Site consist predominantly of chlorinated solvents associated with dry cleaning activities including tetrachloroethylene (PCE) and its breakdown products trichloroethylene (TCE), *cis*-1,2-dichloroethene (*cis*-1,2-DCE), and vinyl chloride. Naturally occurring arsenic is also present in Site groundwater.

2.2 SCOPE OF WORK

Floyd|Snider will be conducting cleanup action construction activities at the Site. The cleanup will consist of the following:

- Conducting a public and private utility locate and potential camera surveys of utility lines
- Contractor mobilization
- Excavation of contaminated soil to depths of up to 9.5 feet below ground surface
- Loading and disposal of contaminated soil
- Advancing direct-push soil borings to inject in situ treatment barriers consisting of liquid activated carbon (PlumeStop), sulfidated micro-zero valent iron, *Dehalococcoides* bacterial culture (BDI Plus), and/or an organic carbon electron donor (Aquifix)
- Collecting and analyzing selected soil samples
- Performing design verification monitoring of soil and groundwater during in situ treatment barrier injection
- Advancing roto-sonic or hollow-stem auger borings to install monitoring wells
- Developing monitoring wells
- Conducting a top-of-casing and surface elevation survey of new monitoring wells
- Measuring water level elevations and collecting groundwater samples from representative wells

3.0 Emergency Contacts and Information

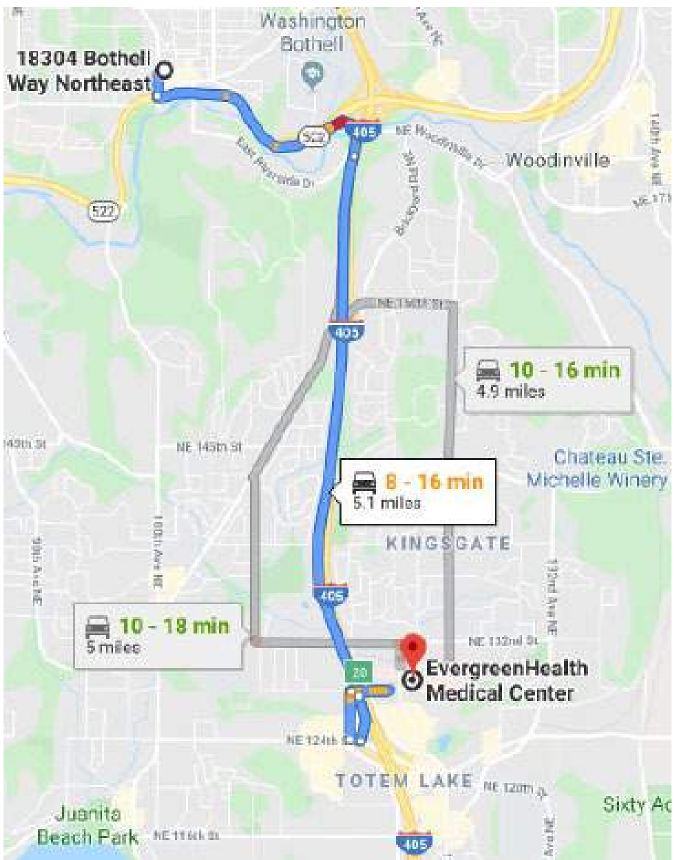
3.1 DIAL 911

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

Figure E.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 E.1)	Ultra Custom Care Cleaners 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 UTILITY EMERGENCY CONTACTS

Additional entities that may need to be contacted in the event of an emergency involving damage to a utility include the following:

PSE Electric or Gas Emergency Line:	(888) 225-5773
City of Bothell Sewer & Water Utility Contact	(425) 488-0118

3.5 PROJECT 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
Kristin Anderson, PM	(206) 292-2078	(206) 552-4241
Lynn Grochala, Associate Principal		(603) 491-3952
Gillian Sweeney, HSO/SS		(510) 316-6679

City of Bothell Emergency Contacts:

Contact	Office Phone Number	Cell Phone Number
Scott Adamek	(425) 806-6824	(425) 409-4278
Ryan Roberts	(425) 806-6823	(425) 471-1837

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4.0 Hazard Evaluation and Risk Analysis

The typical fire, explosion, and physical hazards likely to be present on the job site, and procedures to control the mitigation of these hazards, are presented in the APP. This HASP presents additional information regarding site-specific hazards, including chemical exposure hazards associated with site COCs or the scope of field activities and analysis of the hazards associated with each site investigation task.

4.1 CHEMICAL EXPOSURE HAZARDS

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

- Chlorinated solvents including PCE and its breakdown products TCE, *cis*-1,2-DCE, and vinyl chloride in soil and/or groundwater
- Naturally occurring arsenic in groundwater
- Laboratory preservatives encountered during sampling
- Petroleum products used for equipment
- Arsenic 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. 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.

Chemical 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 personal protective equipment (PPE) and decontamination practices will assist in controlling exposure by means of all pathways to the COCs listed in the following table.

Chemical Hazard	OSHA-Permissible Exposure Limits (8-hour TWA/STEL)	Highest Historical Concentration	Routes of Exposure	Potential Toxic Effects
Groundwater/Sediment Operations				
PCE	25 ppm / 38 ppm	0.75 mg/kg in soil, 6,400 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.
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.

Chemical Hazard	OSHA-Permissible Exposure Limits (8-hour TWA/STEL)	Highest Historical Concentration	Routes of Exposure	Potential Toxic Effects
Groundwater/Sediment Operations (cont.)				
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.
Fueling Operations				
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.
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.

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

4.2 JOB HAZARD ANALYSIS

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.

Work Task	Potential Hazards	Actions to Control Hazards
Load and transport equipment on vehicles	Damage or injury from unsecured cargo	Ensure that all cargo is secured when packing equipment in or out. Prevent movement of equipment while vehicle is in operation.
	Injuries during the removal of work zone delineators	Verify that traffic is clear before removing work zone delineators and/or traffic control devices.
Lifting and manual transport of equipment	Improper lifting techniques, over-reaching/ overextending, lifting overly heavy objects	Use proper lifting techniques and mechanical devices where appropriate. Test the weight of the load prior to lifting. Do not attempt to lift a heavy load alone. Never try to lift more than you are accustomed to lifting. Avoid quick, jerky movements and twisting motions.
Working in populated/urban area	Third party impacts from noise, COCs	Perimeter fencing with controlled entry around the work area. Informational signage will be posted on the perimeter away from the excavation to encourage third parties away from the impacted areas. Refer to Section 5.7 for noise. Refer to Section 5.8 for air monitoring.

Work Task	Potential Hazards	Actions to Control Hazards
Traffic hazards	Vehicle traffic and hazards when working near active operations.	Use of signs, signals, and barricades is required. Spotters will be used to monitor traffic during work activities along roadways. Personnel working are required to wear American National Standards Institute (ANSI) class 2 vests or garments within any ROW. Safety vests will be worn at all times while conducting outdoor work. Traffic control plans and permits from the City will be required for any lane closures, work in sidewalks and equipment or truck movement that is against established traffic signals. Washington State Department of Transportation required signage, protection devices, and flagging will be used by the Contractor during lane closures. Avoid working with your back to traffic whenever possible.
Ground impacting tasks	Underground Utility damage	Utilities are to be surveyed with a public and private utility locate and marked prior to work
Accidents due to inadequate lighting	Improper illumination	Work will only proceed during daylight hours or under sufficient artificial light.

Work Task	Potential Hazards	Actions to Control Hazards
Soil excavation and confirmation sampling activities	Heavy equipment such as drill rigs, excavators, service trucks, telebelts, cranes, etc. Conducting work in road ROWs (on the road shoulder)	Ensure the use of competent operators, backup alarms, regular maintenance, daily mechanical checks, and proper guards. 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. See Traffic hazards for working in ROW.
	Exposure to loud noise	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 onsite to document noise exposure.
	Overhead hazards, 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. Workers will never work under overhead loads
	Trenching, engulfment, slope stability	Personnel will stay clear of excavation area during active digging and never work upslope from other workers. All materials and tools must be kept at least 2 feet from the edge of excavation. Personnel will not enter excavation areas unless sidewalls are appropriately stabilized by sloping, benching or shoring and appropriate ingress and egress are established. Personnel will not enter any excavation in which groundwater intrusion is observed. Daily inspections of excavation shall be conducted to ensure safe working conditions and temporary access controls will be placed around all excavation areas when not being actively worked.

Work Task	Potential Hazards	Actions to Control Hazards
Installation of soil borings, direct push injection, well installation	Lifting hazards, potential dermal or eye exposure to site contaminants in groundwater and soil	See lifting and manual transport of equipment. Wear all required Level D PPE including eye protection
	Exposure to loud noise	See above.
	Overhead hazards, falling and/or sharp objects, bumping hazards, construction equipment	See above.
	Pressurized liquids direct push injection	All lines and connections with pressurized liquids are to be inspected for damage prior to use. Traffic controls will be implemented to prevent vehicles causing damage to lines, and pedestrian controls will be implemented to keep unnecessary personnel away from lines
Water level measurements, well surveying activities, well development and groundwater sampling from monitoring wells	Slip, trip, or fall hazards	Steel-toed boots must be worn onsite 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.
	Heat and cold exposure hazards	Refer to Section 5.3 in the APP.
	Biological hazards, dermal or eye exposure to site contaminants in groundwater	Wear proper PPE including safety glasses at all times while onsite. 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.

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5.0 Site Controls and Monitoring

The following sections describe site controls and monitoring that will be implemented during site field activities. The HSO/SS, or a designated alternate (SSO), is responsible for inspecting the work area daily and identifying additional hazards. Personnel responsibilities are further described in the APP.

5.1 DAILY SAFETY MEETINGS

A safety meeting will be conducted by the HSO/SS or designated SSO daily prior to the start of work. Additional safety briefings or safety checks should also be performed when switching tasks or whenever new hazards are identified. Safety meetings topics and attendance will be recorded on the Daily Tailgate Safety Meeting and Debrief Form provided in Attachment E.2.

Any near-misses or incidents that occur on the job site will be recorded on the Near Miss and Incident Reporting Form provided in Attachment E.3.

5.2 EMERGENCY MUSTER POINT

In the event of an emergency, the muster point is the City Hall greenspace to the east of the source property.

The APP describes required emergency equipment and procedures to be followed in the case of medical emergency; release of a hazardous substance; or other emergencies such as a thunderstorm, vehicle collision, fire, or earthquake.

5.3 PERSONAL PROTECTIVE EQUIPMENT

Work will proceed in standard Level D as described in the APP. PPE should be inspected for defects before each use. Field staff will use clean, disposable nitrile gloves when handling sample material. ANSI class 2 high-visibility vests or garments are required for work within ROWs, working around heavy equipment and on road shoulders.

5.4 WORK AREAS

An exclusion zone will be established when working with contaminated materials. The exclusion zone will be set up during excavation and for each injection boring and/or well location or area of adjacent borings.

A contaminant reduction zone will be set up at the entry/exit point of the exclusion zone. The contaminant reduction zone will contain the necessary elements to perform personnel and equipment decontamination as described in Section 5.5. An injection missing trailer will also be kept in this zone away from unauthorized personnel.

The support zone will consist of vehicles and temporary restrooms located outside the fenced perimeter during work.

The City-owned source property is partially fenced along its southern property line. During excavation, temporary fencing will be extended along the unfenced property boundaries to control access by members of the public. Informational signage will be located in the safest accessible location during the project work to discourage congregation near the perimeter of excavation areas. When working in or near the ROW (sidewalks, roadway, and crosswalks), orange cones and/or flagging will be placed around the work area. 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, never such that personnel are between traffic and equipment. All work within the ROW will be coordinated with the City and conducted in accordance with an approved Traffic Control Plan.

5.5 DECONTAMINATION AND WASTE DISPOSAL

Field staff should always follow the best practices for prevention of contamination detailed in the APP.

Large equipment and vehicle decontamination generally consists of dry sweeping to achieve a visually debris-free surface. If dry sweeping is not sufficient to remove visual evidence of debris, equipment will be decontaminated by pressure washing with detergent solution, followed by a potable water rinse. Direct push drill rods will be decontaminated using the above procedure or by steam cleaning. Reusable sampling equipment will be decontaminated in accordance with the Sampling and Analysis Plan and Quality Assurance Project Plan and will include dry-brushing or performing a tap water rinse to remove particles of debris, followed by scrubbing with a biodegradable soap solution (such as Alconox or Liquinox) and a final rinse with distilled water. Disposable sampling equipment will be dry brushed to remove particles of debris then disposed as municipal solid waste.

Personnel decontamination will include a boot wash and removal of disposal gloves/other disposable PPE.

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 waste. 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.

Disposable PPE, sampling equipment, and contaminated soil will be hauled off-site to a Resource Conservation and Recovery Act Subtitle D licensed facility for disposal as contained-in waste. Excess soil sample material will be transported with other contaminated soil, and direct loaded to trucks or roll-off containers.

Excess sample water and equipment wash water will be captured and not allowed to run onto the ground surface, waste waters will be containerized in drums approved by the U.S. Department of Transportation, which are labeled with their contents, and stored on City-owned property pending profiling. Waste waters will be disposed of at a licensed facility.

5.6 NOISE MONITORING

Noise levels will be monitored with a dosimeter to ensure they are under the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit (REL) for daily exposure. Noise levels will be measured at the closest working distance from the source during the working day for the TWA working dose. Table E.1 shows the duration at maximum exposure level before reaching the Permissible Exposure Level (PEL)/REL, respectively.

Table E.1
Maximum Exposure Level Durations

NIOSH REL Maximum Exposure Level (dBA)	OSHA PEL Maximum Exposure Level (dBA)	Duration of Exposure
82	85	16 Hours
85	90	8 Hours
88	95	4 Hours
91	100	2 Hours
94	105	1 Hour
97	110	30 Minutes
100	115	15 Minutes
103	120	7.5 Minutes
106	125	3.75 Minutes
109	130	1.88 Minutes

Abbreviation:
dBA Decibels "A" weighted for pitch

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

The city municipal code has adopted the maximum permissible environmental noise levels set forth in WAC 173-60-050, which exempts temporary construction sites. The maximum noise level impacts under the municipal code are included in the following table for a Class C to Class B zoned building type in WAC 173-60-050.

Table E.2
Maximum Permissible Environmental Noise Levels

Sound at Source	Sound at Adjacent Buildings (150 feet)	Duration
108.5 dBA	65 dBA	15 mins per hour
113.5 dBA	70 dBA	5 mins per hour
118.5 dBA	75 dBA	1.5 mins per hour

Abbreviation:
dBA Decibels "A" weighted for pitch

Action levels for noise monitoring are presented in the following table. Repeated TWA levels greater than 90 in an 8-hour day will require additional controls.

Table E.3
Noise Action Levels

Monitoring Area	Noise Level	Actions and Controls
Immediate Work Area and Support Zones	Less than 85 dBA 8h TWA; peak less than 100 dBA for no longer than 15 minutes	Continue to monitor noise levels, hearing protection recommended; non-essential personnel should move away from the source.
	Greater than 85 dBA 8h TWA but less than 90; peak greater than 100 dBA but less than 115 dBA for no longer than 15 minutes	Hearing protection required; non-essential personnel should move away from the source. Rotate essential operators to reduce individual dosage.
	Greater than 90 dBA 8h TWA.	Stop noisy operations until TWA drops below 90 dBA. Rotate essential operators to quieter areas/tasks to reduce individual dosage.
Work Perimeter and Adjacent Buildings	Less than 65 dBA at 150 feet; source peak less than 108 dBA for no longer than 15 minutes every hour	Continue to monitor noise levels. Sidewalks/access paths closest to source noise shall be blocked off and information posted away from source to discourage public from increasing duration of exposure.
	Greater than 65 dBA but less than 70 dBA; source peak greater than 108 dBA but less than 113 dBA for no longer than 5 minutes per hour	Along with all the above controls, ensure peaks under 15 minutes per hour and monitor for third parties' high potential exposures.
	Greater than 70 dBA; source peak greater than 113 dBA for more than 5 minutes per hour	Stop noisy operations until TWA drops below 70 dBA at 150 feet. Rotate essential operators to quieter areas/tasks to reduce individual dosage

Abbreviations:
dBA Decibels "A" weighted for pitch
h Hours

5.7 AIR MONITORING

Air monitoring using a photoionization detector (PID) will be performed if personnel are likely to be exposed to volatile contaminants. 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. Potential volatile COCs include chlorinated solvents including PCE, TCE, *cis*-1,2-DCE, and vinyl chloride in soil or groundwater.

Action levels for air monitoring are presented in the following table with PID calibrated to isobutylene with the correction factor for TCE:

Monitoring Area	VOC Concentration	Actions and Controls
Immediate Work Area and Support Zones	Less than 13.5 ppm; less than 54 ppm for no longer than 15 minutes	Continue operations in Level D PPE. Work upwind of excavation area when possible.
	Greater than 13.5 ppm and less than 54 ppm intermittent	Leave work area and allow vapor to dissipate; covering exposed soil or drilling cuttings; use engineering controls if necessary. Monitor VOC concentration every 5 minutes; resume work once concentrations are less than 13.5 ppm for 15 minutes.
	Greater than 54 ppm	Stop operations and evacuate area. Do not resume work until engineering controls are able to maintain VOC concentrations less 13.5 ppm in breathing space.
Work Perimeter and Fence Line	Less than 13.5 ppm; less than 54 ppm for no longer than 15 minutes	Continue operations in Level D PPE. Close pedestrian areas immediately downwind of excavation.
	Greater than 13.5 ppm and less than 54 ppm intermittent	Pause work and allow vapor to dissipate, covering exposed soil or drilling cuttings. Close additional pedestrian zones in the area, use engineering controls if necessary. Monitor VOC concentration every 5 minutes; resume work once concentrations are less than 13.5 ppm for 15 minutes.
	Greater than 54 ppm	Stop operations, close pedestrian zones and evacuate area. Do not resume work until engineering controls are able to maintain VOC concentrations less than 13.5 ppm in breathing space.

Abbreviations:
ppm Parts per million
STEL Short-term exposure limit
VOC Volatile organic compound

PID monitoring will be conducted continuously during excavation at the Site of work and the nearest down-wind perimeter. Once excavation has concluded, monitoring will take place hourly or as outlined in the daily tailgate meeting based on site conditions.

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 Site during active work at least daily to identify any new potential hazards. Addition monitoring will be conducted during movement between barriers, excavation and during increases in third party activity outside the site. If new potential hazards are identified, immediate measures will be taken to eliminate or reduce the risks associated with these hazards.

6.0 Approvals

Project Manager	Date
Project Health & Safety Officer	Date

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7.0 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

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix E

Attachment E.1
Accident Prevention Plan

Accident Prevention Plan

June 2022

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100% Recycled Paper

FLOYD | SNIDER
strategy ▪ science ▪ engineering
Two Union Square ▪ 601 Union Street ▪ Suite 600
Seattle, Washington 98101 ▪ tel: 206.292.2078

Table of Contents

List of Tables

List of Abbreviations

Acronym/ Abbreviation	**Definition**
AED	Automated external defibrillator
APP	Accident Prevention Plan
AQI	Air quality index
COPD	Chronic obstructive pulmonary disease
CPR	Cardiopulmonary resuscitation
°F	Degrees Fahrenheit
FFR	Filtering facepiece respirator
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSO/SS	Health and Safety Officer/Site Supervisor
JHA	Job Hazard Analysis
JSA	Job Safety Analysis
L&I	Washington State Department of Labor & Industries
MTCA	Model Toxics Control Act
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Act
PEL	Permissible exposure limit
PM	Project Manager

Acronym/ Abbreviation	Definition
PPE	Personal protective equipment
RPP	Respiratory Protection Program
SDS	Safety Data Sheet
SSO	Site Safety Officer
USEPA	U.S. Environmental Protection Agency
WAC	Washington Administrative Code
WISHA	Washington Industrial Safety and Health Act

1.0 Plan Objectives and Applicability

This Accident Prevention Plan (APP) describes the policies and best practices established by Floyd|Snider to ensure the safety of employees to the maximum extent possible when performing their work duties. Employee safety is Floyd|Snider's highest priority. Employees are encouraged to use the Health and Safety Department as a resource in identifying potential hazards and the appropriate precautions to address them. While additional safety precautions may impact project schedules and costs, Floyd|Snider will ultimately benefit as accidents are avoided.

This APP has been written to comply with the standards of the Occupational Safety and Health Act (OSHA) and Washington Industrial Safety and Health Act (WISHA) as they pertain to work activities performed by Floyd|Snider.

This APP applies to all employees of Floyd|Snider. It consists of the following components:

- A description of the roles and responsibilities of all Floyd|Snider personnel in ensuring worker safety,
- General safety policies for the office and the field job site,
- Procedures to follow in an emergency,
- Information on common hazards and steps that should be taken to mitigate these hazards,
- A description of the basic safety controls that should be implemented on all field job sites,
- Training requirements for field staff, and
- Safety record keeping and reporting requirements and procedures.

2.0 Roles and Responsibilities

All staff members share responsibility for safety. The roles and responsibilities for Floyd|Snider staff in ensuring company safety are described in the following sections.

2.1 BOARD OF DIRECTORS

The Floyd|Snider board of directors consists of the elected senior officers of Floyd|Snider who establish the company's culture of safety. These individuals set policy for the company, including safety policy. The Management Committee, which consists of the Board of Directors and additional shareholder representatives, is also responsible for enforcement of this APP.

2.2 HEALTH AND SAFETY COMMITTEE

The Health and Safety Committee is composed of field and management staff, who meet on a quarterly basis or more frequently if needed to review and update the Floyd|Snider Health and Safety Program. The Health and Safety Committee is responsible for making updates to this APP as approved by the Management Committee. Health and Safety Committee meeting minutes are recorded and made accessible on Floyd|Snider's Health and Safety department page on SharePoint.

2.3 HEALTH AND SAFETY ADMINISTRATOR

The Health and Safety Administrator receives, organizes, and reviews reports of near misses and incidents in the workplace. The Health and Safety Administrator is responsible for the administration of benefits, working with managers to identify OSHA-reportable incidents, and managing the OSHA reporting process. The Health and Safety Administrator is also responsible for documentation of Health and Safety Committee meeting minutes and employee training record keeping. The Health and Safety Administrator is supported by the Board of Directors and the Health and Safety Committee, who are responsible for taking corrective actions when near misses, incidents, and other safety issues identified in this plan occur.

2.4 PROJECT MANAGERS

Project Managers (PMs) reinforce the Floyd|Snider safety culture. During all phases of projects, PMs review health and safety issues and will have authority to allocate resources and personnel to safely accomplish project work.

PMs direct the field personnel at a job site. PMs coordinate with the project Health and Safety Officer/Site Supervisor (HSO/SS) to ensure that the scope of the project and site conditions are accurately documented in all project safety materials and that all Floyd|Snider personnel on site have received the required safety training and understand the procedures to follow should an incident occur on site. PMs review safety documentation materials with the HSO/SS at intervals determined prior to the start of field events and report near misses and incidents to the Health and Safety Administrator.

2.5 FIELD HEALTH AND SAFETY OFFICER AND SITE SUPERVISOR

The HSO/SS prepares and/or approves the site Health and Safety Plan (HASP) and any amendments thereof and is 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 of the field investigation activities to be conducted at a site. The HSO/SS will specify required exposure monitoring to assess site health and safety conditions, modify the 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 by Floyd|Snider personnel or any contractor personnel, the HSO/SS will suspend all work until the hazard has been addressed.

The HSO/SS is responsible for conducting tailgate safety meetings daily before the start of field work. Tailgate safety meetings should identify the work to be completed, safety hazards likely to be encountered, and the appropriate work practices needed to minimize exposure to these hazards. Tailgate safety meeting forms are included in the HASP documents.

2.6 FIELD SITE SAFETY OFFICER

The field Site Safety Officer (SSO) may be a person dedicated to this task, to assist 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. The SSO will conduct onsite safety meetings daily before work commences. All health and safety equipment will be calibrated daily and records kept in the daily field logbook. The SSO may perform exposure monitoring if needed and will ensure that equipment is properly maintained.

2.7 FLOOR WARDENS

Floor Wardens are Floyd|Snider staff members who have volunteered to coordinate Floyd|Snider's response in case of an emergency at Union Square. Floor Wardens are responsible for ensuring that all staff have evacuated the building if an evacuation order is issued by building management and accounting for staff at the emergency muster point. Floor Wardens also post and update emergency evacuation routes and maintain maintenance records for fire extinguishers located at the office. The names of current Floor Wardens are posted in the office above fire extinguishers and on the Floyd|Snider SharePoint home page.

2.8 EQUIPMENT MANAGER

The Equipment Manager is responsible for ensuring that all field equipment, including the company vehicle, is in safe working order and for keeping records of equipment maintenance. Employees must report any issues with the company vehicle or field equipment to the Equipment Manager. The Equipment Manager will designate an alternate for days when the manager will not be available to assist field staff with urgent equipment or vehicle issues.

2.9 FLOYD|SNIDER PERSONNEL

All Floyd|Snider project personnel will take precautions to prevent accidents and/or incidents from occurring to themselves and others. Employees must read, understand, and sign this APP. Employees will report all incidents and near misses to their PM, HSO/SS, or SSO and inform of any physical conditions that could impact their ability to perform their work.

2.10 EMERGENCY CONTACTS

All Floyd|Snider staff must designate a person outside of the company who may be contacted in case of an emergency in which a staff member requires medical care. Emergency contacts are responsible for making decisions regarding medical treatment in the event that the staff member is incapacitated, or for contacting the individual who has been designated authority by the staff person to make such decisions if they do not have that authority.

Emergency contact information will be provided to the Health and Safety Administrator and updated as needed, at a minimum frequency of once per year. The Health and Safety Administrator is responsible for maintaining emergency contact information in the Floyd|Snider firm contact database and making this information available on the Floyd|Snider SharePoint home page.

3.0 Safety Policies

The safety policies presented in this section have been developed to ensure the safety of all staff. They should be considered the minimum requirements to maintain a safe workplace; staff should be vigilant at all times and take the needed actions to identify and correct unsafe situations.

3.1 GENERAL OFFICE SAFETY

This section describes the policies that have been developed to keep staff safe in all work scenarios, including at the office and on the job site.

3.1.1 Injury Prevention

In office areas, trips and falls are the primary cause of acute injury, and they can be easily prevented. There are many different ways to prevent injury, including, but not limited to:

- Keep all work areas, aisles, and hallways clear at all times.
- Make sure all exits are accessible, clearly marked, and properly illuminated.
- Keep all work and storage areas in a sanitary condition; floors shall be clean and, as much as possible, kept in a dry condition. If floors are wet, they should be marked with signage to notify others.
- Pile or store materials in a stable manner, so that they will not be subject to falling.
- Keep walkways and work areas free of electrical cords.
- Never make repairs to light fixtures unless authorized to do so by a supervisor.
- Use a stepstool when reaching overhead objects.
- Do not lift equipment and materials weighing more than 20 pounds by yourself; ask for help and/or use a handtruck.
- When carrying loads, exercise care to avoid overexertion and strain. Use proper lifting and reaching techniques.
- Use adjustable desk chairs to reduce musculoskeletal injuries; ask for assistance if you are unfamiliar with proper ergonomic adjusts for your desk, computer, and chair.
- Report all unsafe conditions and symptoms of injury to the Health and Safety Administrator.
- Exercise caution in moving about the office.

3.1.2 Administration of First Aid and Cardiopulmonary Resuscitation

First aid and cardiopulmonary resuscitation (CPR) should only be administered by individuals with the appropriate training. Floyd|Snider makes First Aid and CPR/automated external defibrillator (AED) training to available to all staff members and requires this training for all field staff members. At least one person on a field site must be trained and have current certification in

First Aid and CPR. First aid kits compliant with the ANSI Z308.1-2015 Class B standard will be available at the Floyd|Snider office and at all field sites. First aid kits for field sites additionally include basic medications (aspirin and diphenhydramine), tweezers, a clotting sponge, potable water, outdoor skin cleanser, super glue, adhesive moleskin pads, safety pins, sunblock, insect repellant, medical masks and a printed field staff emergency contact list.

3.1.3 New Employee Orientation

All new employees receive an orientation to the Floyd|Snider Health and Safety Program from a member of the Health and Safety Committee. This orientation is arranged by the assigned mentor for the new employee and includes a review of the materials available on the Health and Safety department home page (APP, HASP templates, near miss and incident forms, training resources, etc.) as appropriate to the employee's role at Floyd|Snider, office and field safety policies, and training and documentation requirements for field and office safety.

3.1.4 Workplace Hostility

Floyd|Snider intends to provide a work environment that is free from intimidation, hostility, or other offenses that are inappropriate. Harassment of any sort—verbal, physical, or visual—will not be tolerated.

Harassment can take many forms. It may be, but is not limited to, words, signs, jokes, pranks, physical or verbal intimidation, physical contact, or violence. Harassment is not necessarily sexual in nature, although these prohibitions against harassment specifically include all forms of sexual harassment.

It is the company's policy to regard sexual harassment and other forms of harassment, as well as the threat of such harassment, as very serious matters and to prohibit them in the workplace by any person and in any form. All staff are required to complete harassment training. Floyd|Snider also makes bystander intervention training available to all staff.

3.2 FIELD SAFETY

This section describes the additional policies developed to keep field staff safe on the job site.

3.2.1 Stop Work Authority

All staff members have Stop Work Authority. Stop Work could be a temporary pause in work for a few minutes or a full shutdown of work until unsafe work conditions can be addressed. If unsafe work conditions are encountered and cannot be immediately addressed by the staff on-site, the HSO/SS should report immediately to the PM. Safety hazards may include physical site conditions or dangerous work practices by subcontractors or other workers. The PM will help the field staff to make modifications to the work practices to mitigate the hazard if possible. If the unsafe conditions cannot be mitigated, field staff have the authority to stop all work until the conditions can be properly addressed.

3.2.2 Health and Safety Plan

A site-specific HASP must be prepared and made available to field staff at job sites. A site-specific HASP is required for any activities where field staff may contact contaminated material; activities such as a site visit or oversight where no contact with contaminated material or physical hazards may occur can be completed without a HASP, if approved by the PM. The HASP should address both potential physical and chemical hazards on-site and steps taken to mitigate those hazards.

3.2.3 Tailgate Safety Meetings

The HSO/SS is responsible for conducting tailgate safety meetings daily before the start of field work. Tailgate safety meetings should identify the work to be completed, safety hazards likely to be encountered, and the appropriate work practices needed to minimize exposure to these hazards. Tailgate safety meetings must always cover the site-specific procedures to follow in case of an emergency.

When performing field work, staff should maintain awareness of new or changing hazards at the job site. Staff should always assess then reassess the hazards when changing between tasks or changing the manner in which a task is performed and document meetings and assessments on the tailgate safety meeting form.

3.2.4 Buddy System

Floyd|Snider employs the buddy system for work at job sites meaning employees are never alone in the field. The buddy system ensures that employees can get help in case of an emergency. Working in the field without another Floyd|Snider employee present may be permissible in the following scenarios:

- When the site is occupied, you are not performing an activity with high risk of injury (e.g., not working in traffic, not entering small spaces or lifting heavy objects), and you are in close proximity of other people capable of responding if you call for help.
- If you are accompanied by a teaming partner or subconsultant who may act as your buddy.
- IF FOR ANY REASON YOU ARE NOT COMFORTABLE WITH THE ASSIGNMENT OR THE CONDITIONS, DISCUSS IT WITH YOUR PM AND ASK FOR A BUDDY.

3.2.5 Check-in Procedure

All employees in the field, whether in groups or alone, will follow the check-in procedure detailed below:

- Notify front desk or your PM when you are leaving for field work. Notification can be by email, phone, or in person.
- Provide an estimated completion time of when you think you will return to the office or head home.

- At the end of the field day, before leaving the site, call the office and let the front desk or your PM (the same person you notified at the beginning of the day) know you are returning to the office or heading home. Ask to be transferred to the PM to discuss how things went.
- If you will not be finished with field work by 5:00 p.m., call the office and let the front desk know you are still in the field and that you will check in with the PM when fieldwork is finished.
- Communicate with the PM when you are finished with work and leaving the site (after 5:00 p.m.).
- If you are in a group of Floyd|Snider employees doing this field work, one person can do this check-in process on behalf of the group.
- If you fail to check in and cannot be reached by cell phone, someone from the office may be sent to locate you, or local authorities may be notified.

3.2.6 Personal Protective Equipment

Field staff must wear the appropriate PPE required in the site-specific HASP. Floyd|Snider provides employees with all required PPE such as steel-toed boots, reflective vest/jacket, hardhat, safety glasses, gloves, ear protection, and first aid kits. Field staff are responsible for wearing the appropriate PPE in accordance with the HASP, keeping their PPE in good condition, and replacing it as needed.

All work will proceed in Level D PPE, which shall include hard hat, protective footwear, hearing protection, eye protection, gloves, and sturdy outer work clothing. Protective footwear must be compliant with ASTM F2413 or the former ANSI Z41 (repealed) standard, with oil- and chemical-resistant soles, and must be securely laced without signs of excessive tread wear. For all work involving potential exposure to soil and groundwater, workers will wear nitrile gloves and Level D PPE. Personal floatation devices will be worn at all times during work in the vicinity of surface water. When working in a remote location, all teams must carry a field first aid kit. The contents of a field first aid kit include basic medications (aspirin and diphenhydramine), sterile dressings, adhesive bandages and tape, wound-cleansing towelettes, sting-relief wipes, antibiotic ointment, butterfly bandages, tweezers, safety pins, and a printed field staff emergency contact list.

All field personnel will be properly fitted for PPE and trained in the use of PPE during initial 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training (refer to Section 7.0 for additional training information). The level of protection will be upgraded by the HSO/SS whenever warranted by conditions present in the work area. The HSO/SS will ensure that field staff know how to properly use PPE and periodically inspect equipment such as gloves and hard hats for defects.

3.2.7 Confined Spaces

Floyd|Snider field staff are not trained in confined space entry and may not enter permit-required confined spaces. It is considered entry if your head/face breaks the plane of the confined space opening.

Confined spaces are defined as a spaces that have limited or restricted means for entry or exit and are not designed for continuous occupancy. Confined spaces commonly encountered at field sites may include vaults, manholes, pits, and tanks. OSHA designates confined spaces as "permit-required confined spaces" if they exhibit one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere
- Contains material that has the potential to engulf an entrant
- Has walls that converge inward or floors that slope downward and taper into a smaller area that could trap or asphyxiate an entrant
- Contains any other recognized safety or health hazard (e.g., unguarded machinery, exposed wires, extreme heat)

In accordance with OSHA regulations, only personnel with specialized confined space training may enter a permit-required confined space under a confined space entry plan.

3.3 RESPIRATORY PROTECTION PROGRAM

The goals of the Respiratory Protection Program (RPP) are to protect employees from potential exposure to respiratory hazards and to ensure compliance with applicable occupational safety and health standards regarding respiratory hazards. Additionally, the RPP provides requirements for the proper selection and use of respiratory protection equipment.

On July 16, 2021, the Washington State Department of Labor & Industries (L&I) adopted an emergency rule to protect workers who are exposed to harmful levels of wildfire smoke (WAC 296-62-085). This RPP conforms to the Washington Administrative Code (WAC) standards for WAC 296-841 Airborne Contaminants and WAC 296-842 Respirators, as well as draft rule WAC 296-65-085 Wildfire Smoke.

3.3.1 Applicability

This RPP applies to respiratory protection used in the field due to impaired ambient air quality when respirator use is not required but may be preferred for comfort. This applies to impaired ambient air quality due to chemical hazards or wildfire smoke. Employees will not be required to perform site work when airborne substances (i.e., site contaminants) are present at concentrations exceeding their OSHA permissible exposure limits (PELs) or if air quality due to wildfire smoke exceeds the Stop Work action threshold and respiratory protection would be required to safely complete the work. Employees may additionally elect to use respirators for comfort purposes to control non-hazardous substances such as nuisance odors.

If there is the potential to exceed a PEL or wildfire smoke action threshold at a site, engineering and administrative controls will be implemented to mitigate the hazard. Project work that cannot be altered by using engineering or administrative controls must be approved by the Management Committee in advance of the scheduled fieldwork.

The RPP is intended to help employees identify conditions that may warrant the voluntary use of a respirator and to support the selection and maintenance (if applicable) of an appropriate respirator. The RPP should be implemented when employees are working in conditions where respiratory hazards may be encountered, such as when working in conditions with wildfire smoke.

3.3.2 Administrator and Employee Responsibility

The RPP administrator is the Health and Safety Committee chair. The RPP administrator oversees the development, execution, and evaluation of the RPP and will ensure procedures are followed, respirator use is monitored, and respirators provide adequate protection when job conditions change. The RPP administrator will ensure appropriate respirators and the associated supplies are provided to employees for voluntary use at no cost to the employee.

Employees voluntarily using respirators have the following responsibilities:

1. Participate in the Floyd|Snider medical monitoring program in accordance with Section 7.1.
2. Use the respirator only for the specific tasks that it was issued for.
3. Seek medical help if wearing a respirator creates negative health effects such as difficulty breathing, dizziness, or anxiety.
4. Care for and maintain respirators as instructed, including following the manufacturer's specific cartridge change-out or respirator replacement schedule.
5. Notify the supervisor of any problems associated with using a respirator. This includes a respiratory hazard that needs further evaluation, if the respirator is not providing adequate protection, and any concerns with the RPP.
6. Monitor air quality while wearing a respirator and calling Stop Work if PELs are exceeded or if the Stop Work action level for wildfire smoke is exceeded.

3.3.3 Use of Respirators

Respirator use by Floyd|Snider employees is done on a voluntary basis and may be done at any time when the use of an approved respirator may increase comfort or provide additional protection when air quality conditions are still within a level considered to be safe for work. Voluntary use of respirators applies only when it has been determined that:

- Such respirator use will not in itself create a hazard.
- Airborne occupational exposures to hazardous chemicals will not exceed applicable PELs.
- Exposure to fine particles called PM2.5 in wildfire smoke does not exceed the Stop Work action level (refer to Table 3.1).
- No airborne biological hazard is present.
- No specification standards require the mandatory use of respirators.

3.3.4 Wildfire Smoke Exposure Control Plan

The Wildfire Smoke Exposure Control Plan is intended to address risks to employees working outside from potential exposure to wildfire smoke. This plan will be in effect whenever wildfires are present in the region (in Washington State, surrounding states, or British Columbia, Canada) and will continue to be implemented until such a time that wildfire smoke is no longer a health risk as determined by the air quality index (AQI). The greatest risk of wildfire coincides with the dry season from approximately mid-May through mid-October; however, fires can also occur outside of the typical dry season.

Smoke from wildfires contains chemicals, gases, and fine particles that can be harmful to human health. Breathing in smoke can cause immediate health effects such as coughing, trouble breathing, stinging eyes, a scratchy throat, runny nose, irritated sinuses, wheezing and shortness of breath, chest pain, headaches, an asthma attack, tiredness, and fast heartbeat (CDC 2013). The smallest and most harmful particulate matter in wildfire smoke and other air pollutants are PM2.5. PM2.5 are particles that are 2.5 micrometers or less in width. Increases in daily PM2.5 exposure has been linked to premature death in people with heart or lung disease and nonfatal heart attacks (USEPA 2020). Long-term exposure to PM2.5 is associated with increased rates of lung cancer and heart disease.

Those at increased risk for adverse health effects from wildfire smoke include the following:

- People with lung diseases such as asthma or chronic obstructive pulmonary disease (COPD), including bronchitis and emphysema, and those who smoke
- People with respiratory infections, such as pneumonia, acute bronchitis, bronchiolitis, colds, or flu, or those with or recovering from COVID-19
- People with existing heart or circulatory problems, such as irregular heartbeat, congestive heart failure, coronary artery disease, or angina, and those who have had a heart attack or stroke
- Adults over age 65 and pregnant women

- People with diabetes
- People with other medical or health conditions that can be exacerbated by exposure to wildfire smoke as determined by a physician

Program elements and protocols for wildfire smoke have been developed in accordance with emergency rule WAC 196-62-085 and additionally consider Cal/OSHA Title 8 California Code of Regulations Section 5141.1 regarding Wildfire Smoke.

The Wildfire Smoke Program includes the following elements:

1. Identification of Harmful Exposures (WAC 296-62-08530):

   When wildfire smoke is present, the site-specific HSO will monitor the AQI before each shift and periodically thereafter using U.S. Environmental Protection Agency's (USEPA's) AirNow,[1] available at www.airnow.gov, or a similar state or federal AQI modeling service. The HSO can also monitor real-time air quality using an air quality detector capable of measuring $PM_{2.5}$. The HSO will take actions consistent with the action levels presented in Table 3.1.

2. Hazard Communication (WAC 296-62-08540):

   The HSO will communicate wildfire smoke hazards to employees during the tailgate safety meeting and will record the AQI or $PM_{2.5}$ concentration on the tailgate meeting form when wildfire smoke is present in the air. The HSO will communicate available measures for employees to mitigate wildfire smoke exposure and the symptoms of smoke exposure.

3. Information and Training (WAC 296-62-08550):

   Employees will be trained in the information presented in this RPP (refer to Section 3.3.9), consistent with mandatory information presented in WAC 296-62-08590, prior to conducting work in the presence of wildfire smoke.

4. Exposure Symptom Response (WAC 296-62-08560):

   Employees displaying adverse symptoms of wildfire smoke exposure must be monitored to determine whether medical attention is necessary and may not be penalized for seeking medical treatment. Symptoms of wildfire smoke exposure most often include persistent coughing, difficulty breathing, and aggravation of existing respiratory conditions such as asthma. Provisions for prompt medical treatment will be established for each job site and reviewed during the tailgate safety meetings.

[1] AirNow reports air quality using the official U.S. AQI, a color-coded index designed to communicate whether air quality is healthy or unhealthy. AirNow is a partnership of the USEPA; National Oceanic and Atmospheric Administration; National Park Service; National Aeronautics and Space Administration; Centers for Disease Control and Prevention; and tribal, state, and local air quality agencies.

5. Exposure Controls (WAC 296-62-08560):

   Floyd|Snider will reduce workers' exposure to wildfire smoke by using the hierarchy of controls. Controls are encouraged whenever the ambient air concentration of PM2.5 is greater than 20.5 micrograms per cubic meter ($\mu g/m^3$; AQI 69) and required when the concentration of PM2.5 is greater than 55.5 $\mu g/m^3$ (AQI 151).

   A. Engineering controls will be implemented where feasible. Such controls include providing enclosed buildings, structures, or vehicles where the air is adequately filtered.

   B. If engineering controls are not sufficient to reduce exposure, Floyd|Snider will implement administrative controls. Such controls include relocating work to a location with a lower ambient air concentration of PM 2.5, changing work schedules to a time where the ambient air concentration of PM 2.5 is less, reducing work intensity, and providing additional rest periods.

   C. In addition to the standards provided in the emergency regulation (WAC 296-62-085), Floyd|Snider has developed action levels for wildfire smoke exposure to be followed at job sites. Table 3.1 shows the AQI categories, equivalent $PM_{2.5}$ measurement in micrograms per cubic meter, the level of health concern, and the action required. The HSO will stop work if the AQI for $PM_{2.5}$ is greater than 301 or if it is not possible to conduct field activities safely due to discomfort or decreased visibility.

   D. Where overnight stays are required in areas that do not have filtered indoor air, additional Floyd|Snider policies apply. If the AQI is forecasted to be greater than 301 overnight, or if the AQI exceeds 500 for several hours, the HSO, Floyd|Snider PM, and client PM will coordinate and decide whether demobilization to an off-site location is necessary.

6. Respiratory Protection (WAC 296-62-08570):

   Floyd|Snider will provide respirators at no cost to all employees for voluntary use in accordance with WAC 296-842 Safety Standards for Respirators. Employees are encouraged to use respirators any time the PM2.5 concentration is greater than 20.2 $\mu g/m^3$ (AQI 69), and especially when the PM2.5 concentration is 55.5 $\mu g/m^3$ (AQI 151) or greater.

Table 3.1
Action Levels for Wildfire Smoke

AQI Categories for PM2.5	PM2.5 (µg/m³)	Levels of Health Concern	Action [1]
0 to 50	0 to 12.0	Good	• Monitor air quality if wildfire smoke is present. • Stop work if employees have symptoms of smoke exposure.[2] All employees have Stop Work authority.
51 to 68	12.1 to 20.1	Moderate	• Monitor air quality. • Stop work if employees have symptoms of smoke exposure.[2] All employees have Stop Work authority. • Implement administrative and engineering controls.
69 to 150	20.2 to 55.4	Unhealthy for Sensitive Groups	• Monitor air quality. • Stop work if employees have symptoms of smoke exposure.[2] All employees have Stop Work authority. • Implement administrative and engineering controls. • Respirator provided for voluntary use; respirator use is strongly encouraged. • Take frequent breaks in an indoor space with filtered air.
151 to 200	55.5 to 150.4	Unhealthy	• Monitor air quality. • Stop work if employees have symptoms of smoke exposure.[2] All employees have Stop Work authority. • Implement administrative and engineering controls. • Respirator provided for voluntary use; respirator use is strongly encouraged. • Provide for frequent breaks—at least once per hour—in an indoor space with filtered air; stop work if an indoor space with filtered air is not available. • Accommodations must have filtered air for multi-day and overnight field events.
201 to 300	150.5 to 250.4	Very Unhealthy	• Monitor air quality. • Stop work if employees have symptoms of smoke exposure.[2] All employees have Stop Work authority. • Implement administrative and engineering controls. • Respirator provided for voluntary use; respirator use is strongly encouraged. • Take breaks at least once per hour in an indoor space with filtered air; stop work if an indoor space with filtered air is not available. • Accommodations must have filtered air for multi-day and overnight field events. • Reduce work hours; limit workday to no more than 8 hours on-site.
301 to 500	250.5 to 500.4	Hazardous	• **Stop work.** • Demobilize to an off-site work location if necessary.

Notes:
(1) Respirators can be worn at lower AQI levels based on personal preference. Respirators are provided at no cost to employees for use during any air quality conditions.
(2) Symptoms of wildfire smoke exposure most often include persistent coughing, difficulty breathing, and aggravation of existing respiratory conditions such as asthma.

3.3.5 Selection of Respirators

Employees can voluntarily use a respirator based on personal preference. Floyd|Snider will provide respirators at no cost to all employees for voluntary use in accordance with WAC 296-842 Safety Standards for Respirators. PPE is the last line of defense and should be considered after engineering and administrative controls are implemented.

The only approved respirator types to be used without fit testing are filtering facepiece respirators (FFRs), also known as N95 dust masks. Per WAC 296-842-10200, FFRs are any tight-fitting, half-facepiece, negative-pressure, particulate air purifying respirator with the facepiece composed mainly of filter material. These respirators do not use cartridges or canisters and may have sealing surfaces composed of rubber, silicone, or other plastic-like materials. Employees may elect to use respirators for other voluntary uses such as to control nuisance odors and may additionally elect to use respirators other than FFRs for protection from wildfire smoke if the respirator provides protection from PM2.5 equivalent to or greater than an FFR. Use of respirators other than FFRs is subject to fit testing requirements in accordance with the manufacturer specifications. Fit testing, if required for the selected respirator, is provided by Floyd|Snider at no cost to employees.

The National Institute for Occupational Safety and Health (NIOSH) of the Centers for Disease Control and Prevention certifies N95 respirators including FFRs. A label or statement of certification by NIOSH should appear on the respirator or respirator packaging. KN95 respirators, which are filtering facepiece respirators manufactured to the Chinese particulate filtration standard equivalent to N95, are approved for respiratory protection by the U.S. Food and Drug Administration and may also be used if an adequate supply of NIOSH-approved respirators is not available.

Any employee who experiences any difficulties while wearing a respirator must immediately inform their supervisor. If an employee requests to wear a respirator other than an FFR, they must contact their supervisor to ensure the respirator is appropriate and properly fitted for the user.

3.3.6 Medical Evaluations

All Floyd|Snider field staff participate in a medical monitoring program and are evaluated biennially. This evaluation includes respiratory clearance and accomplishes the goal of medical clearance for this program on a voluntary use basis per WAC 296-842-11005. Workers with breathing problems such as asthma, COPD, or chronic heart and lung disease should communicate these conditions to their doctor to determine whether it is safe for them to voluntarily wear an FFR or other type of protection at work. Respirators restrict breathing and can put stress on the heart and lungs, which may worsen health symptoms.

3.3.7 Respirator Fit and Seal Check

Proper fit is necessary to get the most protection from a respirator. Fit testing is not required for FFRs, so employees are not required to participate in fit testing; however, fit testing can be provided at employee request. Note that facial hair, piercings, or facial abnormalities may disqualify an employee from using certain types of tight-fitting respirators. Shaving facial hair is recommended, but not required, for voluntary FFR or use. Employees who choose to use a tight-fitting elastomeric respirator (half- or full-face respirators) will require fit testing and additional training, which Floyd|Snider will provide at no cost to employees.

FFRs should fit according to the manufacturer's instructions. Elastic straps, a moldable nosepiece, or adhesive may be used to aid in sealing. A seal check should be performed after fitting the respirator to the face, using the following procedure:

1. Cover the respirator with both hands and exhale. If air leaks where the respirator seals against the face, readjust the respirator and nosepiece and try again. When a proper fit is achieved, the respirator should bulge from the face and not leak around the seal.
2. Cover the respirator with both hands and inhale. If air leaks where the respirator seals against the face, readjust the respirator and nosepiece and try again. When a proper fit is achieved, the respirator should collapse slightly and not leak around the seal.

The following video provides additional demonstration of fitting the respirator to the face and performing a seal check: https://www.youtube.com/watch?v=GmJxzGXeIvo

3.3.8 Respirator Replacement, Maintenance, and Storage

FFRs are disposable and generally designed for single use (i.e., one 8-hour day); however, the total hours of use may vary by manufacturer. Employees will replace respirators according to the manufacturer-recommended schedule, or a minimum of once per work day if not specified. Disposable respirators should also be immediately discarded if, at any time during use, they become damaged, deformed, dirty, or difficult to breathe through. The number of times an FFR is doffed and donned should be limited whenever possible. Respirators other than FFRs will be maintained or replaced (in full or in part, such as in the case of respirators with detachable cartridges) according to the manufacturer specification. Respirators will be given to a specific employee and may not be shared among employees.

Before donning, respirators will be inspected by the user for damage, deterioration, or improper functioning before use. FFRs will also be checked for proper sealing using the seal check procedures described in Section 3.3.7.

Respirators will be stored in a clean, dry, and sealed area in the field room, field vehicle, or a designated clean area on the job site.

3.3.9 Training

Training will be provided to all employees who voluntarily wear respirators. At a minimum, the training will cover the following information:

- Identification of the hazard (i.e., wildfire smoke)
- Floyd|Snider's policy on hazard communication and how to obtain current information regarding the AQI
- Potential health affects as a result of exposure to the hazard
- Employee rights regarding medical treatment for exposures
- Mitigation measures for smoke exposure
- Employer requirements to provide respirators under the L&I emergency rule
- The respirator's capabilities and limitations
- Proper fit, use, and maintenance of respirators

3.3.10 Record Keeping

As per WAC 296-842-11010, voluntary use of respirators does not require record keeping; however, all employees are required to read and sign this APP, and Floyd|Snider will retain a copy of the signature page and any additional relevant training materials.

3.4 BUILDING SECURITY

For security purposes, Union Square is equipped with an access card system. Computerized proximity cards let you enter the building on your own, any time, but prevent unauthorized access to the building.

To help maintain the integrity of this system:

- Do not let others follow you into the building when exiting and entering when entrances to the building are locked.
- Notify Tenant Services of lost access cards.
- Notify the company when transferring ownership of access cards.

General regular building hours are defined as the time between 6:00 a.m. and 6:30 p.m. After-hours are defined as the time between 6:30 p.m. and 6:00 a.m. During this time period, One and Two Union Square are in after-hours mode and will require an after-hours access card for entry into the buildings.

There is a security guard desk in the main lobby where any security-related incidents should be reported. The security guards are also available to escort employees to their vehicles if they are feeling unsafe for any reason or can provide access to the office (after verifying your employment status by calling a Principal) if you do not have your access card or keys with you.

3.5 VEHICLE SAFETY

Floyd|Snider maintains a company vehicle for use during field work and to attend meetings. Personal vehicles and/or rental vehicles may be used if additional transportation is needed for a specific task. General vehicle safety and Floyd|Snider vehicle-specific procedures when driving for business purposes are described in the following sections.

3.5.1 General Vehicle Safety

Before driving a vehicle, always perform a safety check:

- Walk around and look for damage such as broken reflectors, damaged mirrors, windshield cracks, missing wiper blades, obviously low tire pressure or damage to tires, new dents, or scratches. Report new damage to the Equipment Manager. Do not drive a vehicle with obvious tire damage or an unrepaired windshield crack. Also note collision hazards in the immediate area.
- Check the vehicle emergency kit for the following items: first aid kit, potable water, eye wash, fire extinguisher, Mylar blanket, road flares, and collapsible traffic cones.
- Ensure that all items stored inside the vehicle are secure and will not slide or tumble during transport. Do not drive with unsecured loads.
- Start the vehicle and check that safety systems are working: headlights, turn signals, emergency flashers, headlights, brake lights, and windshield wipers. Check for dashboard warning lights and address any critical safety warnings (low tire pressure, low oil pressure, high engine temperature, antilock brake system, battery) immediately.

When driving a vehicle for business purposes, all traffic laws must be obeyed. Obey speed limits and all posted signs. Minimize distractions and stay aware of your surroundings. In addition to your safety, you are also a representative of the company behind the wheel and should not conduct any behaviors that would put you or Floyd|Snider in a negative light.

The following safety violations will not be tolerated by Floyd|Snider and will cause revocation of your driving privileges for company business purposes (even if they occur after business hours):

- Texting/cell phone use while driving (hands-free device permitted)
- Citations for reckless driving
- Use of alcohol or drugs before or while driving
- Carrying more passengers than available seatbelts

In the event of an accident, call 911 and follow the procedures in Section 4.3. In the event of a breakdown, call roadside assistance if possible in the area where you are located. If roadside assistance is not available, staff may perform basic tasks (such as addressing a flat tire) in order to be able to return to the office safely only if they are trained and feel comfortable to do so. If you are stuck, call your PM to arrange for emergency assistance.

In the event of a multi-day field effort or a late-night finish, all field equipment (high-dollar-value items) must be stored in a locked garage or other locked storage area for the night and should not be left in the vehicle.

3.5.2 Floyd|Snider Vehicle Safety

The Floyd|Snider vehicle is not equipped with 4-wheel drive, so no off-road driving should be attempted. If the project site is especially muddy or has limited access, an appropriate vehicle should be rented. No one other than Floyd|Snider employees (except for emergency personnel in case of emergency or qualified repair personnel) should be allowed to drive the company vehicle. Do not smoke in the company vehicle.

A first aid kit and fire extinguisher will be kept in the vehicle at all times. A checklist of supplies is kept in the vehicle bulkhead vertical file area and inside the door to the field room for reference. Additional safety supplies that are stocked in the vehicle include nitrile and work gloves, hearing protection, safety glasses, and basic decontamination equipment including Alconox solution, distilled water, disinfectant spray/wipes, and paper towels. If you have used these items, please notify the Health and Safety Committee so they can be replenished. The vehicle is also equipped with basic maintenance supplies including a jack, air pump, and spare tire. The gas tank should always be left at least half full before returning the company vehicle to the garage. The vehicle engine has a minimum octane rating and should be filled with premium gasoline.

Report vehicle warning lights immediately to the Equipment Manager or a designated alternate in the event that the Equipment Manager is not available. The Equipment Manager will work with you to determine a plan to safely address the warning light. If you cannot use the field vehicle safely, notify your PM to assist you with arranging an alternate vehicle. Tire pressure warning lights should be addressed immediately using the pump stored in the van or at a service station if a station is readily available—never drive a vehicle with insufficient tire pressure.

The Equipment Manager will be responsible for making sure the following routine maintenance is performed (but please notify them immediately if you notice any other problems):

- Oil changes and periodic routine maintenance per dealer schedule
- Monthly walk-around check (tires, lights, damage, etc.)
- Detailing when needed

3.6 CONTROLLED SUBSTANCE ABUSE

Floyd|Snider has a strong commitment to provide a safe and drug-free workplace for its employees.

Drug or alcohol testing of current employees may be performed where (a) there are reasonable grounds to believe an employee is under the influence of or suspected of consuming alcohol or using marijuana during work hours or using illegal drugs at any time; (b) as a follow-up to a rehabilitative program; or (c) on a random basis when health and safety requirements for clients or projects necessitate testing.

If the alcohol or drug test reveals positive results, the employee may be suspended pending evaluation of the situation by management.

An employee who voluntarily seeks assistance on a timely basis for an alcohol- or drug-related problem, prior to the company identifying the problem, may do so without jeopardizing their employment status, provided the prescribed treatment is followed and work performance is acceptable. In some cases, temporary reassignment may be necessary.

If an employee is undergoing a prescribed medical treatment with a substance that may alter physical or mental capacity, the employee must report this to the Health and Safety Administrator, particularly if they will be conducting field work. The Health and Safety Administrator will coordinate with the Board of Directors, who will determine how to manage the affected employee’s work load.

Any manager who observes or receives a report of alcohol or drug use must promptly investigate the allegations in a confidential manner. The Board of Directors should also be notified immediately. Any other employee who observes or has knowledge of a violation, whether by an employee or others, has an obligation to promptly report this to their immediate supervisor. If an employee’s immediate supervisor is suspected of violating the company’s drug and alcohol policy, the report should be made directly to the Board of Directors.

In any instance where there exists an imminent threat to the safety of persons or property, an employee shall immediately contact a Principal.

4.0 Emergency Procedures

This section defines the emergency procedures for Floyd|Snider. Reasonably foreseeable emergency situations include medical emergencies; accidental release of hazardous materials or hazardous waste; and general emergencies such as vehicle accident, fire, thunderstorm, and earthquake.

A muster point should be designated for all personnel. The Floyd|Snider office emergency muster point is at the Paramount Theatre, on the corner of Pine Street and 9th Avenue. A map of the office evacuation route and a map of the locations of first aid kits, fire extinguishers, and AEDs is posted in all communal office spaces including kitchens and conference rooms, is available on the Floyd|Snider SharePoint home page. On a job site, the SSO should designate a muster point that is clear of adjacent hazards and not located downwind of site activities and communicate this location to the field team each day. In an emergency, all personnel and visitors will evacuate to the muster point for roll call.

It is important that each person understand their role in an emergency and that they remain calm and act efficiently to ensure everyone's safety. Expected actions for potential emergency situations are outlined in the following sections.

4.1 MEDICAL EMERGENCIES

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 persons from immediate danger if moving them will clearly not cause them harm and no hazards exist to the rescuers.
- Evacuate other personnel from the immediate vicinity until the ill, injured, or exposed persons have been evacuated and it is safe for work to resume.
- If serious injury or a life-threatening condition exists, call 911 for paramedics, fire department, and police. When in doubt, contact emergency services; do not drive a seriously ill or injured person to the hospital unless emergency services cannot be summoned (for example, if phone service is out or there is not an ambulance that can reach the location).
- 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 persons. Provide the responders with information about any chemical hazards that might be present on a job site.
- Trained personnel may provide first aid/CPR 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.

- Once more highly trained personnel (i.e., emergency services) have taken over care of the person experiencing the medical emergency, immediately contact the staff member's designated emergency contact person.
- If you are in the field, notify your PM and HSO/SS.
- If a person experiencing a medical emergency is taken to the hospital, another staff member should accompany whenever possible and remain at the hospital until a designated emergency contact person arrives.
- Immediately implement steps to prevent recurrence of the accident.

4.2 ACCIDENTAL RELEASE OF HAZARDOUS MATERIALS OR WASTES

In the event of a release of a hazardous material or waste:

1. Evacuate all personnel to the designated emergency muster point until it is safe for work to resume.
2. If you are in the field, instruct a designated person to contact the PM or HSO/SS and confirm a response. If a release occurs in the office, the Floor Wardens will contact building security.
3. Contain the spill, if it is a known material, 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 the cleanup process. Cleanup must be performed by professionals trained in cleanup response for the type of material released.
7. Submit a written report to the Washington State Department of Ecology in the event of a reportable release of hazardous materials or wastes.

4.3 OTHER EMERGENCIES AND NATURAL DISASTERS

Vehicle Accident

In the event of an accident:

- Check yourself and your passengers and, if safe to do so, any other persons involved in the accident for serious injuries. If anyone is seriously injured, call 911 and wait for emergency personnel.
- If the vehicle can be moved, move to the shoulder or side of the road out of the way of traffic before calling 911. Do not leave the scene of the accident, and avoid engaging in conversation with other persons involved, aside from confirming injury status.
- If the vehicle cannot be moved, get yourself and your passengers to safety if possible. If the vehicle is disabled in a place with fast moving traffic (such as a multi-lane freeway), it may be safest to wait in the vehicle. Use your best judgment.

- If you are able to move the vehicle to the shoulder, use road flares (located in the vehicle emergency kit) to warn oncoming drivers.
- Wait for police to arrive and fill out an accident report.
- Call your PM or HSO/SS to report the accident. In the case of a minor accident, the PM or HSO/SS will consult with the Equipment Manager to determine whether the vehicle should be driven back to the office or towed to a repair facility. Contact roadside assistance if towing is needed.

Fire

During the incipient phase of a fire, the available fire extinguisher may be used by persons trained in putting out fires, if it is safe for them to do so.

If a fire is identified in the office building (either by smell or by the fire alarm), walk to the nearest emergency exit and walk down the stairs (do not use the elevator). Walk to the emergency muster point. Use common sense during a fire to avoid injury if areas are inaccessible.

In the case of a fire in a job site, work shall be halted and all onsite personnel will be immediately evacuated to the emergency muster point, if the fire cannot be extinguished. The local police/fire department shall be notified if the emergency poses a continuing hazard by calling 911.

Thunderstorm

A thunderstorm may present danger of lightning strike any time that visible lightning or audible thunder are present.

In the event of a thunderstorm, seek shelter inside a building if possible. Avoid concrete walls and floors, corded phones, and puddles. When a thunderstorm is accompanied by high winds, also avoid windows. If sheltering in a building is not possible, shelter inside your vehicle, and avoid direct contact with any metal objects in contact with the frame of the vehicle.

Do not resume work activities outdoors until at least 30 minutes have elapsed since the last thunder or lightning was observed.

Earthquake

If you are inside a building during an earthquake, the area near the exterior wall of a building is the most dangerous place to be. Windows, facades, and architectural details are often the first parts of the building to collapse. To stay away from this danger zone, stay inside if you are inside and outside if you are outside. In a high-rise: drop, cover, and hold on. Face away from windows and other hazards. Do not use elevators. Do not be surprised if sprinkler systems or fire alarms activate. Once the earthquake is over, be alert for aftershocks that might occur, follow instructions of your Floor Warden or building security, take your emergency kit or emergency supplies, proceed to the emergency exit, and walk down the stairs. Walk to the emergency muster point. The above are general guidelines and are not meant to apply to every situation, so please use common sense during an earthquake to avoid injury. Additional office safety precautions for earthquakes are posted in the Production Room of the Floyd|Snider office and posted to the Health and Safety department page on SharePoint.

If you are on a jobsite when an earthquake occurs, move away from buildings, overhead power lines, and any other structures that may collapse. Get down low and stay down until the shaking stops to avoid injury. If you are in a moving vehicle, stop as quickly and safely as possible. Move to the shoulder or curb, away from utility poles, overhead wires, and under- or overpasses. Stay in the car and set the parking brake. Turn on the radio for emergency broadcast information. A vehicle may jiggle violently on its springs, but it is a good place to stay until the shaking stops. If a power line falls on the vehicle, stay inside until a trained person removes the wire. After the shaking stops, take your emergency supplies and proceed to the emergency muster point if it is safe to do so. Call your PM or HSO/SS when it is safe to do so.

4.4 EMERGENCY COMMUNICATIONS

Emergencies at Union Square will be communicated by building security using the public address system. If an emergency announcement is made, pause what you are doing and listen to the entire message. Emergencies involving the Floyd|Snider office only may be communicated over the office telephone system.

In the case of a job site emergency, signals may vary by site and should be discussed at daily tailgate meetings so all personnel on-site are aware of the site-specific signals and alarms. In general, horns (vehicle or airhorns) are used as needed to signal the emergency. One long (5-second) blast will be given as the emergency/stop work signal. If horns are not working, waving of arms is typically used to signal an emergency. In any emergency, all personnel will evacuate to the designated muster point and await further instruction.

After an emergency is resolved, the involved personnel or management 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 filed by the Health and Safety Administrator.

4.5 EMERGENCY EQUIPMENT

The following minimum emergency equipment will be readily available in the office and at all job sites and functional at all times:

- First Aid Kit: Contents approved by the HSO/SS, including two blood-borne pathogen barriers. First aid kits are located in the company vehicle; a personal vehicle kit is located in the field room and should be used when field staff drive personal or rental vehicles; and in the office, first aid kits are located at each fire extinguisher location in the north hall, west hall, main kitchen, and large conference room. The location of first aid kits and fire extinguishers will also be posted on maps kept in communal office spaces (kitchens and conference rooms).

- Portable fire extinguishers are included in the field first aid/safety kits and are also located in the office in the north hall, west hall, main kitchen south entrance, and Cedar Conference room.
- A copy of the HASP if on a job site.
- A binder of Safety Data Sheets (SDSs) for commonly encountered chemicals and all potential contaminants of concern that may be present on a job site. This binder is kept in the document organizer compartment of the company vehicle and an additional copy is kept in the field room.

4.6 INCLEMENT WEATHER

Occasionally, there are weather conditions, like snow, that make travel difficult. If the Seattle Public Schools are closed for the day due to hazardous road conditions, then the office will also be closed out of concern for your safety. Any field work scheduled during an office closure due to inclement weather should also be postponed.

4.7 CATASTROPHIC EVENTS

Floyd|Snider has formed an Emergency Planning Committee to develop preparation, communication, and safety plans to implement if a catastrophic event occurs. A catastrophic event is an event that disrupts or destroys critical infrastructure, such as a large-scale earthquake or other natural disaster.

Emergency Kits

Each staff member is provided one emergency kit backpack in case of emergencies that disrupt transportation or utilities. These backpacks include a map with critical structures, contact list and work plan, 32-ounce water bottle (to be filled and replaced every 6 months by the employee), additional 14-ounce water bottle and Platypus water container, water purification tablets, food bars, magnesium firestarter and matches, a multi-purpose tool, an LED flashlight and extra batteries, an emergency radio, an emergency (heat reflective) blanket, rags, nylon rope, a tarp and trash bags, duct tape, hand cleanser, Super Glue, and a hiker's first aid kit. Employees should provide their own raingear, extra socks, walking/hiking shoes, family plan, sunscreen, and 3-day supply of critical medicines. Not all packs are exactly the same, but all should include the items listed above. The Emergency Planning Committee will send regular reminders to check emergency kits and replace expired items.

Staff members should keep their emergency contact card up to date, listing phone numbers for whom to contact if they are unable to make calls themselves. Emergency contact cards should be kept in the front pocket of the backpack, where they can be easily located by others.

Staff should familiarize themselves with the contents of the emergency backpack to make sure all necessary items are included and that they are operational. The Emergency Planning Committee will remind staff every 6 months to check and update backpack contents (replace water in water containers, check the expiration date on the nutrient bars, update contact list if it is not current, etc.). Staff are responsible for keeping the employee contact list updated and having a sensible pair of shoes available in the office.

WhatsApp Emergency Contact Group

The purpose of our WhatsApp group is for group coordination needs during periods of emergency. It will be an easy way for management to communicate next steps back to the entire group, such as the status of the office/IT and expected timelines for returning to work. It also serves as an additional way to check in and communicate that staff and family are safe. Remember, immediately after an emergency, the initial call to check in with Jessi should still be made. Join the Floyd|Snider group on WhatsApp:

1. Download the WhatsApp app on to your phone and setup your account
2. Join the "F|S Emergency Contact" group by following the instructions on the Health & Safety Department site: https://floydsnider.sharepoint.com/Dept/Safety/SitePages/Emergencies.aspx#emergency-coordination-whatsapp

At the 6-month check-in time for backpack contents, employees should also confirm that they are still connected and included in the WhatsApp group. If an employee has been removed from the group (which can occur during software updates, etc.), the employee should notify the Emergency Planning Committee to have the group invitation resent so they can rejoin the group.

What to Do if You Are <u>in</u> the Office When a Disaster Occurs

If you are in the office when an emergency occurs, first and foremost is to remain safe. Wait until the building gives instructions over the PA system, then take your emergency kit and exit the building safely and quickly to meet at the Floyd|Snider muster point at the Paramount Theatre, on the corner of Pine Street and 9th Avenue. Once you have checked in with other Floyd|Snider staff there, you should find your way home safely to check on family and property. Jessi Massingale has been identified as the Disaster Contact. One person from the muster point will contact Jessi once all employees have been safely evacuated. Floyd|Snider will use the WhatsApp group to communicate next steps, as well as email (if available). WhatsApp is described in more detail above.

What to Do if You Are <u>Not in</u> the Office When a Disaster Occurs

If you are not in the office when an emergency occurs, the first thing to do after ensuring your safety and the safety of your family and property, is to text Jessi or Matt Massingale in Bend, Oregon. Report that you are okay and await further instructions. Other management team members can also be contacted if needed. Floyd|Snider will use the WhatsApp group to communicate next steps, as well as email (if available).

In Emergency, Text Jessi/Matt in Bend		
Jessi	206.683.4307 (cell)	
Matt	206.255.2799 (cell)	541.241.6255 (work)
Management Team Numbers		
Allison	206.722.2460 (cell)	206.842.4484 (home)
Kate	206.375.0762 (cell)	206.781.7682 (home)
Tiffany	206.779.2806 (cell)	

Building Access

Depending on the severity of the disaster, Union Square may be closed for inspection, bus routes may be disrupted, and cell phone service may be limited. The nature and likely duration of the emergency aftermath will affect decision-making around working at the office during this time. Floyd|Snider will send out communications via WhatsApp and/or email with information on when to resume work and when it is safe to return to the office.

5.0 Hazard Awareness and Mitigation

In general, there are three broad hazard categories that may be encountered on the job: chemical exposure hazards, fire and explosion hazards, and physical hazards. Sections 5.1 through 5.3 discuss the specific hazards that fall within each of these broad categories and ways to mitigate these hazards.

Additional hazard analysis for specific chemicals present or tasks to be performed at a job site should be detailed in the HASP for the site.

5.1 CHEMICAL EXPOSURE HAZARDS

Potential toxic effects can occur from significant acute or chronic exposure to hazardous chemicals.

Hazardous products used in the office or on the job site should be sealed and stored in places where they cannot be easily spilled. Always follow manufacturer instructions for storage and use of hazardous chemicals. Discard chemicals no longer in use in accordance with manufacturer's instructions, and discard chemicals if containers are damaged, corroded, or otherwise leaking. Consider nontoxic alternatives to cleaning and other products when possible. Consider use of gloves or eye protection when handling or using chemicals with the potential to irritate eyes or skin if contacted.

On contaminated sites and on work sites where hazardous chemicals are used, chemical exposure hazards, monitoring procedures, and decontamination procedures should be detailed in the site HASP.

5.2 FIRE AND EXPLOSION HAZARDS

When storage of material posing a fire and explosion hazards is necessary, such material will be stored in containers approved by the Washington State Department of Transportation in a location not exposed to strike hazards and provided with secondary containment. A minimum 2A:20B 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 a job site are responsible for providing appropriate material for containment and spill response, which should be addressed in their respective HASP, Job Hazard Analysis (JHA), or Job Safety Analysis (JSA). Transferring of flammable liquids (e.g., gasoline) will occur in areas with containment to capture any spillage, and only after making positive metal-to-metal connection between the containers, which may be achieved by using a bonding strap. Storage of ignition and combustible materials will be kept away from fueling operations.

5.3 PHYSICAL HAZARDS

When working in or around any hazardous or potentially hazardous substances or situations, all personnel should plan all activities before starting any task. Personnel shall identify health and safety hazards involved with the work planned. If you have concerns or uncertainty about the safety of a given task, always consult with your PM or, if in the field, with your HSO/SS to determine how the task can be performed in the safest manner.

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/or 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 during work activities. For convenience, these hazards have been categorized into several general groupings with recommended preventative measures.

Hazard	**Cause**	**Prevention**
Head strike	Falling and/or sharp objects, bumping hazards	Hard hats will be worn by all personnel at all times when overhead hazards exist.
Foot/ankle twist, crush, slip/trip/fall	Sharp objects, dropped objects, uneven and/or slippery surfaces	Steel-toed boots must be worn at all times on site 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 chemical contact	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.
Eye damage from flying materials, or splash hazards	Sharp objects, poor lighting, exposure due to flying debris or splashes	Safety glasses will be worn at all times on a job 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 to avoid splashing or dropping equipment into decontamination water.

Hazard	Cause	Prevention
Electrical hazards	Electrical cord hazards	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 prior to use for defects. 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 double-insulated or grounded with a ground-fault circuit interrupter.
Mechanical hazards	Heavy equipment such as drilling machine	Ensure the use of competent operators, backup alarms, "kill" switches, regular maintenance, daily mechanical checks on all hoses and cables, and proper guards. Verify that "whip checks" or similar securing devices are installed on "quick-connections," where the failure of high-pressure connections could lead to the whipping of hoses. Discuss the need for plastic sheeting or other methods to contain drips (hydraulic oil, motor oil, etc.) to determine if measures are needed to prevent releases to the ground. Subcontractors will supply their own JHA, HASP, or JSA. All personnel will make eye contact with operator and obtain a clear OK before approaching or working within a hazardous radius of the heavy equipment.
Noise damage to hearing	Machinery creating more than 85 decibels time-weighted average, less than 115 decibels continuous noise, or peak at less than 140 decibels	Wear earplugs or protective ear covers when a conversational level of speech is difficult to hear at a distance of 3 feet or if an employee must shout to be heard by nearby coworkers; when in doubt, a sound level meter may be used on site to document noise exposure.

Hazard	Cause	Prevention
Strains from improper lifting	Injury due to improper lifting techniques, overreaching/ 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. 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. Turn the forward foot and point it in the direction of the eventual movement. Never try to lift more than you are accustomed to lifting.
Traffic hazards	Vehicle traffic and hazards when working near active operations	When working in or near the right-of-way, orange cones and/or flagging will be placed around the work area. Safety vests will be worn at all times while conducting work in or near the right-of-way. Multiple staff will work together (buddy system) and spot traffic for each other. Avoid working with your back to traffic whenever possible.
Cold stress	Cold temperatures and related exposure	Workers will ensure 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.
Heat exposure	High temperatures exacerbated by PPE, dehydration	Workers will ensure adequate hydration, shade, and breaks when temperatures are elevated. Further detail on heat stress is provided in Section 5.3.2.
Accidents due to inadequate lighting	Improper illumination	Work will proceed during daylight hours only or under sufficient artificial light.
Drowning hazards	Work in or near water	Wear a personal flotation device at all times when working in or near water. Be aware of surroundings including head strike and trip hazards that could cause a fall into water.

Hazard	Cause	Prevention
Slip, trip, and fall hazards	Working in vegetated areas, areas with uneven ground surface, or areas with obstructions	Watch your step when walking and minimize distractions. Establish a path free of obstructions before mobilizing equipment.

5.3.1 Cold Stress

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

To prevent hypothermia, stay dry and avoid exposure. On a job 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 below.

Signs and Symptoms

- Mild hypothermia (body temperature of 98–90 degrees Fahrenheit [°F])
  - Shivering
  - Lack of coordination, stumbling, fumbling hands
  - Slurred speech
  - Memory loss
  - Pale, purplish gray, or dusky and cold skin
- Moderate hypothermia (body temperature of 90–86 °F)
  - Shivering stops
  - Unable to walk or stand
  - Confused and irrational
- Severe hypothermia (body temperature of 86–78 °F)
  - Severe muscle stiffness
  - Very sleepy or unconscious
  - Ice cold skin
  - Death

Treatment of Hypothermia—Proper Treatment Depends on the Severity of the Hypothermia

- Mild hypothermia
  - Move to warm area.
  - Stay active.
  - Remove wet clothes, 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 re-warm—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, wind chill factors can allow frostbite to occur in above-freezing temperatures. Frostbite typically affects the extremities, particularly the feet and hands. Frostbite symptoms include 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 more 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 right clothing is the most important way to avoid cold stress. The type of fabric also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, on the other hand, 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 left 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—Work in pairs to keep an eye on each other and watch for signs of cold stress.

5.3.2 Heat Stress

To avoid heat-related illness, current regulations in WAC 296-62-095 through 296-62-09570 will be followed during all outdoor work activities. These regulations 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-breathing clothing such as chemical resistant suits or Tyvek. Floyd|Snider will identify and evaluate temperature, humidity, and other environmental factors associated with heat-related illness including, but not limited to, the provision of rest breaks that are adjusted for environmental factors and encourage frequent consumption of drinking water. Drinking water will be provided and made readily accessible in sufficient quantity to provide at least 1 quart per employee per hour. All Floyd|Snider personnel performing outdoor work will be informed and trained for responding to signs or symptoms of possible heat-related illness and accessing medical aid.

Employees showing signs or demonstrating symptoms of heat-related illness must be relieved from duty and provided with a sufficient means to reduce body temperature, including rest areas or temperature-controlled environments (i.e., air conditioned vehicle). Any employee showing signs or demonstrating symptoms of heat-related illness must be carefully evaluated to determine whether it is appropriate to return to work or whether medical attention is necessary.

Any incidence of heat-related illness must be immediately reported to the employer directly through the HSO/SS.

The signs, symptoms, and treatment of heat stress include the following:

Condition	Signs/Symptoms	Treatment
Heat cramps	Painful muscle spasms and heavy sweating	Increase water intake, rest in shade/cool environment.
Heat syncope	Brief fainting and blurred vision	Increase water intake, rest in shade/cool environment.
Dehydration	Fatigue, reduced movement, headaches	Increase water intake, rest in shade/cool environment.
Heat exhaustion	Pale and/or clammy skin, possible fainting, weakness, fatigue, nausea, dizziness, heaving sweating, blurred vision, body temperature slightly elevated	Lie down in cool environment, water intake, loosen clothing, and call 911 for ambulance transport if symptoms continue once in cool environment.
Heat stroke	Cessation of sweating, skin hot and dry, red or flushed face, high body temp, unconsciousness, collapse, convulsions, confusion or erratic behavior; life-threatening condition	**Medical Emergency!! Call 911** for ambulance transport. Move victim to shade and immerse in water.

If site temperatures are forecast to exceed 85 °F and physically demanding site work will occur in impermeable clothing, the HSO/SS will promptly consult with a certified industrial hygienist and a radial pulse monitoring method will be implemented to ensure that heat stress is properly managed among the affected workers. The following heat index chart indicates the relative risk of heat stress.

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

5.3.3 Allergies and Biohazards

Allergens capable of triggering a severe reaction may be present in the office environment or the job site. Outdoor work presents additional biohazards such as bees and other insects and wildlife.

Staff with severe allergies should make these allergies known to Floyd|Snider and maintain appropriate preventative medications (EpiPen, Benadryl, etc.) as directed by their physician in a location that can be easily accessed in case of emergency. The locations of these medications should be shared with the Floor Wardens, along with instructions for delivery if needed.

In the field, persons with allergies to bees or other insects will make the HSO/SS aware of their allergies and will avoid areas where bees/insects 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. Especially when working during the summer months, staff should monitor the work area for evidence of insect nests of stinging insects. A nest may be nearby if multiple flying insects are observed in the area, or if flying insects appear to be entering and leaving the same locations. Nests may be buried underground, located in vegetated areas, or in structures such as well monuments, vaults, and buildings.

Inspect the work area for hazardous plants, medical waste (syringes and similar items), and indications of hazardous organisms, and avoid such areas if possible. On job sites, personnel will maintain a safe distance from any urban wildlife encountered, including stray dogs, raccoons, and rodents, to preclude a bite from a sick or injured animal.

A severe allergic reaction, or anaphylaxis, is a rapid immune response that may be fatal if untreated. Persons experiencing anaphylaxis require medical care beyond preventative medication or first aid. The signs of anaphylaxis may include the following:

- Extensive skin rashes, itching, or hives
- Swelling of the lips, tongue, or throat
- Shortness of breath, trouble breathing, or wheezing
- Dizziness and/or fainting
- Stomach pain, bloating, vomiting, or diarrhea
- Uterine cramps
- Feelings of panic or dread

5.3.4 Fatigue

Worker fatigue can impair judgment and increase the risk of injuries on the job site. Fatigue may be caused by physical exertion from difficult tasks, extended working hours, and environmental challenges, including exposure and extreme weather. Fatigue can be caused by working extended hours for a duration of 1 week or more (including overtime work, consecutive long shifts, and extended work weeks) or by extremely physically and mentally demanding work of any duration. Tasks should be assessed individually for risk of fatigue. Variable weather conditions (high and low temperatures, sustained strong winds) can place additional physical and mental strain on field personnel.

5.3.4.1 Fatigue Symptoms and Self-Monitoring

Signs and symptoms of fatigue may present similarly to inebriation and can include:

- Reduced fine motor skills and coordination (e.g., tripping or dropping items)
- Impaired concentration
- Poor communication
- Poor judgment
- Mood swings or irritation

The above are typical symptoms of fatigue, but individuals can also experience or present fatigue in other ways that may be less obvious to an observer. The HSO/SS should additionally check in with staff members to ensure they are not experiencing any symptoms of fatigue that may impair their judgment or coordination in the field.

5.3.4.2 Managing Fatigue

Fatigue should be managed by limiting working hours and implementing rest days. Signs and symptoms of fatigue and fatigue management should be discussed, when applicable, at the daily tailgate and debrief meetings.

Potential actions to minimize fatigue include the following:

- Plan to get 7 to 9 hours of sleep each night
- Take a lunch break inside, or out of the weather
- Take snack and hydration breaks throughout the day
- Take a late start, half-day, or rest day during the field event

5.3.4.3 Fatigue Response Actions

In job situations where fatigue is likely, the HSO/SS should monitor employee fatigue using the following guide.

If the answer is yes to any of the following questions, the HSO/SS should consider implementing a shortened work day, light duty, or a day off for the affected employee.

- Do environmental factors pose an additional fatigue load (e.g., exposure to extreme hot/cold weather or wind)?
- Has the team member exhibited signs of fatigue?
- Has the team member worked on a physically intense task?

- Has the team member worked through the day without taking regular breaks to eat, stay hydrated, and rest?
- Has the team member had less than 6 hours of sleep in the past 24 hours?
- Did the team member work more than 12.5 hours in the past day?

If the answer is yes to either of the following questions, the HSO/SS will implement a day off for the affected employee.

- Did the team member work more than 75-80 hours in the past week?
- By the end of the shift, has the team member been awake for more than 17 hours?

Employees should also self-monitor for signs of fatigue and immediately report to the HSO/SS if fatigue becomes a concern.

If fatigue becomes a team-wide safety issue on the job site, the HSO/SS should coordinate with the PM to determine the actions that will be taken at the project level to manage fatigue. Actions may include adding team members, changing work practices, and/or adjusting the work schedule.

6.0 Job Site Controls

This section describes the best practices to be implement on a field job site to protect personnel and the environment. These best practices are considered the minimum controls for any job site, and additional site-specific protocols should be detailed in the site-specific HASP.

- All site work should be completed in teams when possible. Teams should establish a primary means of communication on-site and with offsite contacts (generally via cell phones or radios on-site). An agreed-upon system of alerting via air horns and/or vehicle horns may be used around heavy equipment to signal an emergency if shouting is ineffective.
- Work area perimeter controls should be established to ensure that members of the public do not enter the work area and limit the potential for chemical exposure associated with site activities when hazardous materials may be present. These work areas include a support zone, a contaminant reduction zone (decontamination area), and an exclusion zone.
- Staff will take precautions to prevent contamination:
  - Inspect all PPE prior to entering the exclusion zone.
  - Avoid walking through puddles or areas of known or obvious surface soil contamination.
  - Do not carry unnecessary items into the exclusion zone.
  - Take care to limit contact with heavy equipment and vehicles.
  - Protect the ground surface when processing samples and wipe down or sweep surfaces frequently to minimize the amount of potential contaminated material that may be spread during site work.
- Staff will decontaminate all equipment and gear as necessary during field events. Decontamination procedures will be strictly followed to prevent offsite spread of contaminated materials. Decontamination procedures should be detailed in the site-specific HASP but at a minimum will include cleaning equipment to a visually debris-free surface. 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 or cosmetics.
- Visual monitoring for fugitive dust and soil track-out by vehicles leaving the job site should be conducted by the HSO/SS or a dedicated member of the field staff. If visible dust leaving the work area or track-out are observed, immediate action should be taken to correct the issue.
- The HSO/SS will ensure the proper collection, packaging, and identification of waste materials so that waste materials will be properly disposed of.

7.0 Training Requirements

All Floyd|Snider field personnel must comply with applicable regulations specified in WAC Chapter 296-843, Hazardous Waste Operations, and WISHA (WAC Chapter 296-800). WISHA states that personnel who may come into contact with hazardous materials must have current HAZWOPER certification and participate in an employer-sponsored medical monitoring program. Therefore, these sections apply to any employee at Floyd|Snider who performs work where they have the potential to come in to contact with hazardous or dangerous substances. Additionally, when doing site work, at least one person on-site must be trained in CPR/First Aid. In order to maintain compliance with the regulation, **employees whose medical clearance or HAZWOPER certification are expired may not conduct field work unless their medical examination or refresher course is scheduled to occur within 30 days of their previous certification expiration date.**

7.1 MEDICAL MONITORING

In accordance with state medical surveillance regulations, field staff employees must participate in the medical monitoring program, which benefits both the employees and Floyd|Snider by evaluating the overall health of each individual in connection with the work to be performed, as well as monitoring workplace health and safety initiatives. Employees who will be working on-site are required to participate in a baseline examination and biennial examinations, as well as completion of an exit exam should an employee no longer conduct onsite work requiring medical monitoring.

The purpose of the Floyd|Snider examination program is to:

- Provide a baseline of health information for an employee, which can be used for comparison in related future examinations;
- Detect any adverse health effect that might be a result of workplace exposures;
- Detect any underlying medical condition that may place an employee at higher risk for medical problems related to workplace activities; and
- Ensure that an employee is able to function safely while performing their essential job functions at Floyd|Snider.

When an employee is no longer participating in fieldwork and wishes to unenroll from the Floyd|Snider medical monitoring program, the employee should contact the Health and Safety Administrator for approval and to begin the medical monitoring program exit process described in Section 7.5.

7.2 HAZWOPER TRAINING

HAZWOPER training and certification are required for all staff on-site at sites regulated by the Model Toxics Control Act (MTCA) or the USEPA more than 30 days per year. This training typically includes an initial 40-hour HAZWOPER certification and annual 8-hour refresher courses. Field staff who have the potential to contact contaminated materials must have 40-hour HAZWOPER certification and attend annual 8-hour refresher courses. HAZWOPER certification may also be necessary on a project-specific basis for PMs who are not active in the field safety training and medical monitoring program. Field staff who do not have the potential to contact contaminated material, and are not in a supervisory field role, may require fewer hours of HAZWOPER training, to be determined on a case-by-case basis. These employees will also be required to attend annual 8-hour refresher courses.

7.3 JOB-SPECIFIC TRAINING

In addition to the 40-hour classroom training required by HAZWOPER, all field staff must complete 24 hours of job-specific training. This training is conducted on-site in the field under direct supervision of a skilled supervisor who is another Floyd|Snider employee. These training hours can occur on one or multiple field events and can cover an array of standard field activities. Once the 24-hours of training is complete, job-specific training forms (available on Floyd|Snider's Health and Safety department page on SharePoint) must be completed and signed by the trainer and submitted to the Health and Safety Administrator.

Additional site-specific training should be conducted to cover onsite hazards; PPE requirements, use, and limitations; decontamination procedures; and emergency response information as outlined in the HASP for the site.

7.4 CPR/FIRST AID

When conducting field work, at least one person on-site must be trained in CPR/First Aid, with a current certification. All employees who are on-site at MTCA- or USEPA-regulated sites more than 30 days per year are required to have current CPR/First Aid certification. This training is also provided by the company to any interested employees, including those who do not do field work.

7.5 EXITING THE FIELD STAFF SAFETY TRAINING AND MEDICAL MONITORING PROGRAM

This section presents the protocols to be followed in the event that an employee must exit the field staff safety training and medical monitoring program due to termination of their employment or transition to a different role at Floyd|Snider.

7.5.1 Termination of Employment

Washington's medical surveillance regulations require Floyd|Snider to schedule an exit exam for an employee upon termination of employment. Upon termination, employees will be notified of the appointment date and time and will be given information to reschedule the appointment if needed. The exit exam will be provided at Floyd|Snider's sole expense, and it is strongly recommended, in the best interest of your health, that you attend the appointment.

Floyd|Snider reserves the right to withhold payment of any severance package offered until confirmation of the exam is received.

7.5.2 Transition of Role

Floyd|Snider is a company of versatile employees with technical expertise who collaborate effectively to meet client and project needs; because of this collaborative approach, we do not employ full-time field technicians who exclusively fill a sampling role. Therefore, to ensure that client needs are met even during our busiest times and spread workload equitably across the firm, it is essential that all staff involved in field data collection, including in a supervisory capacity, maintain current field safety certification and medical clearance.

However, under certain limited circumstances, an employee may transition roles at the company such that field certifications are no longer needed. An employee who wishes to exit the field staff safety training and medical monitoring program must:

- Document that employee has performed fewer than 30 partial or full days of field work for each of the past 2 calendar years; and
- Obtain approval from the Management Committee, by coordinating with the Health and Safety Administrator.

If an employee's exit from the program is approved, the employee is required by WISHA to complete a medical monitoring exit exam. Failure to complete an exit exam may result in withholding any bonus pay and a delay in annual pay increases.

A letter to document the date and reason for an employee's rationale for terminating participation in the field staff safety training and medical monitoring program, signed by the employee and a Principal, must be maintained in the employee's personnel file.

8.0 Record Keeping and Reporting

Prompt and accurate recording and reporting is essential for continuing to improve the Floyd|Snider health and safety program and comply with the safety regulations.

8.1 RECORD KEEPING

Records should be kept of all employee training, safety meetings including Health and Safety Committee meetings and daily tailgate safety meetings conducted in the field, and near misses and incidents. Forms for on-the-job employee training, daily tailgate safety meetings, and near misses and incidents are available on the company's Health and Safety department page on SharePoint.

The minutes of Health and Safety Committee meetings are recorded by the Health and Safety Administrator and maintained on Floyd|Snider's Health and Safety department page on SharePoint.

The HSO/SS, or a designated alternate, will be responsible for conducting daily tailgate safety meetings and recording the meeting on a daily tailgate safety meeting form. The form, which must be appended to all HASPs, lists the hazards discussed and is signed by all personnel present at the meeting. The HSO/SS will manage the administration of job-specific training. Job-specific training forms must be completed and signed by the trainer.

Daily tailgate safety meeting and job-specific training forms must be reviewed with the PM after completion of the field event. After PM review, scans of the forms should be saved to the appropriate project folder, and the original copies of the forms will be submitted to the Health and Safety Administrator. The PM and the Health and Safety Administrator will determine whether any issues identified on tailgate safety meeting forms require further review or follow-up actions.

8.2 REPORTING

Near misses and incidents should be recorded on a Near Miss and Incident Reporting Form. The form gathers information regarding the circumstances of the near miss or incident, consequences, and corrective actions implemented. Near misses and incident report forms may be filled out by any Floyd|Snider staff. If a near miss or incident occurs in the field, the form must be reviewed and signed by the HSO/SS and the PM. This form must be appended to all site-specific HASPs.

Near Miss and Incident Reporting Forms will be maintained by the Health and Safety Administrator and made accessible to all staff for review after information that may identify specific individuals is redacted. In the event that an injury occurs in the workplace, the Health and Safety Administrator will coordinate with the PM or Management Committee to determine whether the injury is OSHA-reportable and implement follow-up reporting.

9.0 Signature Page

I have read this Accident Prevention Plan and understand its contents. I agree to abide by its provisions and will immediately notify the Health and Safety Administrator or Board of Directors if conditions or hazards not specifically designated herein are encountered.

Name (Print)	Signature	Date

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix E

Attachment E.2
Daily Tailgate Safety Meeting Form

DAILY TAILGATE SAFETY MEETING FORM

Instructions: To be completed by the Site Safety Officer prior to beginning of work each day, when changes in work procedures occur, or when additional hazards are present. Review with your Project Manager (PM) at the conclusion of your event and file with your field notes.

PROJECT NAME AND ADDRESS:	WORK COMPLETED/TOOLS USED:

TOPICS/HAZARDS DISCUSSED:

Chemicals of concern:
Slip, trip, fall:
Weather/Heat or cold stress:
Required PPE:
Other Potential Hazards (Biological, Physical, Environmental, etc.):
Decontamination:

SPECIAL SITE CONSIDERATIONS (e.g. access restrictions)**:**

EMERGENCY RESPONSE:

Muster Point:
Emergency Contacts:
Allergies:
Emergency Resources:

ADDITIONAL TOPICS DISCUSSED:

ATTENDEE NAME/AFFILIATION/SIGNATURE:

Near Misses or Incidents? Complete Near Miss and Incident Reporting Form(s).

Site Safety Officer Signature/Date: ____

PM Review (Initial) __________

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix E

Attachment E.3
Near Miss and Incident Reporting Form

NEAR MISS AND INCIDENT REPORTING FORM

Instructions for Field Staff:

- Report near misses and incidents using this form and notify the Site Safety Officer or Field Lead.
- Notify the Project Manager (PM) immediately in the event of a serious incident such as an injury, damage to equipment, or an event that causes a work stoppage. For all other near misses or minor incidents, review this form with your PM at the end of the workday or field event.
- Submit this form to the Health and Safety Program Administrator after review with the PM. Report additional information (i.e., corrective action or medical updates) to the Health and Safety Program Administrator within 1 week of the near miss or incident.

Date:	**Project:**
Time:	**Site/Location:**
Incident Type: ☐ **Near Miss** ☐ **Incident**	

Employee(s) Involved (include witnesses)**:**

Description of Incident (include precise location, injuries, the task performed, equipment/ materials involved, equipment damaged, anomalies, deviations, and consequences):

What Was the Cause of the Incident?

Describe Any First Aid or Medical Treatment:

Conditions During Incident (extreme weather, fatigue, visibility or lighting, etc.)**:**

Preparer's Signature:___________________________________ **Date:**____________________

SSO or Field Lead Signature:_____________________________ **Date:**____________________

INCIDENT REPORTING FOLLOW-UP FORM

Instructions for the Site Safety Officer or Project Manager:

- Complete this form following an incident.
- Submit this form with a copy of the completed Near Miss and Incident Reporting Form to the Health and Safety Program Administrator with copies to the Principal-in-Charge for the project within 24 hours of the incident.
- Any additional information (i.e., corrective action or medical updates) should be reported to the Health and Safety Program Administrator within one week of the incident.

Describe Any Follow-Up First Aid[1] or Medical Treatment:

Was This an OSHA-Reportable Incident[2]? Why?

What Was the Root Cause of the Incident Based on the 5 Why's Approach[3]?

Follow-Up Actions Taken (include dates)**:**

SSO or Field Lead Signature:______________________________ Date:____________________

Project Manager's Signature: ____________________________ Date:____________________

[1] First Aid is defined as: using non-prescription medication at non-prescription strength, cleaning wounds on the skin surface, applying wound coverings (not sutures/staples), removing foreign bodies from the eye using irrigation or a swab, removing foreign bodies from elsewhere (not the eye) using tweezers, hot/cold therapy, drinking fluids to relieve heat stress, using finger guards or eye patches, using non-rigid means of support (such as bandages), using temporary immobilizing devices while transporting an injured person, administering tetanus immunizations. Care administered beyond these activities requires follow-up reporting by the PM to the Health and Safety Program Administrator and Principal-in-Charge of the Project within 24 hours of the incident.

[2] Guidelines for determining what incidents are OSHA Reportable are available here: *https://www.osha.gov/recordkeeping/*.

[3] If the incident was an OSHA reportable incident, complete a Root Cause Analysis using the Five Why's Approach.

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Appendix F
Quality Assurance Project Plan

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List of Tables

List of Attachments

List of Abbreviations

Abbreviation	Definition
bgs	Below ground surface
COC	Contaminant of concern
CUL	Cleanup level
CVOC	Chlorinated volatile organic compound
DCE	cis-1,2-dichloroethene
DO	Dissolved oxygen
DQI	Data quality indicator
Ecology	Washington State Department of Ecology
EDD	Electronic data deliverable
EDR	Engineering Design Report
HAZWOPER	Hazardous Waste Operations & Emergency Response
HSO	Health and Safety Officer
LCS	Laboratory control sample
MDL	Method detection limit
MS	Matrix spike
MSD	Matrix spike duplicate
ORP	Oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
PCE	Tetrachloroethene
PM	Project Manager
PVC	Polyvinyl chloride
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
REL	Remediation level
RL	Reporting limit
SDG	Sample delivery group
Site	Ultra Custom Care Cleaners Site
SOP	Standard of practice
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

This Quality Assurance Project Plan (QAPP) is presented as an appendix to the Engineering Design Report (EDR) prepared on behalf of the City of Bothell for implementation of cleanup action at the Ultra Custom Care Cleaners Site (Site). It describes the quality assurance (QA) objectives, methods, and procedures for sample analysis of soil and groundwater to document compliance with cleanup levels (CULs) and remediation levels (RELs) and assess remedy performance for contaminants of concern (COCs) established in the Site Cleanup Action Plan (Ecology 2022) and summarized in Tables 2.1, 2.2 and 2.3 of the EDR. Additional analyses will be conducted for assessment of contaminant attenuation in groundwater, as described in the EDR.

The EDR presents the objectives, conceptual study design field management responsibilities, sampling locations, and field sampling methods for the cleanup action. This QAPP presents more detailed information regarding sampling methodologies, data management responsibilities, laboratory analysis methods and procedures, and reporting requirements. This document was prepared in accordance with the U.S. Environmental Protection Agency's (USEPA's) guidance on preparing QAPPs (USEPA 2002a, 2006).

1.1 DOCUMENT ORGANIZATION

This QAPP provides detailed field and laboratory methods and protocols for all anticipated types of data collection. QAPP addenda may be prepared if additional data types not detailed in this plan are determined to be needed after completion of part or all of the cleanup action.

This QAPP is organized into the following sections:

- Section 2.0—Project Organization and Responsibilities
- Section 3.0—Data Generation and Acquisition
- Section 4.0—Assessment and Oversight
- Section 5.0—Data Validation and Usability
- Section 6.0—References
- Section 7.0—Approvals

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2.0 Project Organization and Responsibilities

2.1 PROJECT MANAGEMENT

The following sections describe the responsibilities of project team members for fulfillment of the QAPP. The contact information for key project team members will be provided to the Washington State Department of Ecology (Ecology) prior to implementation of the cleanup action.

2.1.1 Engineer

The Floyd|Snider Engineer will be involved in all aspects of this project, including discussion, review, and interpretation of this QAPP, and the results of the investigation. The Floyd|Snider Engineer will also be responsible for the overall implementation of this QAPP.

2.1.2 Project Manager

The Floyd|Snider Project Manager (PM) will be responsible for providing oversight for planning and coordination, work plans, all project deliverables, and performance of the administrative tasks needed to provide timely and successful completion of the project. They will also be responsible for coordinating with the Engineer on schedule, deliverables, and other administrative details.

2.1.3 Field Technician

The Floyd|Snider Field Technician will be responsible for implementation of the field data collection program, including sample handling and custody documentation. The Field Technician will work closely with the Engineer and PM to ensure that the required sample collection and laboratory analyses are completed. The Field Technician is also responsible for oversight of daily calibration of field equipment in accordance with the QAPP and inspection of sample containers as specified in Section 3.7.

2.1.4 Quality Assurance/Quality Control

The QA and quality control (QC) coordinator or their designee will also serve as the laboratory QA/QC coordinator. The QA/QC coordinator will oversee coordination of the field sampling and laboratory program and supervise data validation and project QA coordination, including coordination with the analytical laboratories and Ecology. The laboratory QA/QC coordinator will be a Floyd|Snider staff member specializing in QA/QC who is independent from the analytical laboratories and field staff responsible for generating the data.

Analytical laboratories will be responsible for chemical analyses and will ensure that submitted samples are handled and analyzed in accordance with the analytical testing procedures and QA/QC requirements, as well as the any other requirements specified in this QAPP. The laboratories will provide certified pre-cleaned sample containers and preservatives, as appropriate, and prepare a data report containing analytical and QA/QC results. The laboratory PM will oversee laboratory operations, including receipt of samples, chemical analyses, and laboratory report preparation. They will prepare and review laboratory reports and case narratives describing any discrepancies that occurred during chemical analyses. They will also notify the laboratory QA/QC coordinator of any problems as soon as they are identified.

2.2 PROBLEM DEFINITION/BACKGROUND

The EDR describes the sample collection that will be performed as part of the cleanup action at the Site. The EDR sampling design is intended to provide sufficient documentation that cleanup standards are met in contaminated Site media including soil and groundwater and additionally to document groundwater quality relative to RELs for commercial worker safety at the Site. Extensive previous sampling data, as summarized in the EDR, inform the sampling design and selection of sample stations.

2.3 PROJECT TASK DESCRIPTION

Sampling activities described in the EDR will be initiated after Ecology approval and issuance of notice to proceed to contractor(s) for construction of the cleanup action. Samples will be collected immediately upon completion of each element of the cleanup action, which will include excavation within three areas, to remove contaminated soil, and installation of in situ groundwater treatment barriers. Soil samples for excavation confirmation will be collected from in situ soil remaining once the required extents of each excavation, and/or necessary over-excavation, are completed, as described in the EDR. Groundwater samples for assessing the remedy performance will be sampled regularly upon completion of in situ treatment barrier installation and establishment of a performance monitoring well network.

2.4 SPECIAL TRAINING/CERTIFICATIONS

The Floyd|Snider Health and Safety Officer (HSO; refer to Appendix E) and all field personnel will be 40-hour Hazardous Waste Operations & Emergency Response (HAZWOPER) certified, consistent with Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120, and be trained in the soil and groundwater sample collection methods described in this QAPP. The HSO will be responsible for ensuring that field staff and contractors have the necessary training and that field staff are up to date on the annual 8-hour HAZWOPER refresher course.

All analytical laboratories will have current environmental laboratory accreditation from Ecology for the analytical methods to be used.

2.5 DOCUMENTATION AND RECORDS

Floyd|Snider will store all project records in a secure manner. Each project team member is responsible for filing all project information and records according to internal Floyd|Snider requirements. All electronic data will be maintained in a database in a designated directory at Floyd|Snider.

2.5.1 Field Records

Documents and records generated in the field should be considered controlled documents that become part of the project file. Floyd|Snider field staff will keep a daily record of significant events, observations, and measurements on forms specific to the field activity. All field documents will be maintained by the Engineer. All sampling forms will contain information on the sample collected and will include at a minimum the following information:

- Project name
- Field staff on site
- Field observations
- Sample collection date and time
- Sampling method and/or description of field activities
- Instruments or equipment used
- Location identifier (ID) and sample ID
- Sample analysis
- Deviations from the EDR

2.5.2 Laboratory Records

The analytical laboratories will retain all analytical records. Additionally, Floyd|Snider will retain a copy of analytical data in the internal project files. Laboratory data packages will include those items necessary to complete data validation. Elements to be reported in the laboratory data packages are listed in Section 5.1.

All instrument data will be fully restorable at the laboratory from electronic backup. The laboratory will be required to maintain records relevant to project sample analyses for a minimum of *7 years*. Data validation reports will be maintained within the Floyd|Snider internal project files with the laboratory data packages.

Each laboratory employs an internal QA manager who is responsible for ensuring that laboratory standards of practice (SOPs) are followed, and laboratory staff perform routine audits for SOP compliance; routine audits are required for state accreditation. The Engineer or Ecology PM may request to review records of SOP compliance.

The analytical laboratories will submit data electronically, in the Floyd|Snider standard electronic data deliverable (EDD) format. Guidelines for EDDs will be communicated to the analytical laboratories by the QA/QC coordinator or Database Manager.

All electronic data submittals must be tab-delimited text files that include all results, method detection limits (MDLs; as applicable), and reporting limits (RLs) consistent with those provided in the laboratory report. If laboratory replicate analyses are conducted on a single submitted field sample, the laboratory sample identifier must distinguish each replicate analysis.

2.5.3 Data Management and Reduction

The Floyd|Snider Database Manager will oversee data management and reduction in coordination with the Engineer. Once all required data are confirmed to be received and validated, the Database Manager will load all records to Floyd|Snider's electronic database accessed using Microsoft Access software. The database is maintained on the Floyd|Snider server and is backed up with a hard disc. The Database Manager will manage data exports and will confirm that data are assembled in the required deliverable format with appropriate qualifiers.

3.0 Data Generation and Acquisition

The purpose of this section is to provide a summary of sample design and methods.

3.1 SAMPLING DESIGN

Data will be collected to determine compliance with CULs and RELs in Site soil and groundwater. Additional data will be collected to further evaluate the performance of in situ treatment barriers in removing and degrading chlorinated volatile organic compounds (CVOCs) in Site groundwater.

3.2 SAMPLING METHODS

This section summarizes the collection and analysis of soil and groundwater samples presented in the EDR. Additional sampling design for other media, if determined to be necessary, would be addressed in a supplemental work plan document.

3.2.1 Sample Collection

The general field procedures for soil sample collection and groundwater collection using low-flow methodology are described in the Standard Field Guidelines provided in Attachment F.1. Sampling considerations specific to the cleanup action are described in the following sections.

3.2.1.1 Excavation Confirmation Soil Sample Collection

During excavation, soil samples will be collected after the contractor has completed surveying the extents of the excavation to ensure that the measurements specified in the EDR have been reached. Samples will be collected from the excavation base and/or sidewalls as shown on Figure 6.1 of the EDR.

The soil on the sidewalls and bottom of the excavation will be photographed and soil descriptions and identification noted on the field log. The sample collection method will depend on the depth of excavation and whether the excavation can be safely entered by field personnel. The two sample collection methods are as follows:

- Direct base or sidewall collection
  - Use a shovel or trowel to scrape the base or sidewall and expose a fresh surface to minimize volatile loss.
  - Push a disposable plunger directly into the surface to the demarcation line for the required sample volume as specified by the laboratory, then discharge the soil plug from the plunger directly into the laboratory-provided vial.
- Sample collection from an excavator bucket
  - Use the bucket to scrape the base or sidewall and expose a fresh surface to minimize volatile loss.

- Making sure the bucket is clean of other soil, advance the bucket a few inches into the sidewall or base at the selected sample depth.
- Remove the sample material to the surface, taking care not to disturb the soil structure and making sure soils from higher up in the excavation do not fall into the bucket.
- Push a disposable plunger directly into soils in the middle of the bucket that have not contacted the sides of the bucket. Insert the plunger to the demarcation line for the required sample volume, as specified by the laboratory, then discharge the soil plug from the plunger directly into the laboratory-provided vial.

3.2.1.2 Groundwater Performance Monitoring Well Installation and Sample Collection

The new groundwater performance wells will be installed using auger or rotosonic drilling methodologies, and soils will be logged during drilling to identify the appropriate depth for the screened interval. Wells will be constructed of 2-inch diameter, 0.10-inch slotted polyvinyl chloride (PVC) screen with 2-inch diameter PVC riser and completed with flush-mounted protective monuments. Proposed well screen interval depths are presented in Table 7.1. After installation, wells will be developed by surging and overpumping in accordance with the procedures presented in Attachment F.1. Wells will be developed a minimum of 1 week prior to the first round of sampling. Drill soil cuttings and purge water will be containerized pending characterization for off-site disposal.

The horizontal and vertical position of all new wells will be recorded by a licensed surveyor with a horizontal accuracy of ±0.1 foot and a vertical accuracy of ±0.01 foot in Washington State Plane North and North American Vertical Datum of 1983.

All wells will be purged and sampled using low-flow procedures in accordance with the Floyd|Snider low-flow groundwater sample collection guidelines (refer to Attachment F.1). During the groundwater sampling event, the depth to groundwater will be recorded using an electronic water level meter prior to sampling at all wells specified for water level measurement. Water levels will additionally be monitored during sampling to measure drawdown of the water column.

During purging, field staff will periodically measure and record pH, dissolved oxygen (DO), temperature, specific conductivity, and oxidation-reduction potential (ORP) using a multi-parameter water quality meter. The field parameter measurements, particularly DO and ORP, will be used to evaluate current geochemical conditions (i.e., oxidizing or reducing) of the aquifer.

3.2.1.3 Equipment Decontamination

Reusable sampling equipment will be decontaminated by dry-brushing or performing a tap water rinse to remove particles of debris, followed by scrubbing with a biodegradable soap solution (such as Alconox or Liquinox), and a final rinse with distilled water. Disposable sampling equipment will be dry brushed to remove particles of debris, then disposed as municipal solid waste.

3.2.2 Sample Analysis

Soil and groundwater samples will be submitted to Onsite Environmental Laboratory, an accredited laboratory located in Redmond, Washington.

Soil samples will be analyzed for tetrachloroethene (PCE).

Groundwater samples will be analyzed for the groundwater COCs as well as geochemical parameters, as described in Section 7.1 and Table 7.1 of the EDR, including the following:

- COCs
  - CVOCs (PCE, trichloroethene, cis-1,2-dichloroethene [DCE], trans-1,2-DCE, and vinyl chloride) by USEPA Method 8260D
- Secondary Geochemical Parameters for Monitored Natural Attenuation
  - Anions (nitrate, nitrite, and sulfate) by USEPA Method 300.0
  - Sulfide by method SM4500
  - Ferrous iron by Standard Method 3500-FE-D or colorimetric field test

3.3 ANALYTICAL METHODS

Laboratory analytical methods were selected to ensure that the samples can be compared to the CULs and RELs presented in Tables 2.1 through 2.3. The laboratory quantitation limits including practical quantitation limits or RLs and MDLs for the selected analytical methods are presented in Table F.1.

3.4 DATA QUALITY OBJECTIVES AND CRITERA

Field and laboratory data quality objectives include obtaining data that are technically sound and properly documented, having been evaluated against established criteria for the principal data quality indicators (DQIs; i.e., precision, bias, accuracy, representativeness, completeness, comparability, and sensitivity). Evaluation of the principal DQIs is summarized in the following sections. Data QA/QC criteria (also known as measurement quality objectives) and frequencies are presented in Tables F.2 and F.3, respectively.

3.4.1 Precision

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 is assessed by performing multiple analyses, such as laboratory duplicate or field duplicate samples, and is defined as the relative percent difference

(RPD) between results. Precision will be evaluated for both laboratory and field duplicate samples and calculated as follows.

$$RPD = \frac{(C_1 - C_2) \times 100\%}{\frac{(C_1 + C_2)}{2}}$$

Where:
- RPD = relative percent difference
- C_1 = larger of the two observed values
- C_2 = smaller of the two observed values

Laboratory duplicate sample precision criteria and frequency requirements are presented in Tables F.2 and F.3, respectively. Field duplicate precision will be screened against an RPD of 50% for all samples. For precision calculations (i.e., for calculating RPD) the RL will be used when a non-detect result is included in the evaluation. Additionally, the result/s based on the final dilution will be used in the calculation (i.e., values flagged as estimated greater than a given concentration, which are superseded with subsequent sample dilutions, will not be used).

3.4.2 Accuracy and Bias

Accuracy is an expression of the degree to which a measured or computed value represents the true value. Bias is "the systematic or persistent distortion of a measurement process that causes error in one direction" (EPA 2002a). Analytical bias and accuracy may be assessed by analyzing "spiked" samples with known concentrations, such as laboratory control samples (LCSs), blank spikes, and standard reference materials. Additionally, matrix spike (MS) samples can be analyzed to provide accuracy or bias information in the actual sample matrix. Precision criteria and frequency requirements are presented in Tables F.2 and F.3, respectively. Accuracy will be evaluated as percent recovery (%R) and will be calculated as follows.

$$\%R = 100\% \times \frac{(S-U)}{C_{sa}}$$

Where:
- %R = percent recovery
- S = measured concentration in the spiked aliquot
- U = measured concentration in the unspiked aliquot
- C_{sa} = actual concentration of spike added

For accuracy calculations (i.e., for calculating %R), non-detect results will be assigned a value of zero. Additionally, the results based on the final dilution will be used in the calculation (i.e., values flagged as estimated greater than a given concentration, which are superseded with subsequent sample dilutions, will not be used).

3.4.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent an environmental condition. This DQO is addressed by the design of the sampling plan. A list of analytes has been identified to provide a comprehensive assessment of known or potential contaminants. 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 (refer to Sections 6.3 and 7.1 of the EDR). Sufficient volume of samples will be collected at each sampling location to minimize bias or errors associated with sample particle size and heterogeneity.

Representativeness in laboratory data will be assessed by evaluating holding time compliance and the results of the method blanks, equipment blanks, field blanks, and instrument blanks.

3.4.4 Completeness

Completeness is defined as the number of acceptable data points relative to the total number of data points and is also a measure of the amount of validated data reported versus the expected amount of data (the amount of data collected). Completeness will be assessed for each sample medium. The QA/QC objective for completeness for all components of this project is 90% (Table F.2). 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 their intended use or for the purpose of assessing completeness. If a sample medium has an unacceptable completeness percentage (less than 90%), 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 (if feasible). The equation used to calculate completeness is as follows:

$$\text{Completeness} = \frac{\text{number of valid measurements}}{\text{total number of data points planned}} \times \mathbf{100}$$

3.4.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one dataset can be compared to another. To ensure that results are comparable, samples will be analyzed using USEPA methods, Standard Methods, ASTM methods, and/or other acceptable method protocols. Calibration and reference standards will be traceable to certified standards, and standard data reporting formats will be employed.

3.4.6 Sensitivity

Analytical sensitivity is the minimum concentration of an analyte above which a data user can be reasonably confident that the analyte was reliably detected and quantified. For this investigation, the MDL or estimated detection limit will be used as the measure of sensitivity for each analyte.

3.5 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Guidance for QA/QC is derived from the protocols developed for USEPA's Test Methods for the Evaluation of Solid Waste: Physical/Chemical Methods (USEPA 1986), the USEPA Contract Laboratory Program (USEPA 2020a, 2020b, and 2020c), and cited methods.

The Field Technician or field personnel will assess and implement field QC procedures as required in this QAPP.

3.5.1 Field Quality Assurance/Quality Control Procedures

3.5.1.1 Sample Identification

Each sample will have a label affixed to the container and the container will be labeled at the time of collection. The minimum information will be recorded on the label:

- Sample identifier
- Date and time of collection
- Preservative type (if applicable)
- Project name
- Sampler's name or initials

Excavation sidewall and base soil samples will be identified by their excavation area ID, sequential order of sample collection, and depth in feet below ground surface (bgs). For example, the third sidewall sample collected from in excavation Area C at a depth of 5.5 feet bgs would be labeled "C-S3-5.5" and the first base sample collected in Area B at 5 feet bgs would be labeled "B-B1-5."

Groundwater samples will be identified using the following format: "Well Location"-"Date." For example, a sample collected from monitoring well UCCMW-7 on December 1, 2023, would be labeled "UCCMW-7-120123."

At each laboratory, a unique sample identifier will be assigned to each sample. The laboratory will ensure that a sample tracking record follows each sample through all stages of laboratory processing. The sample tracking record must contain, at a minimum, the name/initials of individuals responsible for performing the analyses, dates of sample extraction/preparation and analysis, and types of analyses being performed. The analytical laboratories will meet the sample handling requirements and follow the procedures described in the sections below.

3.5.1.2 Field Quality Control Sampling and Identification

Field QC is evaluated through the analysis of field duplicates, equipment rinsate blanks, and trip blanks. Field duplicates are used to assess proper homogenization in the field, reproducibility of the sample preparation and analysis, and heterogeneity of the matrix. Rinsate blank samples are used to evaluate potential field cross contamination and will be collected after decontamination of sampling equipment. Trip blank samples are used to evaluate potential cross contamination from volatile compounds from ambient conditions or from other samples during handling and transport of samples for volatiles analysis. Field duplicate samples will be collected at a rate of 1 per 20 investigation samples or 1 sample per event if fewer than 20 samples will be collected. Rinsate blanks will be collected at a frequency of 1 sample per type of reusable sample equipment per event. Trip blanks will be analyzed for each cooler containing samples for volatiles analysis. Field QA/QC criteria and frequency are presented in Tables F.2 and F.3.

The labeling of field QC samples is described as follows.

- Field duplicates will be labeled with a fictitious sample location by adding 50 to the sample location. For example, a field duplicate collected from monitoring well UCCMW-7 on December 1, 2023, would be named “UCCMW-57-120123.”
- Equipment rinsate blanks will be collected by pouring laboratory-provided distilled water over decontaminated, non-dedicated field equipment. Equipment blanks will be labeled using the following format: “EB”-“Number”-“Date.” For example, an equipment blank collected on December 1, 2022, would be named “EB-1-120122.”
- Trip blanks will be collected by pouring laboratory-provided distilled water into sample containers during the sampling event near a sample collection location or may be pre-filled by the laboratory and stored with filled sample bottles during the field event. Field blanks will be labeled using the following format: “FB”-“Number”-“Date.” For example, a field blank collected on December 1, 2022, would be named “FB-1-120122.”

3.5.1.3 Sample Custody Procedures and Requirements

Sample custody is a critical aspect of environmental investigations. Sample possession and handling must be traceable from the time of sample collection, through laboratory and data analyses, to delivery of the sample results to the recipient. Procedures to be followed for sample custody related to shipping are detailed in Section 3.5.1.4.

Samples are considered to be in custody if they are: (1) in the custodian's possession or view; (2) in a secured place (under lock) with restricted access; or (3) in a container and secured with a custody seal such that the sample cannot be reached without breaking the seal. Chain-of-custody forms will accompany all samples, and each person who has custody of the samples will sign the chain-of-custody form and ensure that the samples are not left unattended unless properly secured. Information on chain-of-custody forms will include at a minimum the following:

- Sampling location, project name, and unique sample ID
- Sample collection date and time

- Any special notations on sample characteristics or problems
- Name of the person who initially collected the sample
- Date when the sample was sent to the laboratory
- Shipping company name and waybill number (if applicable)

The Engineer or qualified designee will be responsible for all sample tracking and custody procedures. They will also be responsible for final sample inventory and will maintain sample custody documentation. The Field Technician or designee will complete chain-of-custody forms prior to transporting samples. Information on the sample labels will be checked against sample collection forms and chain-of-custody forms, and sample containers will be recounted prior to transporting samples. Copies of all chain-of-custody forms will be retained and included as appendices to the data reports.

The analytical laboratories will ensure that chain-of-custody forms are properly signed upon receipt of the samples and will note any questions or observations concerning sample integrity on the chain-of-custody forms. The analytical laboratories will contact the Engineer and project QA/QC coordinator immediately if discrepancies are discovered between the chain-of-custody forms and the sample shipment upon receipt.

3.5.1.4 Sample Preservation and Shipping Requirements

Sample volumes will be placed in laboratory-provided certified pre-cleaned sample containers and preserved in accordance with the requirements presented in Table F.4. The laboratory will maintain manufacturer documents certifying the cleanliness of containers and/or purity of preservatives provided. The field coordinator or a designee will also inspect containers for cleanliness, for signs of damage or tampering, and for presence of preservative if pre-preserved containers will be used. Individual containers with evidence of damage or tampering will be discarded.

Prior to shipping or transporting samples, containers will be securely packed inside a cooler with ice packs or wet ice and bubble wrap. The original signed chain-of-custody forms will be placed in a sealed plastic bag and taped to the inside lid of the cooler. If third-party shipping (e.g., shipping with FedEx rather than a laboratory courier), each cooler will be sealed with a custody seal.

3.5.2 Laboratory Sample Handling and Holding Times

Samples will be stored in accordance with the conditions specified in the methods or laboratory SOPs. Samples transferred to other laboratories will be packed in coolers on ice and delivered via courier service or shipped on ice in coolers at temperatures of <6 degrees Celsius, not frozen. The temperature inside each cooler will be checked by the laboratory upon receipt of the samples. The laboratory will specifically note any coolers that are not sufficiently cold upon receipt.

All samples will be handled to prevent contamination or sample loss. Any remaining sample material will be disposed of upon receipt of written notification by the Engineer. Holding times will vary by analysis and are summarized in Table F.4.

Archive samples will be stored frozen as allowed by the analytical method (refer to Table F.4). Samples will be disposed of after hold times expire, following written authorization from the Engineer. The Engineer may elect to hold archived samples past the specified hold time as needed to gather the additional project data.

3.5.3 Laboratory Quality Assurance/Quality Control

Laboratory results will be evaluated by reviewing analytical results of method blanks, LCSs, certified reference materials, MS/matrix spike duplicate (MSD) samples, duplicate samples, internal standards, calibrations, and performance evaluation samples, as specified by the analytical methods.

All samples will be diluted and re-analyzed if target compounds are detected at levels that exceed their respective established calibration ranges. Any required cleanups will be conducted prior to the dilutions. Re-analyses will be performed if surrogate, internal standard, or spike recoveries are outside of the QA parameters. QC samples may be re-analyzed if results are not within control limits, and it cannot be determined that the sample matrix is the cause.

3.5.3.1 Sample Delivery Groups

A sample delivery group (SDG) is defined by the laboratory and is generally considered 20 samples, or a group of samples from the same sampling period received at the laboratory on the same day. Although an SDG may span 2 weeks, all holding times specific to each analytical method will be met for each sample in the SDG.

3.5.3.2 Method Blanks

Method blanks are analyzed to assess possible laboratory contamination at all stages of sample preparation and analysis. A minimum of one method blank will be analyzed for every 20 samples.

3.5.3.3 Laboratory Control Samples

LCSs are prepared from a clean matrix source using the same process as project samples and are spiked with known amounts of the target compounds. The recoveries of the compounds are used as a measure of the accuracy of the test methods.

3.5.3.4 Matrix Spikes and Matrix Spike Duplicates

The analysis of MS and MSD samples provides information on the extraction efficiency of the method for the sample matrix and is used to evaluate the precision of the method. A minimum of one MS/MSD pair will be analyzed for every 20 samples, when sufficient sample volume is available. A laboratory duplicate sample may be analyzed in place of MSD samples, as allowed by the analytical method.

3.5.3.5 Laboratory Duplicates

Laboratory duplicate samples provide information on the precision of the analysis and are useful in assessing potential sample heterogeneity and matrix effects. Laboratory duplicates are subsamples of the original sample that are prepared and analyzed as separate samples. A minimum of one laboratory duplicate sample will be analyzed for every 20 samples, when sufficient sample volume is available.

3.5.3.6 Surrogates

All samples, including laboratory QC samples (blanks, LCSs, MS/MSDs, and duplicate samples), analyzed for organic analytes will be spiked with appropriate surrogate compounds. Surrogate recoveries will be reported by the analytical laboratories; however, no sample results will be corrected for recovery using these values.

3.5.3.7 Internal Standards

Internal standards may be used for calibrating and quantifying organic compounds and metals. If internal standards are required by the method, all calibration, QC, and project samples will be spiked with the same concentration of the selected internal standards. Internal standard recoveries and retention times must be within method criteria, laboratory criteria, or both.

3.6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Inspection and maintenance of field and laboratory equipment are important to determine the quality of sampling and analysis results.

3.6.1 Field Equipment Maintenance and Calibration and Frequency

Field equipment for *soil* sampling that requires maintenance or calibration includes the photoionization detector, which is used to screen for volatile organic vapors as a field indication of contamination. Field equipment for groundwater sampling that requires maintenance and/or calibration includes a multi-parameter water quality meter (with pH, specific conductivity, ORP, DO, and temperature probes) and turbidity meters.

Field equipment will be maintained and calibrated in accordance with the procedures described in the operations manuals supplied by the manufacturer at the intervals recommended in the manual. The manufacturers' manuals will accompany each instrument for use during equipment calibration and to support troubleshooting. Equipment maintenance information will be documented in the instrument's maintenance log. Equipment calibration performed by field staff will be documented in a calibration log. The calibration log will include at minimum, the equipment type and model number, date and time, project name, the calibration results, and the initials of the calibrator. Any discrepancies or calibration failures will be noted in the calibration log and corrected prior to sampling. During the sampling event, any discrepancies or calibration failures will be noted in the field notes and corrected prior to continuing sampling. Maintenance and calibration records will be verified prior to each sampling event by the Engineer.

3.6.2 Laboratory Instruments Calibration and Frequency

Laboratory equipment will be maintained and calibrated according to the manufacturers' recommendations, the laboratory QA plan, SOPs, and standard methodologies. Calibrations will be performed on each analytical instrument prior to analysis. Calibrations are performed at a frequency determined by the analytical method and/or the laboratory SOP. The analysis must stop if the calibration does not meet the specified criteria. The analysis may resume after corrective actions have been taken to meet the method specifications. All project samples analyzed by an instrument found to be out of compliance must be reanalyzed. Laboratories will be responsible for their own preventative maintenance and calibration of laboratory equipment.

3.7 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Inspection and acceptance of field supplies, including laboratory sampling containers, will be the responsibility of the Field Technician. Any chemical standards and solutions (such as nitric acid for metals sample preservation) used in this project will be provided by a reliable, commercial source and will be traceable. Any discrepancies will be documented by the Field Technician.

3.8 DATA MANAGEMENT AND REPORTING

Analytical chemistry results will be provided by the laboratory in PDF and EDD formats. Data packages will be returned within the time frame specified in the work order between Floyd|Snider and the laboratory, with a duration not to exceed 15 business days, unless delays are otherwise communicated to, and approved by, the Engineer. Preliminary data packages may also be requested for rush analysis, as provided in the work order. The data packages will be reviewed to ensure that the correct analyses were performed for each sample submitted and that all analyses requested on the chain-of-custody forms were performed. If discrepancies are noted, the QA/QC coordinator will be notified and they will promptly follow up with the laboratory to resolve any issues. After completion of data validation, the digital files will be used to generate the appropriate report tables.

Laboratory data, which are electronically provided and loaded into Floyd|Snider's electronic database, will undergo a check against the laboratory data deliverable. Data will be validated or reviewed manually, and qualifiers, if assigned, will be entered manually. All manually entered data will be verified by a secondary review performed by Floyd|Snider staff. As a final review, after entry into the database, the EDD data will be compared to the field information (e.g., station/location identifiers, sample identifiers, requested analyses) previously entered into the database to confirm that all requested analytical data have been received.

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4.0 Assessment and Oversight

The project field activities will be overseen by the Engineer and laboratory activities will be overseen by the laboratory PM. Once data are received from the laboratory, a number of QC procedures will be followed to evaluate data quality and attainment of the data QA/QC objectives and criteria. Specific procedures will be followed to assess the principal DQIs (precision, bias, accuracy, representativeness, completeness, comparability, and sensitivity).

4.1 FIELD OVERSIGHT AND CORRECTIVE ACTIONS

The Engineer will be responsible for field oversight and identifying issues that may result in noncompliance with this QAPP that could adversely affect data quality. The Engineer is responsible for performing corrective actions. The Field Technician and the QA/QC coordinator will be responsible for completing and for verifying and documenting completion of any corrective actions.

Field performance inspections may be conducted at the discretion of the Engineer to determine the effectiveness of QA/QC procedures and compliance with the QAPP. Field performance inspections should be conducted by the Engineer or HSO. During a field performance inspection, the inspector will observe and review field procedures and health and safety procedures, including but not limited to documentation of sample collection, packaging procedures, sample shipment to the laboratories, and proper use of personal protection equipment per the Health and Safety Plan.

If issues are identified that may adversely affect data quality, corrective actions will be determined and implemented as soon as possible, and potential impacts to data quality will be evaluated. The inspector or a key member of the project team may temporarily stop work until deficiencies adversely affecting data quality are corrected. The Engineer and the QA/QC coordinator will be responsible for verifying and documenting completion of any corrective actions.

4.2 LABORATORY OVERSIGHT AND CORRECTIVE ACTIONS

Laboratory audits and performance inspections consist of on-site reviews of QA systems and equipment. Laboratory audits will not be conducted as part of this study; however, the laboratory PM will provide reports from laboratory audits performed as part of general operations to the QA/QC coordinator upon request. The laboratory will provide written details of all method modifications planned prior to project commencement.

The laboratory is required to comply with its SOPs. The laboratory PM will be responsible for ensuring that appropriate corrective actions are initiated as required for compliance with this QAPP. All laboratory personnel will be responsible for reporting problems that may compromise the quality of the data. If QC results exceed the laboratory control limits, the analyst will identify and correct the anomaly before continuing with the sample analyses, if possible. If the issue cannot be overcome with standard corrective action (e.g., repreparation and reanalysis), the causes of the exceedance and corrective actions will be described in the data package narrative. If the exceedance is gross or widespread, the Engineer and project QA/QC coordinator will be notified immediately, and the appropriate action will be decided.

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5.0 Data Validation and Usability

5.1 DATA REVIEW

Floyd|Snider will review the laboratory reports for internal consistency, transmittal errors, laboratory protocols, and adherence to the objectives specified in this QAPP. A Stage 2A Data Quality Review will be performed as described in this section for all data. The results of the Data Quality Review will be summarized in the Construction Completion Report.

A Stage 2A Data Quality Review (Summary Validation) includes the following:

- Evaluation of package completeness
- Verification that sample numbers and analyses match those requested on the chain-of-custody form
- Review of method-specified preservation and sample holding times
- Verification that the required detection limits and RLs have been achieved
- Verification that the field and laboratory duplicates, MS/MSDs, and LCSs were analyzed at the proper frequency
- Verification of analytical precision and accuracy via replicate analysis and analyte recoveries
- Verification that the surrogate compound analyses have been performed and meet QC criteria
- Verification that the laboratory method blanks are free of contaminants

5.2 VALIDATION METHODS AND RECONCILIATION WITH USER REQUIREMENTS

Data validation programs have been established in accordance with USEPA guidance (USEPA 2002a). Data validation will be based on the QA/QC criteria as recommended in the methods identified in this QAPP and in the USEPA's National Functional Guidelines (USEPA 2020a, 2020b, 2020c) and environmental data verification and validation guidance (USEPA 2002b).

Data usability and any deviations that may have affected the quality of the data, as well as the basis of application of qualifiers, will be included in the final reporting of the data. Any required corrective actions based on the evaluation of the analytical data will be determined by the laboratory PMs, Engineer, and data validators in consultation.

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6.0 References

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7.0 Approvals

By signing below, I acknowledge that I have reviewed the Quality Assurance Project Plan and agree to follow the methods and quality assurance procedures contained therein.

____ **Date**________
Emily Jones, Engineer, Floyd|Snider

____ **Date**________
Chell Black, QA Manager, Floyd|Snider

____ **Date**________
David Baumeister, Project Manager, OnSite Environmental

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix F

Tables

Table F.1
Quality Assurance Project Plan Analyte List for Soil and Groundwater

Analyte	Method	Units	Cleanup Standards CUL	Cleanup Standards REL	Laboratory Reporting Limit
Soil					
Chlorinated Volatile Organic Compounds					
Tetrachloroethene	USEPA 8260D	mg/kg	0.05	--	0.0010
Groundwater					
Chlorinated Volatile Organic Compounds					
Tetrachloroethene	USEPA 8260D	µg/L	5.0	120	0.20
Trichloroethene	USEPA 8260D	µg/L	5.0	12	0.20
cis -1,2-Dichloroethene	USEPA 8260D	µg/L	7.0	--	0.20
trans -1,2-dichloroethene	USEPA 8260D	µg/L	--	--	0.20
Vinyl Chloride	USEPA 8260D/SIM	µg/L	0.20	1.5	0.020000
MNA Parameters					
Nitrate	USEPA Method 353.2	mg/L	--	--	0.050
Nitrite	USEPA Method 353.2	mg/L	--	--	0.020
Sulfate	ASTM D516-11	mg/L	--	--	5.0
Sulfide	SM4500-S2	mg/L	--	--	0.30
Methane	RSK-175	mg/L	--	--	0.55
Ethene	RSK-175	mg/L	--	--	0.29
Ethane	RSK-175	mg/L	--	--	0.22
Ferrous iron (1)	SM3500-FE B	mg/L	--	--	0.050
Ferrous iron (1)	Color disc/ 1,10 Phenanthroline	mg/L	--	--	0.5 (maximum detect 7.0)

Notes:

-- Not applicable or not established.

1 Ferrous iron may be analyzed by either the listed laboratory or field method.

Abbreviations:

CUL Cleanup level

µg/L Micrograms per liter

mg/kg Milligrams per kilogram

REL Remediation level

USEPA U.S. Environmental Protection Agency

Table F.2
Quality Assurance/Quality Control Criteria

Parameter	QA/QC Criteria		
	Precision [1]	Accuracy	Completeness
Soil			
CVOCs	±20% RPD	60–140%	95%
Groundwater			
CVOCs	±30%	60–140%	90%
Nitrate, Nitrite	≤19% RPD / 11% RPD	85–119% / 85–121%	95%
Sulfate	≤10% RPD	73–127%	95%
Sulfide	≤15% RPD	75–124%	95%
Methane, Ethene, Ethane	≤25% RPD	75-125%	95%
Ferrous Iron	≤20% RPD	85–115%	95%

Note:

1 Precision criteria apply to analytical precision only. Field duplicate precision will be screened against an RPD of 75%.

Abbreviations:

RPD Relative percent difference
CVOC Chlorinated volatile organic compound
QA/QC Quality Assurance/Quality Control

Table F.3
Quality Assurance/Quality Control Frequency

Parameter	Method Blank [1]	Laboratory Control Samples [1]	Matrix Spike	Matrix Spike Duplicate (MSD) [2]	Surrogate Spike	Field Duplicate	Rinse Blank	Field Blank	Trip Blank
CVOCs	1 per 20 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	every sample	1 per 20 samples	1 per event	1 per day	1 per day
MNA Parameters			--	--				--	--

Notes:

-- Not applicable

1 If less than 20 samples, analyze 1 per analytical batch.

2 Duplicates may be analyzed in place of MSDs.

Abbreviations:

CVOC Chlorinated volatile organic compound

MNA Monitored natural attenuation

Table F.4
Container and Preservation Criteria for Soil and Groundwater

Analyte	Method	Sample Handling		
		Container/ Preservative	Holding Time	Sample Preservation Technique
Soil				
PCE	USEPA 8260D	4-oz WMG, three 40-mL pre-weighted VOA vials: two with stir bar, one without	48 hours to freeze or preserve VOA vials, 14 days to analyze	Cool to <4 °C
Groundwater				
VOCs	USEPA 8260D	40-mL pre-weighted VOA vials	14 days	HCl pH<2
Sulfate	ASTM D516-11	500-mL HDPE	28 days	Cool to <4 °C
Sulfide	SM4500-S2	250-mL HDPE	7 days	Add Zinc Acetate NaOH to pH>9
Nitrate, Nitrite	USEPA Method 353.2	250-mL HDPE	48 hours	Cool to <4 °C
Methane, Ethene, Ethane	RSK-175	40-mL pre-weighted VOA vials	14 days	HCl pH<2
Ferrous iron (1)	SM3500-FE B	500 mL amber with HCL	24 hours	Cool to <4 °C
	Color disc/ 1,10 Phenanthroline	Two 18-mm plastic viewing tubes with color comparator box	Analyze immediately- field method	Ferrous iron reagent power (added to one 25-mL sample aliquot)

Note:
1 Ferrous iron may be analyzed by either the listed laboratory or field method.

Abbreviations:
°C Degrees Celsius
HCL Hydrochloric acid
HDPE High-density polyethylene
mL Milliliters
mm Millimeters
NaOH Sodium hydroxide
PCE Tetrachloroethene
oz Ounce
VOA Volatile organic analysis
VOC Volatile organic compound
WMG Wide-mouth glass

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix F

Attachment F.1
Field Procedures

Two Union Square
601 Union Street, Suite 600
Seattle, WA 98101
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F|S STANDARD GUIDELINE

Low-Flow Groundwater Sample Collection

DATE/LAST UPDATE: December 2022

These procedures should be considered standard guidelines and are intended to provide useful guidance when in the field but are not intended to be step-by-step procedures, as some steps may not be applicable to all projects.

All field staff should be sufficiently trained in the standard guidelines for the sampling method they intend to use and should review and understand these procedures prior to going into the field. It is the responsibility of the field staff to review the standard guidelines with the field manager or project manager and identify any deviations from these guidelines prior to field work. When possible, the project-specific Sampling and Analysis Plan should contain any expected deviations and should be referenced in conjunction with these standard guidelines.

1.0 Scope and Purpose

This standard guideline provides details necessary for collecting representative groundwater samples from monitoring wells using low-flow methods. These guidelines are designed to meet or exceed guidelines set forth by the Washington State Department of Ecology (Ecology). Low-Flow sampling provides a method to minimize the volume of water that is purged and disposed from a monitoring well, and minimizes the impact that purging has on groundwater chemistry during sample collection.

2.0 Equipment and Supplies

Groundwater Sampling Equipment and Tools

- For wells with head less than 25 feet:
  - Peristaltic pump with fully charged internal battery or standalone battery and appropriate connectors
- For wells with head greater than 25 feet:
  - Bladder pump and controller, as well as an air cylinder, or air compressor (with extension cord if near an electrical outlet; with battery and appropriate connectors or generator if not near an outlet)

    OR

  - Low-flow submersible pump and controller (with extension cord if near an electrical outlet; with battery and appropriate connectors or generator if not near an outlet)
- Multi-parameter water quality meter
- Water level meter
- Polyethylene tubing, Teflon tubing, or similar (assume polyethylene unless otherwise specified in SAP) and tubing weights (for wells deeper than approximately 10 feet)
- Silicone tubing
- Filters (if field filtering)
- Tools for opening wells and drums (1/2-inch, 9/16-inch, 5/8 and 15/16-inch sockets ratchet, screwdriver, hammer/rubber mallet, bung wrench; any other necessary tools if non-standard monuments have been used)
- Well keys
- Tube cutters, razor blade, or scissors
- 5-gallon buckets, lids, and clamp
- Decontamination supplies: Alconox (or similar), distilled or deionized water, spray bottles, and paper towels
- Bailer or hand pump to drain well box if full of stormwater
- Trash bags

Lab Equipment

- Sample jars/bottles
- Coolers
- Chain-of-Custody Forms
- Labels
- Ice
- Ziploc bags

Paperwork

- Field notebook with site maps
- Table of well construction details and/or well logs, if available
- Sampling forms (enclosed)
- Purge water plan
- Rite-in-the-Rain pens, paper, and permanent markers

- Site-Specific Health and Safety Plan (HASP) and F|S Accident Prevention Plan (APP)
- List of emergency contacts for the Site or facility
- Safety Data Sheets (SDS) binder
- Sampling and Analysis Plan (SAP) and/or Quality Assurance Project Plan (QAPP) (including tables of analytes and bottle types)

Safety Equipment

- PPE:
  - Waterproof boots (safety toed, depending on site)
  - Safety vest
  - Safety glasses
  - Rain gear
  - Nitrile gloves
  - Work gloves
- First Aid kit
- Emergency kit (fire extinguisher, road flares)
- Traffic barricades or cones

3.0 Standard Procedures

Low-flow groundwater sampling consists of purging groundwater within the well casing at a rate equal to or less than the flow rate of representative groundwater from the surrounding aquifer into the well screen. The flow rate will depend on the hydraulic conductivity of the aquifer and the drawdown, with the goal of minimizing drawdown within the monitoring well. Field parameters are monitored during purging and groundwater samples are collected after field parameters have stabilized. Deviations from these procedures should be approved by the Project Manager and fully documented.

3.1 OFFICE PREPARATION

First, meet with the PM to identify the key objectives of the groundwater sampling effort. This may include the order of wells to be sampled (e.g., if using non-dedicated equipment, wells may need to be sampled in order of least contaminated to most contaminated), whether any wells require redevelopment at least 24-hours prior to sampling, and/or key stabilization parameters (e.g., elevated turbidity may require purging beyond 30 minutes, even if the readings are within 10%).

Conduct a kick-off meeting with the sampling team to discuss site health and safety protocols, data quality objectives, and any site-specific special considerations or sampling procedures.

3.2 TAILGATE SAFETY MEETING

Conduct a tailgate safety meeting prior to beginning work at the site. Emergency evacuation procedures, rally points, and onsite communication protocols should be discussed at the first tailgate meeting and repeated if new personnel join the field team onsite.

The safety meeting should cover the hazards specific to groundwater sampling. Typical hazards include the following:

- Chemical hazards (refer to HASP for site chemical exposure hazards)
- Site hazards
  - Traffic hazards onsite (e.g., truck traffic, heavy machinery)
  - Biological hazards (e.g., spiders or wasps within well monuments)
- Physical hazards associated with lifting and carrying heavy equipment and repeated bending while sampling
- Cuts and abrasions associated with using blades and tools
- Electrical hazards (make sure all wires/cables are in good condition and connections to battery or outlet are secure)
- Heat stress and cold stress

Record the meeting attendees and topics discussed on the front page of the tailgate safety meeting form (included as an attachment to the HASP). All attendees should sign the form.

3.3 OTHER HEALTH AND SAFETY GUIDELINES

The following are additional health and safety guidelines that should be followed in the field. These guidelines are intended to supplement the guidelines and requirements identified in the HASP and are not intended to replace the HASP.

- Review and sign the HASP prior to going into the field.
- Conduct a tailgate safety meeting prior to beginning work at the site as discussed in Section 3.2
- When moving between monitoring wells or switching to different tasks (e.g., transitioning from sampling to cooler QC prior to lab pickup), assess any additional hazards that may be associated with the new location or task. Record additional hazards noted and corrective actions to address those hazards on the Daily Tailgate Safety Meeting and Debrief Form (included as an attachment to the HASP).
- Record near misses and incidents on the Near Miss and Incident Reporting Form (included as an attachment to the HASP) and conduct management/client notifications according to the protocols detailed in the HASP.

3.4 CALIBRATION OF WATER QUALITY METERS

All multi-parameter water quality meters to be used will be calibrated prior to each sampling event. Calibration procedures are outlined in each instrument's specific user manual.

3.5 MONITORING, MAINTENANCE, AND SECURITY

Prior to sampling, depth to water and total depth measurements will be collected and recorded for accessible monitoring wells onsite (or an appropriate subset for larger sites). Check for an existing measuring point (notch or visible mark on top of casing). If a measuring point is not observed, a measuring point should be established on the north side of the casing. The conditions of the well box and bolts will also be observed, and deficiencies will be recorded on the sampling forms or logbook (i.e., missing or stripped bolt). The following should also be recorded:

- Condition of the well box, lid, bolts, locks, and gripper cap, if deficiencies
- Condition of gasket if deficient and if water is present in the well box
- Note any obstructions or kinks in the well casing
- Note any equipment in the well casing, such as transducers, bailers, or tubing
- Condition of general area surrounding the well, such as subsidence, potholes, or if the well is submerged within a puddle.

Replace any missing or stripped bolts and redevelop wells if needed.

3.6 LOW-FLOW PURGING METHOD AND SAMPLING PROCEDURES

Groundwater samples will be collected using low-flow purging and sampling procedures consistent with Ecology guidelines and the U.S. Environmental Protection Agency (USEPA) standard operating procedures (USEPA 1996). The following describes the Low-Flow purging and sampling procedures for collecting groundwater samples using a peristaltic pump. If the water level is greater than approximately 20 to 25 feet below ground surface (bgs), Grundfos or Geotech submersible pumps or bladder pumps can be used since their pumping rates can be adjusted to low-flow levels. Submersible pumps are preferable to bladder pumps in situations where less than 5 feet of water column are present in the well casing.

- Place the peristaltic pump and water quality equipment near the wellhead. Slowly lower new poly tubing down into the well casing approximately to the middle of the well screen. When sampling wells with a bottom screen depth greater than approximately 10 feet, it is important to measure the length of tubing prior to placement as longer lengths of tubing are more likely to get caught or otherwise obstructed and feel like it has reached the well bottom; this issue can be mitigated by using decontaminated stainless steel tubing weights. If the depth of the well screen is not known, lower the appropriate length of tubing to the bottom of the well, making sure that the tubing has not been caught on the slotted well casing, and then raise the tubing 3 to 5 feet off the bottom of the casing (limit this distance to 2 feet for wells with total depth less than 10 feet). Document the estimated depth of the tubing placement within the well. Connect the tubing to the peristaltic pump using new flex tubing and connect the discharge line to the flow-through cell of the water quality meter. The discharge line from the flow cell should be directed to a bucket to contain the purged water.

- If using a low-flow submersible pump, connect the pump head to dedicated or disposable tubing. If using a bladder pump, connect both the air intake and water discharge ports to decontaminated or disposable tubing, using the manufacturer's instructions to ensure a secure connection. Lower the pump with tubing into the well as described above and connect the water discharge tubing directly to the flow-through cell.
- Measure the depth to water to the nearest 0.01 foot with a decontaminated water level meter and record the information on a sampling form.
- Start pumping the well at a purge rate of 0.1 to 0.2 liters per minute and slowly increase the rate. Purge rate is adjusted using a speed control knob or arrows on peristaltic and low-flow submersible pumps. The purge rate for bladder pumps is controlled by the air compressor, which first pressurizes the pump chamber in order to compress the flexible bladder and force water through the discharge line, and then vents the chamber in order to allow the bladder to refill with water.
    - A good rule of thumb is to pressurize to 10 psi + 0.5 psi/foot of tubing depth and begin with 4 discharge/refill cycles per minute; using greater air pressure and accelerating the pump cycles will increase the purge rate.
- Check the water level. If the water level is dropping, lower the purge rate. Maintain a steady flow with no or minimal drawdown (less than 0.33 feet according to USEPA 2002). Maintaining a drawdown of less than 0.33 feet may not be feasible depending on hydrogeological conditions. If possible, measure the discharge rate of the pump with a graduated cylinder or use a stopwatch when filling sampling jars (500 milliliters [mL] polyethylene or glass ambers) to estimate the rate. When purging water through a flow cell, the maximum flow rate for accurate water quality readings is about 0.5 liters per minute (L/minute).
- The discharge tubing should be connected to the flow cell immediately upon initial water discharge, unless the discharge water is visibly turbid or flocculant is observed. Monitor and record water quality parameters every three to five minutes after one tubing volume (including the volume of water in the flow cell) has been purged.
    - One foot of ¼-inch interior diameter tubing holds about 10 mL of water, and flow-through cells typically hold less than 200 mL of water; one volume should be purged after about 5 minutes at a flow rate of 0.1 L/minute.
- Water-quality indicator parameters that will be monitored and recorded during purging include:
    - pH
    - Specific conductivity

- Dissolved oxygen
- Temperature
- Turbidity
- Oxidation reduction potential (ORP)

- Continue purging until temperature, pH, turbidity, and specific conductivity are approximately stable (when measurements are within 10 percent) for three consecutive readings, or 30 minutes have elapsed. Because these field parameters (especially dissolved oxygen and ORP) may not reach the stabilization criteria, collection of the groundwater sample will be based on the professional judgment of field personnel at the time of sampling. A minimum of 5 water quality readings should be collected prior to sampling.
- The water sample can be collected once the criteria above have been met.
- If drawdown in the well cannot be maintained at 0.33 feet or less, reduce the flow or turn off the pump for 15 minutes and allow for recovery. If the water quality parameters have stabilized, and if at least two tubing volumes and the flow cell volume have been purged, then sample collection can proceed when the water level has recovered, and the pump is turned back on. This should be noted on the sampling form.
- To collect the water sample, maintain the same pumping rate. After the well has been purged and the sample bottles have been labeled, the groundwater sample will be collected by directly filling the laboratory-provided bottles from the pump discharge line prior to passing through the flow cell. All sample containers should be filled with minimum disturbance by allowing the water to flow down the inside of the bottle or vial. When collecting a volatile organic compound (VOC) sample, fill to the top to form a meniscus over the mouth of the vial prior to placing the cap to eliminate air bubbles. Be careful not to overflow preserved bottles/pre-cleaned Volatile Organic Analyte (VOA) vials.
- If sampling for filtered metals, collect these samples last and fit an in-line filter at the end of the discharge line. Take note of the flow direction arrow on the filter prior to fitting, invert filter to eliminate air bubbles, and allow minimum of 0.5 to 1 liter of groundwater to pass through the filter prior to collecting the sample.
- Sample labels will clearly identify the project name, sampler's initials, sample location and unique sample ID, analysis to be performed, date, and time. After collection, place samples a cooler maintained at a temperature of approximately 4 to 6 degrees Celsius (°C) using ice (if required). Complete the chain-of-Custody forms. Upon transfer of the samples to the laboratory, the Chain-of-Custody Form will be signed by the persons transferring custody of the sample containers to document change in possession.
- When sample collection is complete at a designated location, remove and properly dispose of the non-dedicated tubing. In most cases, this waste is considered solid waste and can be disposed of as refuse. Close and lock the well.

4.0 Decontamination

All reusable equipment that comes into contact with groundwater should be decontaminated using the processes described in this section prior to moving to the next sampling location.

Water Level Meter: The water level indicator and tape will be decontaminated between sampling locations and at the end the day by spraying the entire length of tape that came in contact with groundwater with an Alconox (or similar)/clean water solution followed by a thorough rinse with distilled or deionized water.

Water Quality Sensors and Flow-Through Cell: Distilled water or deionized water will be used to rinse the water quality sensors and flow-through cell. No other decontamination procedures are recommended since they are sensitive equipment. After the sampling event, the water quality meters will be cleaned and maintained according to the specific manual.

Submersible Pump (if applicable): Decontaminating the pump requires running the pump in three progressively cleaner grades of water.

1. Fill a bucket with approximately 4 gallons of an Alconox (or similar)/clean water solution to sufficiently cover the pump. Place the pump and the length of the power cord (if applicable) that was in contact with water into the bucket and run the pump for approximately two minutes or until the volume of water in the bucket has been exhausted.
2. Fill a second bucket containing approximately 4 gallons of clean water to sufficiently cover the pump. Place the pump and cord into this bucket and run the pump for approximately two minutes or until the volume of water in the bucket has been exhausted.
3. Fill a third bucket with approximately 4 gallons of distilled or deionized water to sufficiently cover the pump. Place the pump and cord into this bucket and run the pump for approximately two minutes or until the volume of water in the bucket has been exhausted.

The soap/water solution may be reused; however, rinse water should be collected for disposal as described in Section 5.0 below. When done for the day, dry the exterior of the pump and cord with clean towels to the extent practical prior to storage.

Bladder Pump: Clean the inside and outside of the pump body with an Alconox (or similar)/clean water solution, followed by a thorough rinse with distilled or deionized water. The outside of the air supply line that came in contact with groundwater may also be cleaned with Alconox (or similar) solution and re-used; bladders and water discharge lines must be replaced after each sample is collected.

5.0 Investigation-Derived Waste (IDW)

Unless otherwise specified in the project work plan, water generated during groundwater sampling activities will be contained, transported, disposed of in accordance with applicable laws, and stored in a designated area until transported off-site for disposal. This includes purge water and decontamination waste water.

The approach to handling and disposal of these materials for a typical cleanup site is as follows.

For IDW that is containerized, such as purge water, 55-gallon drums (or other smaller sized drums) approved by the Washington State Department of Transportation will be used for temporary storage pending profiling and disposal. Each container holding IDW will be sealed and labeled as to its contents (e.g., “purge water”), the dates on which the wastes were placed in the container, the owner’s name and contact information for the field person who generated the waste, and the site name.

IDW containerized within drums will be characterized relative to applicable waste criteria using data from the sampling locations whenever possible. Material that is designated for off-site disposal will be transported to an off-site facility permitted to accept the waste. Manifests will be used, as appropriate for disposal. Refer to the FS Special Condition Standard Guideline for Investigation Derived Waste for additional information regarding proper profiling and disposal of wastewater generated by groundwater sampling.

Disposable sampling materials and incidental trash such as tubing, paper towels and gloves/other disposable used in sample processing will be placed in heavy-duty garbage bags or other appropriate containers and disposed of as trash in the municipal collection system unless otherwise specified in the SAP.

6.0 Field Documentation

Groundwater sampling activities will be documented in field sampling forms and/or field notebooks, and Chain-of-Custody Forms. Information recorded will, at a minimum, include personnel present (including subcontractors or client representatives), purpose of field event, weather conditions, sample collection date and times, sample analytes, depths to water, water quality parameters, well box/lid conditions, amount of purged water generated, and any deviations from the SAP. Photographs of damaged well casings or well boxes should be taken.

At the end of the day, complete and review the second page of the tailgate safety meeting form detailing additional hazards, corrective actions, near-misses or incidents. Any incidents that result in equipment damage or field staff injuries should be reported immediately to the PM.

7.0 Demobilization

Upon returning to the office, ensure that all equipment is property cleaned and put away in the field room. Equipment with rechargeable batteries should be plugged in as appropriate. It is preferable to dispose of trash on-site, but any trash left in the field vehicle should be disposed as regular trash at Two Union Square.

If rented equipment or sample coolers will be placed at the front desk for pickup, clearly label each item with the company picking it up, anticipated pickup time frame, and your contact information so front desk staff can contact you if there are any questions. Notify front desk staff if any items require a signature at pickup.

Within one week of returning from the field, the field lead for the event should review field notes, sampling forms and tailgate safety meeting forms with the PM. Following PM review and approval, field notes will be scanned and saved to the project folder. Hard copies should be filed. The PM will provide copies of near miss and incident reports to the Safety Program Manager.

8.0 References

U.S. Environmental Protection Agency (USEPA). 1996. Low-Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, Revision 2. Region 1. July 30, 1996.

_____. 2002. Groundwater Sampling Guidelines for Superfund and CAR Project Managers. Office of Solid Waste and Emergency Response. EPA 542.S-02-001. May 2002.

Enclosures: Groundwater or Surface Water Sample Collection Form

Record of Revisions:

Revisions	**Date**
Added health and safety information, reviewed EPA guidance, and added revisions table.	12/9/2022

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project:________________________________ Date of Collection: ________________________________

Task:________________________________ Field Personnel: ________________________________

Purge Data

Well ID: ____________ Secure: ☐ Yes ☐ No Ecology Tag #: ____________ Casing Type/Diameter/Screened Interval ________________________

Replacement Required: ☐ Monument ☐ Lid ☐ Lock ☐ Bolts: Missing (#) _____ Stripped (#) _____ Other Damage: ____________________________

Depth Sounder decontaminated Prior to Placement in Well: ☐ Yes ☐ No One Casing Volume (gal): ____

Depth of water (from TOC):__________________Time: ______________

Total Depth (from log or field measurement): ______________________

After 5 minutes of purging (from top of casing): ______________________

Begin purge (time): ______________End purge (time): ______________

Volume purged:___________ Purge water disposal method____________

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼”	1.660”	1.380”	0.08	0.64
2”	2.375”	2.067”	0.17	1.45
3”	3.500”	3.068”	0.38	3.2
4”	4.500”	4.026”	0.66	5.51
6”	6.625”	6.065”	1.5	12.5

Time	Depth to Water (ft)	Vol. Purged (_____)	pH (s.u.)	DO (mg/L)	Specific Conductivity (µs/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments

Sampling Data

Sample No: ____ Location and Depth: ____

Date Collected (mo/dy/yr):____________________ Time Collected: ____________ Weather:________________________________

Type: ☐ Ground Water ☐ Surface Water Other: ________________________ Sample: ☐ Filtered ☐ Unfiltered Filter Type: ______________________

Sample Collected with: ☐ Bailer ☐ Pump Other: ____________ Type: ☐ Peristaltic ☐ Bladder ☐ Submersible Other: ____________________

Water Quality Instrument Data Collected with: Type: ☐ YSI ProDSS ☐ Tudbidity Meter ☐ Other: ____

Sample Decon Procedure: Sample collected with: ☐ decontaminated all tubing; ☐ disposable tubing ☐ dedicated silicon and poly tubing; ☐ dedicated tubing replaced

Sample Description (Color, Turbidity, Odor, Other): ____

Sample Analyses

Analyte	Analysis Method	Sample Container	Quantity	Preservative	Notes

QC samples

Duplicate Sample No: ________________________ Duplicate Time: ________ MS/MSD: ☐ Yes ☐ No

Signature: ____ **Date:** ________________________

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F|S STANDARD GUIDELINE

Soil Sample Collection

DATE/LAST UPDATE: December 2022

These procedures should be considered standard guidelines and are intended to provide useful guidance when in the field but are not intended to be step by step procedures, as some steps may not be applicable to all projects.

All field staff should be sufficiently trained in the standard guidelines for the sampling method they intend to use and should review and understand these procedures prior to going into the field. It is the responsibility of the field staff to review the standard guidelines with the field manager or project manager and identify any deviations from these guidelines prior to field work. When possible, the project-specific Sampling and Analysis Plan should contain any expected deviations and should be referenced in conjunction with these standard guidelines.

1.0 Scope and Purpose

This standard guideline presents commonly used procedures for collection of soil samples for characterization and laboratory analysis. The methods presented in this guideline apply to the collection of soil samples during the following characterization activities: soil borings via drilling, manual collection of shallow soil samples, test pit excavation, excavation confirmation, and stockpile characterization. Specific details regarding the collection of discrete and composite samples, and special sampling techniques for volatile organic compounds (VOCs) are also included. The guideline is intended to be used by staff who collect soil samples in the field.

It is important that the field staff completing the soil sample collection discusses the specific needs for a particular investigation with the project geologist, the project manager, or whoever will ultimately be responsible for interpreting the findings of the field investigation. This discussion is in addition to field training and general knowledge about soil sampling, and should happen prior to entering the field, with additional follow-up before finalizing the field forms, after the investigation is complete.

2.0 Equipment and Supplies

Soil Sampling Equipment and Tools:

- Tape measure or measuring wheel
- Stainless steel bowls and spoons
- Trowel, hand auger, or shovel (if needed)
- Table and disposable sheeting, tape or clamps to hold down sheeting (if needed).
- White board and dry erase pen
- Graduated plunger and collection tubes for VOC samples (if needed)
- Photoionization detector (PID) (if needed)
- Ziploc bags (sandwich and gallon sizes)
- Trash bags
- Decontamination tools including:
  - Paper towels or shop towels
  - Spray bottles of Alconox (or similar) solution
  - Deionized or distilled water
  - Scrubbing brush and bucket
- Adhesive drum labels, and paint or grease pen
- Washington State Department of Transportation- (WSDOT) approved drums for investigation-derived waste (IDW) disposal, if needed (if drilling, to be provided by driller)
- Camera
- Hand-held global position system (GPS; if needed)
- Coolers, sample jars, labels, ice

Paperwork:

- Work Plan and/or Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP)
- Field map printed on Rite in the Rain paper
- Site-specific Health and Safety Plan (HASP)
  - Tailgate meeting form (for each day you expect to be on Site)
  - Safety Data Sheets
- Floyd|Snider's Accident Prevention Plan (APP)

- Sample collection forms printed in Rite in the Rain paper
- Boring Logs
- Rite in the Rain field notebook
- Chain of custody forms
- Emergency contact numbers for utilities, property owner/manager, etc. (as needed)

Safety Equipment:

- Steel-toed boots
- Safety vest
- Safety glasses
- Nitrile gloves
- Rain gear
- Work gloves
- Hard hat
- Ear protection
- Traffic barricades or cones
- Vehicle emergency kit (road flares, fire extinguisher, first aid kit, etc.)
- Sunscreen if needed
- Hand and foot warmers, if needed
- Mosquito repellent, Hornet Spray, if needed
- Drinking water
- Rain or sun shelter, if needed
- Cell phone and charger cables

3.0 Standard Procedures

3.1 OFFICE PREPARATION

Prior to going into the field, review the SAP and QAPP to become familiar with the sampling goals, data quality objectives, desired sample intervals and nomenclature, field Quality Assurance (QA) samples (i.e., frequency of field duplicates, MS/MSDs) to be collected, analytes, sample containers, and holding times for each analytical method.

At least one week prior to sampling, coordinate with the laboratory specified in the SAP/QAPP to receive coolers and appropriate sample containers (including additional containers for

QA samples). Familiarize yourself with the volume requirements and container types, preservation methods, and holding times for each class of analytes.

If drilling or digging test pits, mark the sample area and sample locations with white spray paint prior to sampling, then submit an 811 public utility locate request at least 3 business days prior to work. Hire a private utility locator and schedule to locate utilities on private property and ensure proposed boring and/or excavation locations are free of utilities (Note: not all locators are equipped to mark non-conductible utilities).

3.2 TAILGATE SAFETY MEETING

Conduct a tailgate safety meeting prior to beginning work at the Site. Include any subcontractors working with you at the Site in this meeting. The safety meeting should cover the hazards specific to soil sampling. Typical hazards include:

- Heavy machinery/drill rig awareness (overhead hazards, pinch points, noise, uncontrolled release of energy). Always make eye contact before approaching an operator.
- Physical hazards (heavy lifting, uneven ground/trip hazards)
- Chemical hazards (dust, site-specific contaminants of concern, lab preservatives)
    - Refer to HASP for specific air monitoring requirements, permissible exposure limits (PELs), and actions if PELs are exceeded.

Additional hazards that may be present at any job site include traffic, adverse weather, slips, trips, falls, biological hazards (such as insects, plants, animals), and worksite distractions (such as pedestrians or other onsite activities).

Record the meeting attendees and topics discussed on the front page of the tailgate safety meeting form. All attendees should sign the form.

3.3 OTHER HEALTH AND SAFETY GUIDELINES

The following are additional health and safety guidelines that should be followed in the field. These guidelines are intended to supplement the guidelines and requirements identified in the HASP and are not intended to replace the HASP.

- Review and sign the HASP prior to going out into the field.
- Conduct a tailgate safety meeting prior to beginning work at the site as discussed in Section 3.2.
- If conditions change (e.g., weather or personnel) or when moving between sampling locations/switching to different sampling tasks, assess any additional hazards that may be associated with the new condition or location/task. Record additional hazards noted and corrective actions to address those hazards on the second page of tailgate safety meeting form.

Record near misses and incidents on the Near Miss and Incident Reporting Form (included as an attachment to the HASP) and conduct management/client notifications according to the protocols detailed in the HASP.

3.4 GENERAL SOIL SAMPLE COLLECTION PROCEDURES

1. Locate the desired sample location and depth interval using a handheld GPS or by taking field measurements from known site features. Record the soil type and any other observations or indications of contamination on a soil boring log (enclosed), soil sample collection form, or field notebook, as described in the Soil Logging Standard Guideline. Note the location and depth of the sample on the whiteboard or notecard and take a photograph with a scale (e.g., tape measure), if possible.
2. Refer to Sections 3.4.1 through 3.4.4 for the appropriate soil collection procedures for drilling, shallow soil, test pit excavation, excavation confirmation, and stockpiles. If collecting samples for VOC analysis by the U.S. Environmental Protection Agency (USEPA) Method 5035, refer to Section 3.5 for specific sample collection procedures for this method. If composite soil sampling is recommended, refer to Section 3.6 for details.
3. Once soil has been collected from the desired depth or interval, mix thoroughly in a disposable or decontaminated stainless-steel bowl until the sample is homogenous in color, texture, and moisture.
4. Fill the required laboratory-provided jars, taking care not to overfill. If large gravels (diameter greater than ~ 1 inch) are encountered, these should be discarded to ensure that an adequate soil volume is collected for analysis. If necessary, use a clean paper towel to remove soil particles from the threaded mouth of the jar before securing lids to ensure a good seal. Remove any soil or dirt from the outside of the jar with a clean paper or shop towel.
5. Label each jar with the sample name, date, time, field staff initials and required analyses. If collecting a field duplicate, use the sample nomenclature specified in the SAP\QAPP and note the field duplicate name and sample time in the sample log and/or field notebook. If extra volume for matrix spike/matrix spike duplicate (MS/MSD) analysis is required, use the same name on all jars. Soil samples should be protected from moisture by placing the filled sample jars into separate sealed Ziploc bags before placing them into a cooler.
6. Upon completion of each day of sampling, complete a chain-of-custody form for all samples, including sample names, date and time of collection, number of containers, and required analyses and methods. Write neatly and make sure information on the chain is legible. If you need to correct an entry, strike the incorrect entry out once, and add your initials next to the strike out. Samples collected for waste characterization purposes should be recorded on a separate chain-of-custody. Keep samples on ice (unless otherwise specified in the SAP/QAPP) to maintain

temperatures of 4-6 degrees Celsius (°C) and transport to the laboratory under chain-of-custody procedures.

3.4.1 Soil Sample Collection via Drilling

These procedures should be used for drilling via direct-push, hollow stem auger, or roto-sonic methods where a pre-designated sample interval (i.e., 0 to 5 feet below ground surface [bgs]) is retrieved from the subsurface using a split spoon sampling device, lined core, or bag sampler.

1. Ensure that reusable sampling equipment has been thoroughly decontaminated prior to sampling.
2. Collect PID measurements and other field tests, if necessary. PID measurements should be collected using the head-space method: put a small amount of soil from the selected interval into a sandwich bag and seal the bag. Label the bag with the soil interval. After at least 10 seconds, insert the tip of the PID into the bag and record the PID reading on the boring log or field collection form. If a sheen test is necessary, place a small amount of soil into a disposable or decontaminated stainless steel bowl, spray it with tap water or deionized water and observe whether a sheen appears on the water. Record results on the boring log or sample collection form.
3. Prior to sample collection, log soil on the boring log or sample collection form following the Soil Logging Standard Guideline.
4. Use a stainless-steel spoon or trowel, or disposable scoop to remove an equal volume of soil across the targeted depth interval from the sampler.
    a. If using a split spoon sampler or other reusable sampler, avoid collecting the soil that is touching the sides of the sampler to the extent practical.
    b. If the soil touching a reusable sampler must be collected to obtain adequate volume for analysis, notify the PM and record in the field logbook.

3.4.2 Manual Collection of Shallow Soil Samples

These procedures should be used for shallow soil sampling via scoop, trowel, shovel, or hand auger.

1. Dig or auger to the bottom depth of the shallowest sample to be collected, using a tool that has been thoroughly decontaminated. Verify that the target depth has been reached using a measuring tape.
2. If using a scoop or trowel, collect the soil directly into a decontaminated stainless-steel bowl.
3. If using a shovel, the soil may either be collected in bowls or set as aside on plastic sheeting in favor of collecting the sample from the sidewall of the hole. If sampling the sidewall, use a decontaminated or disposable scoop or trowel to collect soil from the target depth, or scrape along the sidewall to collect soil across a target depth

interval. Transfer soil to a disposable or decontaminated stainless-steel bowl, repeating until a sufficient volume has been collected.

4. If using a hand auger, empty the cylinder of the auger directly into a disposable or decontaminated stainless-steel bowl. It may be necessary to empty the hand auger onto plastic sheeting or into a bowl to reach the target depth without overflowing the sampler.
5. Any soil from depth intervals that are not targeted for sampling should be set aside on plastic sheeting and returned to the hole after sampling.
6. Collect PID measurements and other field tests as described in Section 3.4.1.

3.4.3 Sample Collection from Test Pits or Limited Soil Excavations

These procedures should be used for collecting samples from test pit explorations excavated using a backhoe or excavator. These same general procedures should also be followed for post-excavation soil samples used to confirm that an excavation has removed contaminated material or to document post-excavation conditions after target excavation limits have been reached.

1. Measure the length, width, and depth of the test pit or excavation area to verify that the target extents have been reached. The lateral spacing of the test pit or excavation confirmation samples, or exact location of samples should be specified in the work plan and typically depend on the size of the excavation area but can vary significantly by project.
2. If not specified in the work plan, sidewall samples may be collected either midway between the ground surface and base of the excavation, or incrementally along the entire height of the sidewall. Both sidewall and base (bottom) samples should penetrate a minimum of 6 inches into the excavated surface.
3. If the test pit or excavation is less than 4 feet deep, or has been benched to accommodate safe entry, a sample may be collected directly from the sidewall(s). Do not enter an excavation before reviewing and verifying the necessary safety requirements. Most excavations can be sampled without entering, which is preferred. If entering is safe, based on the depth or accommodations to support entry, to collect soil from a sidewall, use a decontaminated or disposable scoop, trowel, or shovel to obtain soil from the desired depth or depth interval directly into a decontaminated stainless-steel bowl.
4. If a test pit or excavation cannot be safely entered, instruct the excavator operator to scoop sidewall material from the target depth or depth interval. Collect the soil sample from the excavator bucket using a decontaminated stainless-steel spoon, trowel, or disposal scoop, avoiding material that has come into contact with the teeth or sides of the bucket. Place an adequate volume of soil into a decontaminated stainless-steel bowl. If necessary, follow the compositing procedures in Section 3.6.

3.4.4 Stockpile Sampling

These procedures should be used for classifying stockpiled soil, including excavated soil and imported backfill material.

1. Where potentially contaminated soils have been previously excavated and stockpiled on site, Washington State Department of Ecology (Ecology) guidance recommends using a decontaminated or disposable scoop or trowel, penetrating 6 to 12 inches beneath the surface of the pile at several locations until sufficient volume for analysis is achieved. A decontaminated shovel may also be used to facilitate collection of soil from large piles. The locations for soil collection should be where contamination is most likely to be present based on field screening (i.e., staining, odor, sheen, or elevated photoionization detector [PID] readings). If there are not field indications of contamination, the locations should be distributed evenly around the stockpile.
2. The stockpile may need to be broken up into sections for sample collection depending on the size of the pile (i.e., segregate the pile in half or quarters). If this is necessary, it is important to document where each set of samples were collected from (i.e., north quadrant) and create a field sketch in the project notebook of the pile for reference and mark sample locations with flags.
3. If a sampling frequency is not specified in the work plan, the general rule of thumb for contaminated soil stockpile profiling is to collect and submit 3 analytical samples (these samples can be multi-point composites or grabs) for stockpiles less than 100 cubic yards (CY), 5 samples for stockpiles between 100 and 500 CY, 7 samples for stockpiles 500 to 1,000 CY, 10 samples for stockpiles 1,000 to 2,000 CY, and 10 samples for stockpiles larger than 2,000 CY with an additional sample collected for every 500 CY of material. This rule of thumb is consistent with the Washington State Guidance for Remediation of Petroleum Contaminated Site (Ecology 2016).
4. Samples for characterization of stockpiles of imported backfill or other presumed clean material should also be collected as described under 3. If not described in the work plan, the typical sample frequency for imported or clean material characterization is one sample per 500 CY.

3.5 SOIL SAMPLE COLLECTION FOR VOC ANALYSIS

If collecting soil samples for VOC analysis by USEPA Method 5035, collect these samples first before disturbing the soil. This method uses a soil volume gauge fitted with a disposable soil sampling plunger tube to collect a soil plug that can be discharged directly to a VOA vial, limiting the loss of volatiles during sampling. The collection of VOC samples using the 5035 method specifies use of an airtight VOA vial with a septum lid. Ecology’s interpretation of the USEPA 5035 method allows for field preservation of the sample with methanol or sodium bisulfate, or laboratory preservation (i.e., field collection into an un-preserved vial). It is important to note that if laboratory preservation is the selected method, samples must be received at the laboratory within 48-hours of sample collection. The method of sample preservation for the 5035 method will vary for each site and is dependent on site-specific conditions. Preservation method selection should be coordinated with the laboratory and specified in the sampling plan. Note that not all labs use the soil volume gauge as described below (some use syringes or Terra Core samplers) and that it is important to verify the sampling process with the lab.

1. Note the volume of soil needed for analysis as specified by the laboratory (commonly 5 or 10 grams). Raise the handle of the soil volume gauge to the slot in the gauge body corresponding to the desired volume and turn clockwise until the tabs in the handle lock into the slot.
2. Insert a sample tube at the open end of the gauge body and turn clockwise until the tabs on the tube lock into the "0 gram" slot. Remove the cap from the sample tube and press directly (where possible) into the shallow soil, soil core/sampler, excavation base or sidewall, or stockpile.
3. Continue pressing the sample tube until the plunger is stopped by the sample volume gauge. If a depth interval (for example 9 to10 feet) is targeted for VOC sampling, collect small volumes of soil across this interval until the sample tube is filled
4. Twist counterclockwise to disengage the sample tube, then depress the plunger to eject the soil plug directly into a laboratory-provided VOA vial. Wipe off any soil particles on the VOA vial threads before tightening the lid. Grit on the VOA vial threads can cause a poor seal and interfere with the laboratory analyses. If multiple vials per sample are required, the same plunger may be re-used to fill the remaining vials.

3.6 COMPOSITE SAMPLE COLLECTION

For this guideline, composites are considered samples that are collected across more than one location, or multiple depth intervals at a single location. Samples collected over continuous depth intervals within a sampling device (i.e., split spoon) are addressed for each sampling method in Section 3.4 above.

Compositing of sample material may be performed in the field or by the analytical laboratory. To collect a field composite sample, identify the locations and depth(s) that will comprise the composite. Collect soil from the first target sub-sample depth or depth interval and hold in a decontaminated stainless-steel bowl, covered with aluminum foil to prevent cross contamination and label with the location and depth. Continue to collect and hold individual sub-samples until all components of the composite have been collected, then transfer an equal amount of each sub-sample to a clean bowl and homogenize. Fill necessary sample jars from homogenized composite. In some cases, project plans may require that each individual sample that comprised the composite be collected in jars and submitted to the laboratory if individual sample analysis is desired, or if laboratory compositing is requested in addition to field compositing as a field quality control measure. In this case, label each individual jar, but indicate HOLD on the chain-of-custody, and note that the sample is part of composite XYZ.

To collect a laboratory composite sample, collect, and label each sub-sample using the procedures described above in Section 3.4. Record each sub-sample on the chain-of-custody form, and indicate on this form which samples should be composited by the laboratory and the desired name of the composite sample. It is important to communicate to the laboratory if discrete samples will also require analysis (in some cases) or only the composite sample. It is helpful to send a follow up email to the laboratory PM with laboratory compositing details.

4.0 Decontamination

All reusable equipment that contacts soil or dust should be decontaminated prior to moving to the next sampling location.

Stainless-steel bowls and spoons, and any tools used for sample processing will be decontaminated between each sample; alternatively, disposable bowls and spoons may be used. Equipment decontamination will consist of a tap water rinse to remove soil particles, followed by scrubbing with brushes and an Alconox (or other soap)/tap water solution, and a final rinse with distilled or deionized water.

5.0 Investigation-Derived Waste

Unless otherwise specified in the project work plan, waste soils accumulated as investigation derived waste (IDW) will be contained, transported, disposed of in accordance with applicable laws, and stored in designated drums in a designated area until transported off-site for disposal.

The approach to handling and disposal of these materials is as follows. For IDW that is containerized, such as waste soils, 55-gallon drums approved by WSDOT (or the applicable stage agency) will be used for temporary storage pending profiling and disposal. Each container holding IDW will be sealed and labeled as to its contents (e.g., “soil”), the dates on which the soil was accumulated, the site owner’s name (i.e., the generator), Floyd|Snider name, and the Floyd|Snider field person contact information or front desk telephone number.

Refer to the IDW Special Conditions SOP for further information on IDW storage, sampling, profiling, and handling.

Disposable sampling materials and incidental trash such as paper towels and personal protective equipment (PPE) used in sample processing will be placed in heavy duty garbage bags or other appropriate containers and disposed of as solid waste in the municipal collection system (i.e., site dumpster).

6.0 Field Documentation

All observations including sample collection locations, soil descriptions, sample depths, collection times, analyses, and field QC samples should be recorded on a boring log, soil sample collection form, and/or bound field notebook. Information recorded should additionally include personnel present (including subcontractors), purpose of field event, weather conditions, sample collection date and times, sample analytes, and any deviations from the SAP.

At the end of the day, complete and review the second page of the tailgate safety meeting form detailing additional hazards, corrective actions, near-misses or incidents. Any incidents that result in field staff injuries or have the potential to result in staff injuries (such as hitting buried utility lines when drilling) should be reported immediately to the PM.

7.0 Demobilization

Upon returning to the office, ensure that all equipment is property cleaned and put away in the field room. Equipment with rechargeable batteries should be plugged in as appropriate so it is ready for use by the next person. It is preferable to dispose of trash at the project site, but any trash left in the field vehicle should be brought upstairs, labeled, and placed in the front production room for building staff to dispose of.

If equipment or sample coolers will be placed at the front desk for pickup, clearly label each item with the company picking it up, anticipated pickup time frame, and your contact information so front desk staff can contact you if there are any questions. Notify front desk staff if any items require a signature at pickup.

Within one week of returning from the field, the field lead for the event should review field notes, sampling forms and tailgate safety meeting forms with the PM. Following PM review and approval, field notes will be scanned and saved to the project folder. Hard copies should be filed. The PM will provide copies of near miss and incident reports to the Health and Safety Administrator.

Enclosures: Boring Log
Test Pit Log and Sample Collection Form

Record of Revisions:

Revisions	**Date**
Added H&S information and line edits for clarity.	7/22/2022
Reviewed with minor updates	SD 12/9/2022

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PROJECT:		LOCATION:	BORING ID:
LOGGED BY:		COORDINATE SYSTEM:	
DRILLED BY:		NORTHING:	EASTING:
DRILLING EQUIPMENT:		GROUND SURFACE ELEVATION:	
DRILLING METHOD:		TOTAL DEPTH (ft bgs):	DEPTH TO WATER (ft bgs):
SAMPLING METHOD:		BORING DIAMETER:	DRILL DATE:

Depth (feet)	USCS	Description	Drive	Recovery	# of Blows	PID (ppm)	Sample ID
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

ABBREVIATIONS:
ft bgs = feet below ground surface
ppm = parts per million
USCS = Unified Soil Classification System
= denotes groundwater table

NOTES:

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	PROJECT:	LOCATION:	BORING ID:
	LOGGED BY:	COORDINATE SYSTEM:	
DRILLED BY:		NORTHING:	EASTING:
DRILLING EQUIPMENT:		GROUND SURFACE ELEVATION:	
DRILLING METHOD:		TOTAL DEPTH (ft bgs):	DEPTH TO WATER (ft bgs):
SAMPLING METHOD:		BORING DIAMETER:	DRILL DATE:

Depth (feet)	USCS	Description	Drive	Recovery	# of Blows	PID (ppm)	Sample ID
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

ABBREVIATIONS:
ft bgs = feet below ground surface
USCS = Unified Soil Classification System
ppm = parts per million
▼ = denotes groundwater table

NOTES:

Test Pit Log and Sample Collection Form

Project:	Date:
Field Personnel:	
Test Pit #	
Pit Dimensions	Depth:________________ Length:_______________ Width:____________ Units:_____________
Soil Description: (note depth to native, presence of debris, odor, sheen)	
Sketch	
GPS coordinates	
Other Notes or Observations:	

Samples Details

Sample ID	Depth	Time	Analysis

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix G
Inadvertent Discovery Plan

LIMITATIONS

This report has been prepared for the exclusive use of the City of Bothell, their authorized agents, and regulatory agencies. It has been prepared following the described methods and information available at the time of the work. No other party should use this report for any purpose other than that originally intended, unless Floyd|Snider agrees in advance to such reliance in writing. The information contained herein should not be utilized for any purpose or project except the one originally intended. Under no circumstances shall this document be altered, updated, or revised without written authorization of Floyd|Snider.

The interpretations and conclusions contained in this report are based in part on site characterization data collected by others in the Washington Information System for Architecture and Archaeological Records Data and provided by the Washington State Department of Archaeology and Historic Preservation. Floyd|Snider cannot assure the accuracy of this information.

Inadvertent Discovery Plan

Plan and Procedures for the Unanticipated Discovery of Cultural Resources and Human Skeletal Remains

June 2023

Project Title: Ultra Custom Care Cleaners Site

Project Proponent: Floyd|Snider on behalf of the City of Bothell

Remedial Action Grant Agreement No.: TCPRA-2015-BothPW-00039

County: King

Address: 18304 Bothell Way NE, Bothell, WA 98011

Section, Township, Range: 7 and 8, 26N, 5E

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
DAHP	Washington State Department of Archaeology and Historic Preservation
Ecology	Washington State Department of Ecology
EO	Executive Order
IDP	Inadvertent Discovery Plan
MTCA	Model Toxics Control Act
NHPA	National Historic Preservation Act

Acronym/ Abbreviation	Definition
RCW	Revised Code of Washington
SOI	Secretary of the Interior
WISAARD	Washington Information System for Architectural and Archaeological Records Data

1.0 Introduction

This Inadvertent Discovery Plan (IDP) outlines procedures to perform in the event of discovering cultural resources or human remains, in accordance with Washington preservation laws. These laws concern historic preservation, archaeology, human remains and cemeteries. This IDP covers all ground-disturbing activities related to the Ultra Custom Care Cleaners Site located in the downtown corridor of the City of Bothell. Previous IDP data and text from the Lot D Site (also within the downtown corridor) were used to develop this IDP (Cardno 2019).

1.1 BACKGROUND

The City of Bothell has retained Floyd|Snider to conduct a data gaps investigation for the Ultra Custom Care Cleaners Site to further delineate chlorinated solvent contamination in soil and groundwater at the site associated with former dry-cleaning operations. This project utilizes state and city funds and will utilize a Model Toxics Control Act (MTCA) Remedial Action Grant to investigate and remediate contamination for compliance with state regulations.

The Washington State Department of Archaeology and Historic Preservation's (DAHP's) predictive model on the Washington Information System for Architectural and Archaeological Records Data (WISAARD) characterizes the project area for the Ultra Custom Care Cleaners Site as high to moderate risk for containing buried archaeological materials. No archaeological resources have been identified in the project area; however, there are eight previously recorded archaeological sites within a 1-mile radius of the project area. Seven of these sites are historic in nature, consisting of debris scatters, road segments, and railroad properties, and one is a precontact camp consisting of lithic materials.

The project will be partially funded by Washington state public funds and is, therefore, subject to review under the Governor's Executive Order (EO) 21-02, which replaced EO 05-05. EO 21-02 directs state agencies to review capital construction projects not undergoing Section 106 review under the National Historic Preservation Act (NHPA) and consult with DAHP and affected tribes to determine potential effects to archeological and cultural resources.

EO 21-02 was signed in 2021 by Washington Governor Jay Inslee. This EO requires the preservation and protection of Washington's cultural resources, which are defined as archaeological and historical sites and artifacts and traditional areas or items of religious, ceremonial, and social uses to affected tribes. EO 21-02 outlines the steps of review and consultation, which should be undertaken as early in the project planning process as possible. In the event a culturally significant site will be impacted by a capital project, the state agency must work with the DAHP and affected tribes on appropriate archaeological survey and mitigation strategies consistent with state and federal laws. Additionally, the state agency must take reasonable action to avoid, minimize, or mitigate adverse effects to the resource.

In addition, precontact and historic archaeological sites are protected by several Washington state regulations on both public and private lands. Revised Code of Washington (RCW) 27.44

(Indian Graves and Records) and RCW 27.53 (Archaeological Sites and Resources) require that a person obtain a permit from DAHP before excavating, removing, or altering Native American human remains or archaeological resources in Washington. Chapter 25-48 of the Washington Administrative Code outlines the requirements of the Archaeological Excavation and Removal Permit. A failure to obtain a permit is punishable by civil fines and penalties under RCW 27.53.095 and criminal prosecution under RCW 27.53.090.

If a person violates this statute and knowingly disturbs or alters an archaeological site, DAHP is allowed to issue civil penalties of up to $5,000, in addition to site restoration costs and investigative costs per RCW 27.53.095. Restorative and monetary remedies do not prevent concerned tribes from undertaking civil action in state or federal court or law enforcement agencies from undertaking criminal investigation or prosecution. If human remains and/or burials are disturbed, RCW 27.44.050 allows an affected tribe to undertake civil action. Additionally, the excavation of human remains without a permit is a felony.

1.2 PROJECT LOCATION AND DESCRIPTION

The project area for the Ultra Custom Care Cleaners Site consists of approximately 4.5 acres split between 10 parcels under mixed ownership between the City of Bothell and multiple private parties and city-owned rights-of-way (Figure G.1). At present, only the southernmost property (tax lot 9457200020) is vacant and unpaved. The project area is located in the northeast quarter of Section 7 and northwest quarter of Section 8 of Township 26 North, Range 5 East.

2.0 Recognizing Cultural Resources

2.1 INADVERTENT DISCOVERY

This IDP provides the steps that the City of Bothell employees and their contractors will follow in the event of an inadvertent discovery. This plan contains the necessary steps to minimize damage to any inadvertently discovered archaeological resources during any ground-disturbing activities. Archaeological resources include objects modified by humans and locations of human activity, occupation, or use, including locations (sites or places) of traditional, religious, and cultural importance to specified social and/or cultural groups.

An inadvertent discovery could consist of, but is not limited to:

- Precontact features (e.g., hearths, occupational surfaces, shell middens, charcoal stains);
- Prehistoric artifacts (e.g., lithic debitage, projectile points, modified shells);
- Historic features (e.g., roads, railroads, foundations);
- Historic artifacts (e.g., glass bottles, sanitary cans, bricks, lumber, nails); and
- Burials and funerary items (including, but not limited to skeletal remains, headstones, coffin wood fragments, burial goods [e.g., pipes, ornaments]).

All contractor and subcontractor construction personnel will review the IDP prior to the start of any ground-disturbing construction activities. New construction personnel added after construction begins will be required to review the IDP.

See cultural resource images in Attachment G.1.

2.2 CONFIDENTIALITY

All parties recognize that cultural resources and human remains are of a sensitive nature, and sites where cultural resources are discovered can become targets of vandalism and illegal removal activities. All parties shall keep and maintain as confidential all information regarding any discovered cultural resources, particularly the location of known or suspected human remains, and exempt all such information from public disclosure consistent with applicable regulations. All information indicating the location of known suspected cultural resources or human remains from this project shall be turned over to DAHP. While any party is in possession of this confidential information, such party shall limit access to these records to authorized persons.

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3.0 Onsite Responsibilities

STEP 1: Stop work. If any City of Bothell employee, contractor, or subcontractor believes that he or she has discovered a cultural resource, leave it in place and cease all ground-disturbing work in the area (about a 50-foot radius). Do not allow vehicles, equipment, and unauthorized personnel to traverse the discovery area. Delineate and secure the area to protect the integrity of the discovery. Protection may include installing a physical barrier (e.g., exclusionary fencing).

Upon encountering cultural resources within a boring, discontinue all further work within that boring. The construction supervisor or other responsible party may direct work away from cultural resources to work in other areas prior to contacting the concerned parties.

STEP 2: Upon discovery, City of Bothell employees and their contractors will comply with applicable laws and regulations including RCW 27.53 (Archaeological Sites and Resources).

STEP 3: The City of Bothell will obtain the services of a professional archaeologist who meets the Secretary of the Interior (SOI) standards (36 Code of Federal Regulations Part 61). The SOI-qualified archaeologist will conduct an initial evaluation of the resource immediately.

STEP 4: Notify the Project Manager:

Primary Contact:	**Alternate Contact:**
Scott Adamek, City of Bothell	Ryan Roberts, City of Bothell
Direct Line: (425) 806-6824	Direct Line: (425-806-6823
Cell: (425) 409-4278	Cell: (425) 471-1837
Scott.adamek@bothellwa.gov	ryan.roberts@bothellwa.gov

The Project Manager or alternate will make all calls and necessary notifications and delegate calls and notifications to the professional archaeologist as appropriate.

If human skeletal remains are encountered, treat them with dignity and respect at all times. Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection and to shield them from being photographed. Do not call 911 or speak with the media. Do not take pictures. Follow the procedure described in Section 5.0.

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4.0 Project Manager Responsibilities upon Discovery of Potential Cultural Resources

1. Protect Potential Find: Ensure no work occurs within the discovery area (about a 50-foot radius around potential find) delineate and secure the discovery area to protect the integrity of the discovery.
2. Direct Sampling/Construction Activities Elsewhere: Direct sampling/construction activities away from the discovery area prior to contacting the concerned parties.
3. Contact the Washington State Department of Ecology (Ecology): Maintain regular communications until treatment of the discovery is completed as set forth in this IDP:

   Ecology Contacts:

Project Manager, Toxics Cleanup Program Sunny Becker Direct Line: (425) 457-3842 sunny.becker@ecy.wa.gov	Cultural Resource Specialist Donna Podger Direct Line: (360) 407-7016 donna.podger@ecy.wa.gov

4. Provide Archaeological Examination: Ensure that a qualified professional archaeologist examines the find. If the archaeologist determines that the find:
   A. Is not archaeological or historical material, or human remains/funerary objects, work may proceed with no further delay.
   B. Is archaeological or historical material, contact DAHP and the affected tribe. The SOI-qualified archaeologist will contact DAHP via telephone call and email to inform them of the find and seek guidance as expeditiously as possible. If applicable, a photograph of the discovery will be included in the email notification to DAHP. The SOI-qualified archaeologist will notify the tribes listed below (Tribal Contacts) of the discovery. Document discoveries as described in Section 6.0.
   C. May be human remains or funerary objects, ensure that a qualified physical anthropologist examines the find. If it is determined to be human remains, follow the procedure described in Section 5.0.
5. Protect Confirmed Find: The archaeologist may refine the boundaries of the cultural resource discovery area. Do not work in this designated area until treatment of the discovery is completed, following the procedures set forth in this IDP.

DAHP Contacts

Allyson Brooks, Ph.D. State Historic Preservation Officer Main Office: (360) 586-3066 Cell: (360) 480-6922 allyson.brooks@dahp.wa.gov	Rob Whitlam, Ph.D. State Archaeologist Main Office: (360) 586-3066 Cell: (360) 890-2615 rob.whitlam@dahp.wa.gov
Alternate: Rob Whitlam, Ph.D. State Archaeologist Main Office: (360) 586-3066 Cell: (360) 890-2615 rob.whitlam@dahp.wa.gov	Alternate: Lance Wollwage, Ph.D. Assistant State Archaeologist Main Office: (360) 586-3066 Cell: (360) 890-2616 lance.wollwage@dahp.wa.gov

Tribal Contacts

Muckleshoot Indian Tribe Laura Murphy, Preservation Program, Cultural Resources Main Office: (253) 939-3311 Cell: (253) 876-3272 laura.murphy@muckleshoot.nsn.us	Snoqualmie Indian Tribe Steven Mullen-Moses, Director of Archaeology & Historic Preservation Main Office: (425-888-6551 Direct Line: (425) 292-0249 Extension 2010 steve@snoqualmietribe.us
Stillaguamish Tribe of Indians Kerry Lyste, Tribal Historic Preservation Officer Main Office: (360) 631-5586 Direct Line: (360) 572-7072 klyste@stillaguamish.com	Suquamish Tribe Dennis E. Lewarch, Tribal Historic Preservation Officer Main Office: (360) 598-3311 Direct Line: (360) 394-8529 dlewarch@suquamish.nsn.us
Tulalip Tribes Richard Young, Cultural Resources Main Office: (360) 716-4000 Direct Line: (360) 716-2652 ryoung@tulaliptribes-nsn.gov	

5.0 Special Procedures for the Discovery of Human Skeletal Remains

If human skeletal remains, unmarked burial grave or unregistered grave, funerary object, or object of cultural patrimony are encountered during ground-disturbing activities, all project activity within 100 feet (30.5 meters) of that location must be immediately halted along with all work that may cause further disturbance to the remains. Efforts will be made to secure and protect the discovery area from vandalism, and the discovery will not be removed or otherwise disturbed. Onsite personnel will not speak with media or share any information on social media.

Any unmarked burial grave or unregistered grave, funerary object, or object of cultural patrimony that is discovered during project-related excavation will be treated with dignity and respect.

Project Manager: Immediately call the King County Medical Examiner's Office and the City of Bothell Police Department (DO NOT CALL 911), and the State Physical Anthropologist at the DAHP:

King County Medical Examiner's Office 908 Jefferson St #2 Seattle, WA 98104 Main Office: (206) 731-3232	City of Bothell Police Department 18410 101st Ave NE Bothell, WA 98011 Main Office: (425) 486-1254
Guy Tasa, Ph.D. DAHP State Physical Anthropologist (Human Remains Identification) Main Office: (360) 586-3066 Cell: (360) 790-1633 guy.tasa@dahp.wa.gov	Alex Garcia-Putnam, Ph.D. DAHP Assistant State Physical Anthropologist (Human Remains Identification) Main Office: (360) 586-3066 Cell: (360) 890-2633 alex.garcia-putnam@dahp.wa.gov

The medical examiner and law enforcement personnel will determine whether the remains are human and whether the discovery site constitutes a crime scene. If the remains constitute a crime scene (forensic), the medical examiner will retain jurisdiction. If they do not constitute a crime scene (nonforensic), the medical examiner will notify DAHP. This determination will be completed within 5 business days of receiving notification.

DAHP will have jurisdiction over non-forensic remains until provenance of the remains is established. The state physical anthropologist will make an initial determination of whether nonforensic skeletal human remains are Indian or non-Indian to the extent possible based on the remains within 2 business days of notification of a finding of such nonforensic remains. If the remains are determined to be Indian, the DAHP will notify all affected tribes via certified mail to the head of the appropriate tribal government within 2 business days and contact the appropriate tribal cultural resources staff.

The affected tribes have 5 business days to respond via telephone or writing to the DAHP as to their interest in the remains. The DAHP will handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

Sampling/construction in the discovery area may resume only as directed by the medical examiner/law enforcement personnel for forensic remains and by DAHP for nonforensic remains.

6.0 Documentation of Cultural Resources

The Project Manager will ensure the proper documentation and field assessment of any discovered cultural resources in cooperation with all parties: DAHP, Ecology, affected tribes, and a contracted consultant (if any).

All prehistoric and historic cultural material discovered during sampling will be recorded by a professional archaeologist on a cultural resource site or isolate form using standard and approved techniques. Site overviews, features, and artifacts will be photographed; stratigraphic profiles and soil/sediment descriptions will be prepared for minimal subsurface exposures. Discovery locations will be documented on scaled site plans and site location maps.

Cultural features, horizons, and artifacts detected in buried sediments may require further evaluation using hand-dug test units. Units may be dug in controlled fashion to expose features, collect samples from undisturbed contexts, or to interpret complex stratigraphy. A test excavation unit or small trench might also be used to determine whether an intact occupation surface is present. Test units will be used only when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site's significance. Excavations will be conducted using state-of-the-art techniques for controlling provenience, and the chronology of ownership, custody, and location recorded with precision.

Spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock will be recorded for each probe on a standard form. Test excavation units will be recorded on unit-level forms, which include plan maps for each excavated level, and material type, number, and vertical provenience (depth below surface and stratum association where applicable) for all artifacts recovered from the level. A stratigraphic profile will be drawn for at least one wall of each test excavation unit.

Sediments excavated for purposes of cultural resources investigation will be screened through 0.125-inch mesh, unless soil conditions warrant 0.25-inch mesh.

All prehistoric and historic artifacts collected from the surface and from probes and excavation units will be analyzed, catalogued, and temporarily curated. Ultimate disposition of cultural materials will be determined in consultation with DAHP, Ecology and the affected tribes.

If field assessment work exposes human skeletal remains, the process described in Section 5.0 will be followed.

Within 30 days of concluding fieldwork, the Project Manager will provide a technical report summarizing the work and findings of the professional archaeologist to Ecology, DAHP, and the affected tribes.

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7.0 Proceeding with Work

Work outside the designated discovery area may continue while documentation and assessment of the discovery proceeds.

Work inside the discovery area may resume only after treatment of the discovery is completed in accordance with this IDP and with the concurrence of the Project Manager, DAHP, affected tribes, and Ecology. For forensic human remains, the county examiner, law enforcement personnel, and DAHP must concur with resumption of work.

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8.0 IDP Availability and Use

The IDP must be immediately available on site, be implemented to address any discovery, and be available by request by any party. The IDP must be discussed and reviewed with all personnel performing fieldwork in advance of commencing fieldwork.

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9.0 References

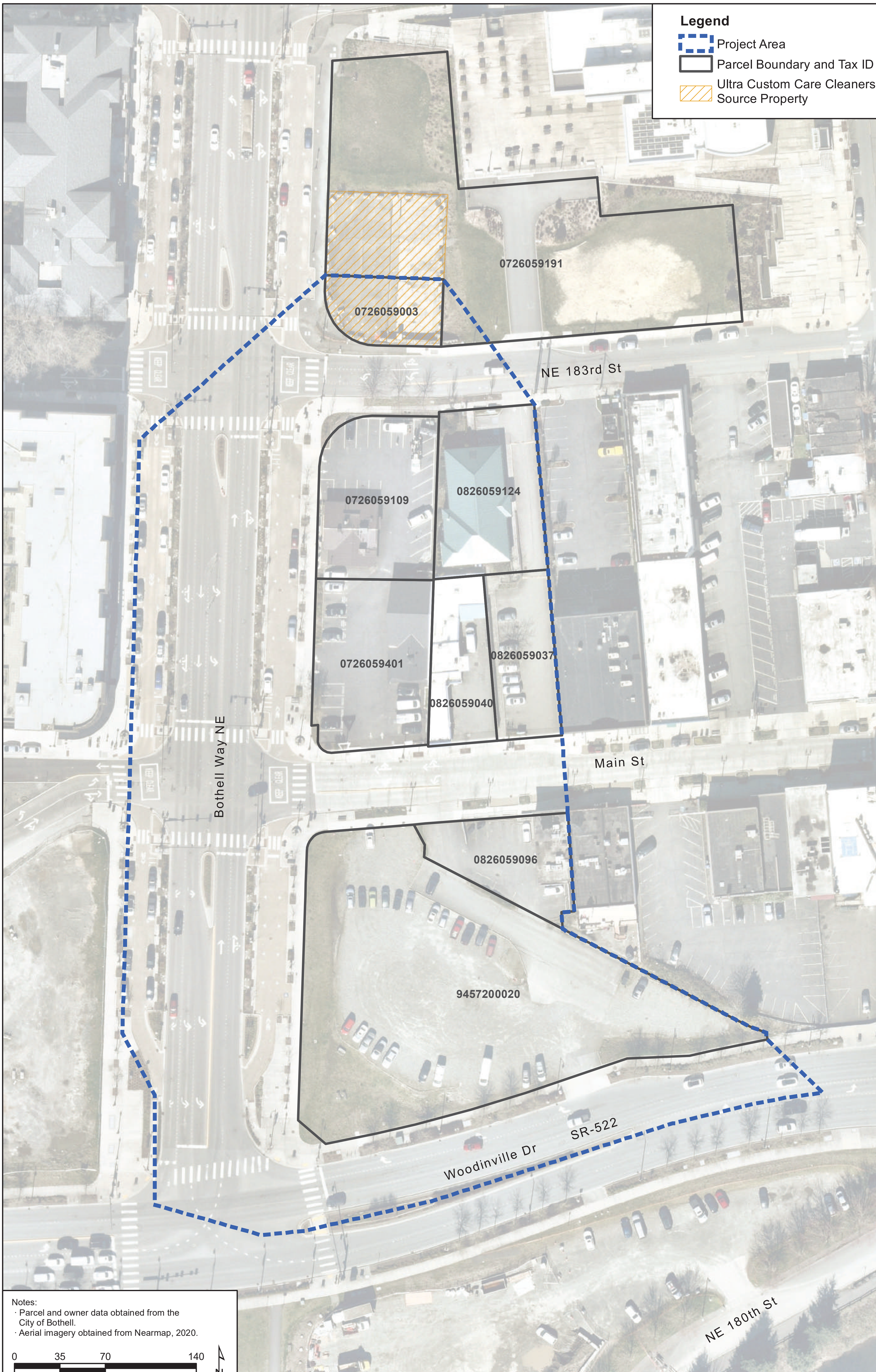
Cardno. 2019. *Inadvertent Discovery Plan, Bothell Downtown Lot D Project, Bothell, Washington*. 26 September.

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix G

Figure



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Inadvertent Discovery Plan
Ultra Custom Care Cleaners Site
Bothell, Washington

Figure G.1
Project Location and Tax Lot Information

I:\GIS\Projects\COBothell-Ultra\MXD\IDP_20_0422\Figure 1.1 Project Location and Tax Lot Information.mxd
4/30/2020

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix G

Attachment G.1
Example Images of Cultural Resources
(ECY 070-560)

Implement the IDP / UDP if …

You see chipped stone artifacts.

- Glass-like material
- Angular
- “Unusual” material for area
- “Unusual” shape
- Regularity of flaking
- Variability of size

Implement the IDP / UDP if …

You see ground or pecked stone artifacts.

- Striations or scratching
- Unusual or unnatural shapes
- Unusual stone
- Etching
- Perforations
- Pecking
- Regularity in modifications
- Variability of size, function, and complexity

Implement the IDP / UDP if …

You see bone or shell artifacts.

- Often smooth
- Unusual shape
- Carved
- Often pointed if used as a tool
- Often wedge shaped like a "shoehorn"

Bone Awls from Oregon and Bone Wedge from California

Implement the IDP / UDP if …

You see bone or shell artifacts.

- Often smooth
- Unusual shape
- Perforated
- Variability of size

Implement the IDP / UDP if …

You see fiber or wood artifacts.

- Wet environments needed for preservation
- Variability of size, function, and complexity
- Rare

Artifacts from Mud Bay, Olympia, Washington

Implement the IDP / UDP if …

You see historic period artifacts.

Artifacts from Downtown Seattle, Alaskan Way Viaduct (Upper Left and Lower) and Unknown Site (Upper Right)

Implement the IDP / UDP if …

You see strange, different or interesting looking dirt, rocks, or

- Human activities leave traces in the ground that may or may not have artifacts associated with them
- “Unusual” accumulations of rock (especially fire-cracked rock)
- “Unusual” shaped accumulations of rock (e.g., similar to a fire ring)
- Charcoal or charcoal-stained soils
- Oxidized or burnt-looking soils
- Accumulations of shell
- Accumulations of bones or artifacts
- Look for the “unusual” or out of place (e.g., rock piles or accumulations in areas with few rock)

Implement the IDP / UDP if …

You see strange, different or interesting looking dirt, rocks, or

- "Unusual" accumulations of rock (especially fire-cracked rock)
- "Unusual" shaped accumulations of rock (e.g., similar to a fire ring)
- Look for the "unusual" or out of place (e.g., rock piles or accumulations in areas with few rock)

Site on Muckleshoot Indian Reservation, near WSDOT ROW along SR 164

Implement the IDP / UDP if …

You see strange, different or interesting looking dirt, rocks, or

- Often have a layered or “layer cake” appearance
- Often associated with black or blackish soil
- Often have very crushed and compacted shells

Implement the IDP / UDP if ...

You see historic foundations or buried structures.

45KI924, In WSDOT ROW for SR 99 Tunnel

Engineering Design Report

Ultra Custom Care Cleaners Site

Appendix H
Contaminated Soil and Groundwater Protocol

APPENDIX E: CONTAMINATED SOIL AND GROUNDWATER PROTOCOL

Protocol When Contaminated Soil or Groundwater

May be Encountered During Private Development Work on Private Property or in the Public ROW or Utility Work in the Public ROW in Downtown Bothell

---

All projects within areas identified on the attached map should follow through with the following protocol since they may encounter contaminated soil or groundwater.

An environmental peer review consultant shall be made available to provide support to City staff.

If contaminated soil/groundwater Is suspected to exist on private property

1. Notification
   a. The City shall notify the developer at the pre-application meeting and provide available documents
   b. The City shall indicate that the developer needs to meet all local, state, and federal
   c. requirements
   d. The developer shall acknowledge in writing receipt of this information. The City shall document that the information was provided to the developer.

2. The City shall review the design of the development with the objective of not exacerbating and/or spreading contamination
   e. The review by the City will include a review by the City's environmental peer review consultant
   f. The design may need to include such things as, but not limited to, check dams on utility trenches; no foundation, French drains, or under drains; no groundwater resource wells; and/or special requirements during dewatering of groundwater, and other current Best Management Practices (BMPs).

If contaminated soil and/or groundwater is suspected to exist in the public ROW where the private developer is required to do utility work and/or frontage work

1. Notification
   a. The City shall notify the developer at the pre-application meeting and provide available documents
   b. The City shall indicate that the developer needs to meet all local, state, and federal requirements
   c. The developer shall acknowledge in writing receipt of this information. The City shall document that the information was provided to the developer.

2. The City shall review the design of the development work with the objective of not exacerbating and/or spreading contamination
   a. City shall provide the developer or utility company with existing location, analytical laboratory results, field reports, consultant reports, and all other available information related to the presence of contamination.

b. Developer or utility company shall notify the City of any planned cleanup activities, excavation or stockpiling of suspected or confirmed contaminated soils, treatment or disposal of suspected or confirmed contaminated soils, and any associated dewatering. The City may monitor and inspect the work.
c. Developer or utility company shall notify the City of any planned storage, testing, treatment, or discharge of suspected or confirmed contaminated water, and provide copies of all permits required to discharge or remove any contaminated water (water removed from storage tanks via vacuum truck, 55-gallon water drums, and other water storage vessels.

3. Soil/ water disposal
   a. Developer or utility company shall meet all local, state, and federal requirements for handling, management and disposal of any contaminated soil, water, or underground storage tanks encountered.

4. Reporting
   a. Developer or utility company shall provide the City with copies of all manifests, bills of lading, and soil disposal certificates for all contaminated and impacted soils disposed of off-site as either Washington State designated hazardous or dangerous waste. Contaminated or impacted soils contain detectable concentrations of any potential chemical of concern listed in the Washington State Department of Ecology Cleanup Levels and Risk Calculation (CLARC) database.
   b. Developer or utility company shall provide the City with copies of all maps or figures showing the exact location of contaminated soil or ground water, analytical laboratory results, field reports, consultant reports, and all other available information documenting the handling and disposal of contaminated or impacted soil or ground water.

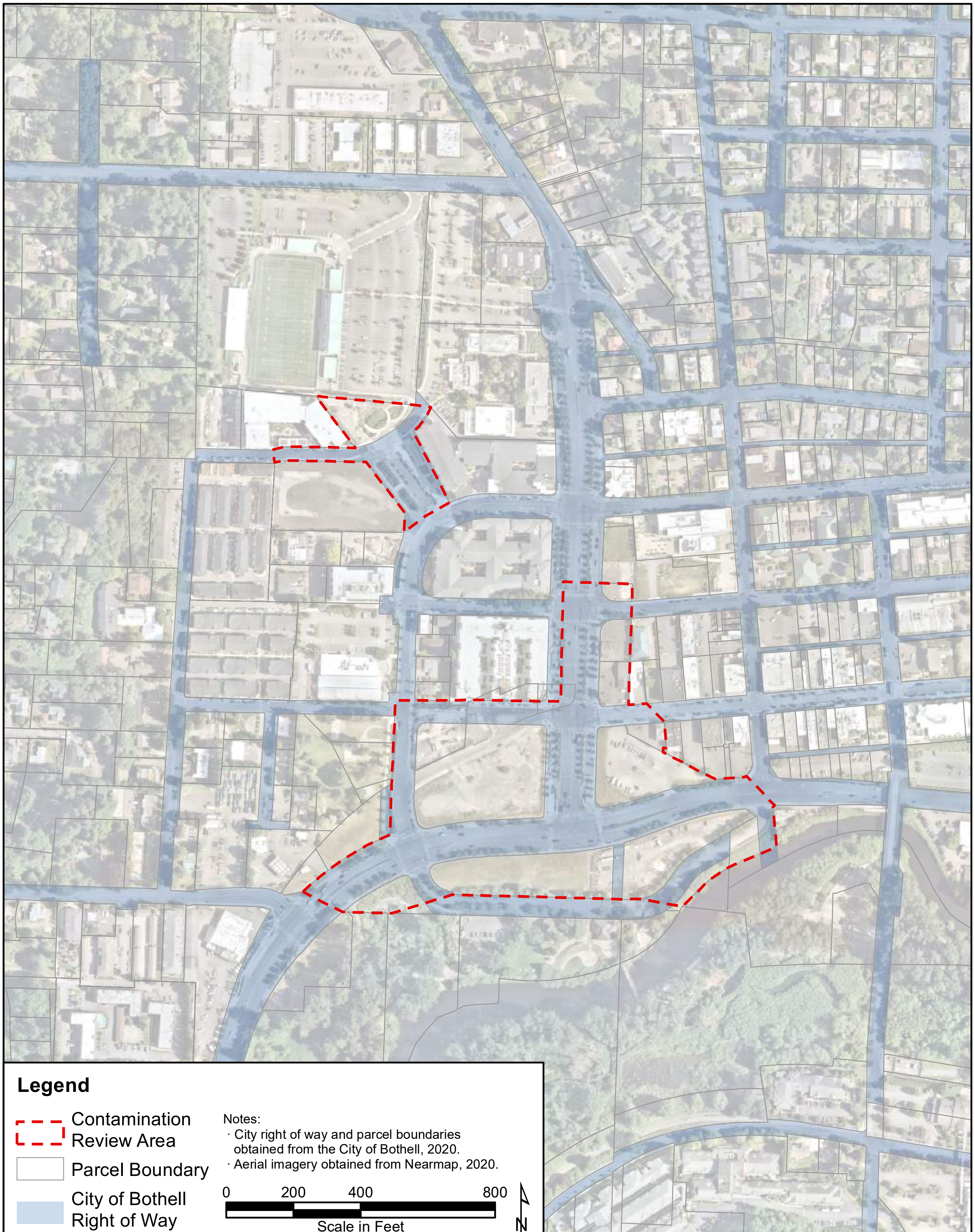
The following disclaimers shall be included in any letter, formal notice, and map that is sent to the developers and utility companies.

MAPS

This map has been prepared by the City of Bothell to identify and depict areas within the City's downtown core that may potentially contain contaminated or impacted soil or groundwater. The map was created using information collected by the City and by others. The City does not guarantee the completeness or accuracy of the information. This information may no longer be current or accurate and is provided to you as a courtesy only. It is the property owner or developer's responsibility to verify the condition of the land upon which they are working and to comply with all local, state, and federal laws and regulations regarding contaminated soil and groundwater.

INFORMATION

The following information has been provided by the City of Bothell to identify and depict areas within the City's downtown core that may potentially contain contaminated or impacted soil or groundwater. The information was collected by the City and by others. The City does not guarantee the completeness or accuracy of the information. This information may no longer be current or accurate and is provided to you as a courtesy only. It is the property owner or developer's responsibility to verify the condition of the land upon which they are working and to comply with all local, state, and federal laws and regulations regarding contaminated soil and groundwater.



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City of Bothell

Figure 1
Contamination Review Areas

I:\GIS\Projects\COBothell-Lot-P\MXD\ContaminationReviewAreas_20_0702\Figure 1 Contamination Review Areas.mxd
8/7/2020

MEMORANDUM OF AGREEMENT BETWEEN

THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (ECOLOGY)

AND

THE CITY OF BOTHELL (CITY)

REGARDING

CITY STREETS AND RIGHT-OF-WAYS AT MTCA SITES

I. INTRODUCTION

A. The Washington State Department of Ecology ("Ecology") and the City of Bothell ("City") have entered into a series of agreements pursuant to the Model Toxics Control Act, RCW 70A.305 ("MTCA"), governing the cleanup and long-term monitoring of the release of hazardous substances associated with historical activities on various properties within the City;

B. The Cleanup Agreements are listed in Exhibit D and require the City to undertake certain remedial actions (the "Remedial Action"). As part of the Remedial Action, certain public streets and rights of way contain residual hazardous substances to be managed in a manner that protects public health and the environment while accommodating continued use for a range of public purposes, including transportation and utilities, using institutional controls as required by MTCA. The City owns fee title to some street segments and has maintenance responsibilities in others;

C. Ecology may require institutional controls at cleanup sites or properties at any stage of the cleanup to assure the integrity of the cleanup and continued protection of human health and the environment. MTCA, the Uniform Environmental Covenant Act, RCW 64.70 ("UECA") and the MTCA regulation, WAC 173-340-440, describe the provisions that need to be included in an environmental covenant and the procedures for establishing such covenants;

D. Ecology and the City have explored implementing restrictive (environmental) covenants that are recorded with the King County Recorder's Office as an institutional control for streets and rights-of-way but have determined this approach to be infeasible and inefficient given the number of streets and cleanup actions involved and the manner in which the King County Assessor records instruments that affect public streets and rights of way;

E. Without a parcel number, a covenant cannot be recorded with the county recorder. WAC 173-340-440(8)(b) permits an alternative system to a restrictive covenant for properties owned by local governments if the entity can demonstrate: (1) that it does not routinely file with the county recording officer based on the type of interest in real listed segments that it has in the site; and (2) the alternative system meets the requirements of WAC 173-340-440(9). Use of an alternative system, as described here, makes sense because these restrictions become part of the City's routine right-of-way management practices. As such, these restrictions are more likely to be recognized and complied with.

F. Ecology and the City have determined that this Memorandum of Agreement ("MOA") will be an effective and efficient institutional control for public streets and rights of way that is also consistent with MTCA and the Cleanup Agreements.

NOW THEREFORE, ECOLOGY AND THE CITY MUTUALLY AGREE TO UNDERTAKE THE ACTIONS SET FORTH HEREIN.

Section 1. Listed segments

Streets and rights of way subject to this MOA are listed in Exhibit A-1. This MOA refers to the subject streets and rights of way as "listed segments." Exhibit A-2 depicts the right of way segments and intersections ("listed segments") which are subject to the provisions of this MOA.

Section 2. Contaminants

Soil or groundwater in specific areas under the listed segments may contain one or more of the hazardous substances listed in Exhibit B, at concentrations above MTCA cleanup levels.

Section 3. Ecology Responsibilities

Ecology will upload this document and its attachments to Ecology's document repository for the sites listed in Exhibit D, and reference this instrument in the Environmental Covenants List.

Section 4. City Responsibilities

a. The City will incorporate the terms of this MOA by reference in the City's Design and Construction Standards (http://www.ci.bothell.wa.us/DocumentCenter/View/688/Design-and-Construction-Standards-and-Specifications-PDF?bidId=).

b. The City will provide a copy of this MOA to City contractors, third parties, or their contractors before authorizing work in the listed segments. The City will provide the entity performing the work access to current information known about contaminants in the listed segment, and advise the entity of any remedial equipment in the work area.

c. All contaminated materials removed by the City or its contractors will be disposed in accordance with applicable laws and regulations, including but not limited to WAC 173-303 and WAC 173-304. Work performed by the City or its contractors must comply with worker safety regulations concerning potential exposure to hazardous substances in solid, liquid, or vapor form.

d. The City will require in the Right-of-Way Invasion Permit that all contaminated materials removed be disposed in accordance with applicable laws and regulations, including but not limited to WAC 173-303 and WAC 173-304. As a condition of any Right-of-Way Invasion Permit granted for work in the listed segments, the City will require compliance with worker safety regulations concerning potential exposure to hazardous substances in solid, liquid, or vapor form.

Section 5. General Restrictions and Requirements.

The following general restrictions and requirements shall apply to the listed segments:

a. Interference with Remedial Action. The City shall not permit or engage in any activity on the listed segments that may impact or interfere with the Remedial Action and any operation, maintenance, inspection or monitoring of that Remedial Action without prior written approval from Ecology.

b. Protection of Human Health and the Environment. The City shall not permit or engage in any activity in the listed segments that may threaten continued protection of human health or the environment without prior written approval from Ecology. This includes, but is not limited to, any activity that results in the release of residual contamination that was contained as a part of the Remedial Action or that exacerbates or creates a new exposure to contamination remaining on the listed segments.

c. Continued Compliance Required. City shall not convey any interest in any portion of the listed segments without providing for the continued adequate and complete operation, maintenance and monitoring of Remedial Action and continued compliance with this MOA. The City agrees to require that, within 30 days after conveyance, the party accepting title must record an Ecology approved environmental covenant with the appropriate county auditor.

d. Preservation of Reference Monuments. City shall make a good faith effort to preserve any reference monuments and boundary markers used to define the areal extent of coverage of this MOA. Should a monument or marker be damaged or destroyed, City shall have it replaced by a licensed professional surveyor within 30 days of discovery of the damage or destruction.

Section 6. Specific Prohibitions and Requirements.

In addition to the general restrictions in Section 5 of this MOA, the following additional specific restrictions and requirements shall apply to the listed segments.

a. Land Use. The listed segments may only be used for usual and accustomed public right of way uses such as transportation and utilities. The City will not vacate or convey any interest in any listed segment without at least 30 days prior notice to Ecology.

b. Containment of Soil/Waste Materials. Contaminated soil remains at least four (4) feet under caps consisting of asphalt road and concrete sidewalk located as illustrated in Exhibits B and C. The primary purpose of these caps is to minimize the potential for contact with contaminated soil and to minimize the leaching of contaminants to groundwater. As such, the following restrictions shall apply within the areas illustrated in Exhibits B and C.

Any activity in the illustrated areas that will compromise the integrity of the cap including: drilling; digging; piercing the cap with sampling device, post, stake or similar device;

grading; excavation; installation of underground utilities; removal of the cap; or, application of loads in excess of the cap load bearing capacity is prohibited, except as follows:

i. If the activity occurs four (4) feet or less below ground surface, the City shall notify Ecology ten (10) working days ahead of the work and shall promptly repair any damage to the cap by replacing the damaged area with similar materials and submit written documentation of the repairs to Ecology within ninety (90) days of completing the repairs.

ii. If the activity occurs more than four (4) feet below ground surface, the City must obtain prior written approval from Ecology. Should the City propose to remove all or a portion of the cap so that access to the underlying contamination is feasible, Ecology may require treatment or removal of the underlying contaminated soil. Unless otherwise agreed to by Ecology, the City shall promptly repair any damage to the cap by replacing the damaged area with similar materials and submit written documentation of the repairs to Ecology within ninety (90) days of completing the repairs.

c. Work in the Listed Segments. The listed segments contain areas of contamination in soil and/or groundwater at concentrations above cleanup levels protective of human health. At least ten (10) working days prior to undertaking or permitting work to begin in a listed segment, the City shall notify Ecology's site manager in writing. If previously undocumented contamination is encountered in the course of the work, the City will notify Ecology.

d. Groundwater Use. Groundwater beneath the listed segments shall not be extracted for any purpose other than temporary construction dewatering, investigation, monitoring or remediation. Drilling of a well for any water supply purpose is strictly prohibited. Groundwater extracted within these segments for any purpose shall be considered potentially contaminated and any discharge of this water shall be done in accordance with state and federal law.

e. Stormwater facilities. New stormwater infiltration facilities may have an impact on groundwater plumes if constructed in the listed segments. Permit applications for stormwater infiltration facilities planned for the listed segments should note that the planned facility is in proximity to areas of contamination.

f. Monitoring.

Several groundwater monitoring wells are located in the listed segments to monitor the performance of Remedial Action. The City shall maintain clear access to these devices and protect them from damage. The City shall report to Ecology within forty-eight (48) hours of the discovery of any damage to any monitoring device. Unless Ecology approves of an alternative plan in writing, the City shall promptly repair damage to wells installed by the City and submit a report documenting this work to Ecology within thirty (30) days of completing the repairs.

Section 7. Access. The City shall maintain clear access to all Remedial Action components necessary to construct, operate, inspect, monitor and maintain the Remedial Action.

Section 8. Notice Requirements.

a. Conveyance of Any Interest. The City, when conveying any interest in any part of the listed segments including but not limited to title, easement, leases, and security or other interests, must:

> **i.** Provide written notice to Ecology of the intended conveyance at least thirty (30) days in advance of the conveyance.
>
> **ii.** Include in the conveying document a notice in substantially the following form, as well as a complete copy of this MOA:

NOTICE: THIS PROPERTY IS SUBJECT TO USE RESTRICTIONS DETAILED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY ON [Date] AND AVAILABLE AT THE ECOLOGY ENVIRONMENTAL COVENANTS LIST. USES AND ACTIVITIES ON THIS PROPERTY MUST COMPLY WITH THE RESTRICTIONS, A COMPLETE COPY OF WHICH IS ATTACHED TO THIS DOCUMENT.

> **iii.** Unless otherwise agreed to in writing by Ecology, provide Ecology with a complete copy of the executed document within thirty (30) days of the date of execution of such document.
>
> **iv.** In the case of conveyance of title, require that within 30 days after conveyance the party accepting title must file with the county auditor an environmental covenant approved by Ecology.

b. Reporting Violations. Should the City become aware of any violation of this MOA, City shall promptly report such violation in writing to Ecology.

c. Emergencies. For any emergency or significant change in site conditions due to Acts of Nature (for example, flood or fire) resulting in a violation of this MOA, the City is authorized to respond to such an event in accordance with state and federal law. The City must notify Ecology in writing of the event and response actions planned or taken as soon as practical but no later than within 24 hours of the discovery of the event.

d. Notification procedure. Any required written notice, approval, reporting or other communication shall be personally delivered or sent by first class mail to the following persons. Any change in this contact information shall be submitted in writing to Ecology and the City.

Erin Leonhart Interim City Manager City of Bothell 18415 101stAvenue NE Bothell, WA 98011 (425) 806-6100 Erin.Leonhart@bothellwa.gov	Environmental Covenants Coordinator Washington State Department of Ecology Toxics Cleanup Program P.O. Box 47600 Olympia, WA 98504 – 7600 (360) 407-6000 ToxicsCleanupProgramHQ@ecy.wa.gov

As an alternative to providing written notice and change in contact information by mail, these documents may be provided electronically in an agreed upon format at the time of submittal.

Section 9. Modification or Termination.

The parties will endeavor to meet and confer at least once every two (2) years to update, as appropriate, the exhibits to this agreement. In addition, if the conditions necessitating these restrictions have changed or no longer exist, then the City may submit a request to Ecology that these restrictions be amended or terminated.

Section 10. Enforcement and Construction.

a. This MOA is enforceable according to the terms of the Cleanup Agreements and any disputes arising under this MOA should be resolved in accordance with the terms of the Cleanup Agreements.

b. The City shall be responsible for all costs associated with implementation of this MOA, including but not limited to costs to process a request by the City for any modification or termination of this MOA and any approval or consultation conducted under this MOA. The City reserves the right to recover its costs from third parties through easement agreements, permit fees or similar regulatory mechanisms, and/or through claims arising under MTCA.

c. This MOA shall be liberally construed to meet the intent of MTCA and UECA.

d. The provisions of this MOA shall be severable. If any provision in this MOA or its application to any person or circumstance is held invalid, the remainder of this MOA or its application to any person or circumstance is not affected and shall continue in full force and effect as though such void provision had not been contained herein.

e. Nothing in this agreement shall be construed to restrict in any way Ecology's authority to fulfill its oversight and enforcement responsibilities under MTCA or other applicable State laws.

The undersigned individual warrants he/she has authority to execute this MOA on behalf of the City of Bothell.

EXECUTED this 8th day of June, 2021.

____

By: Erin Leonhart
Title: Interim City Manager

REPRESENTATIVE ACKNOWLEDGEMENT

STATE OF Washington

COUNTY OF King

On this 8th day of June, 2021, I certify that Erin Leonhart personally appeared before me, acknowledged that **he/she** signed this instrument, on oath stated that **he/she** was authorized to execute this instrument, and acknowledged it, as the Representative of the City of Bothell, to be the free and voluntary act and deed of such party for the uses and purposes mentioned in the instrument.

Catherine E. Jansen
Notary Public in and for the State of Washington

Residing at Bothell, WA

My appointment expires 2-8-25

CATHERINE JANSEN
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXPIRES 7031 2-08-25

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

By: ROBERT W. WARREN

Title: SECTION MANAGER

Dated: 7/9/21

STATE ACKNOWLEDGMENT

STATE OF Washington

COUNTY OF King

On this 9th day of July, 2021, I certify that Robert W. Warren personally appeared before me, acknowledged that **he/she** is the Section Manager of the state agency that executed the within and foregoing instrument, and signed said instrument by free and voluntary act and deed, for the uses and purposes therein mentioned, and on oath stated that **he/she** was authorized to execute said instrument for said state agency.

Vivian M. Perez
Notary Public in and for the State of Washington

VIVIAN M PEREZ
Notary Public
State of Washington
Commission # 137737
My Comm. Expires Mar 15, 2023

Residing at 1527 N. 107th Seattle WA 98133

My appointment expires Mar. 15, 2023

EXHIBIT A-1
Right of Way Segments and Intersections

Bothell Way NE

Bothell Way NE beginning 250 feet west of 98th Avenue NE to Main Street including intersections at Bothell Way NE and 98th Ave NE and Bothell Way NE and Woodinville Drive but excluding the intersection at Bothell Way NE and Main Street.

98th Avenue NE

98th Ave NE from Bothell Way NE to Main Street including intersections at 98th Ave NE and Main Street and at 98th Ave NE and Bothell Way NE

Main Street

Main Street from 98th Ave NE to Bothell Way NE including the intersection at Main Street and 98th Ave NE but excluding the intersection at Main Street and Bothell Way NE

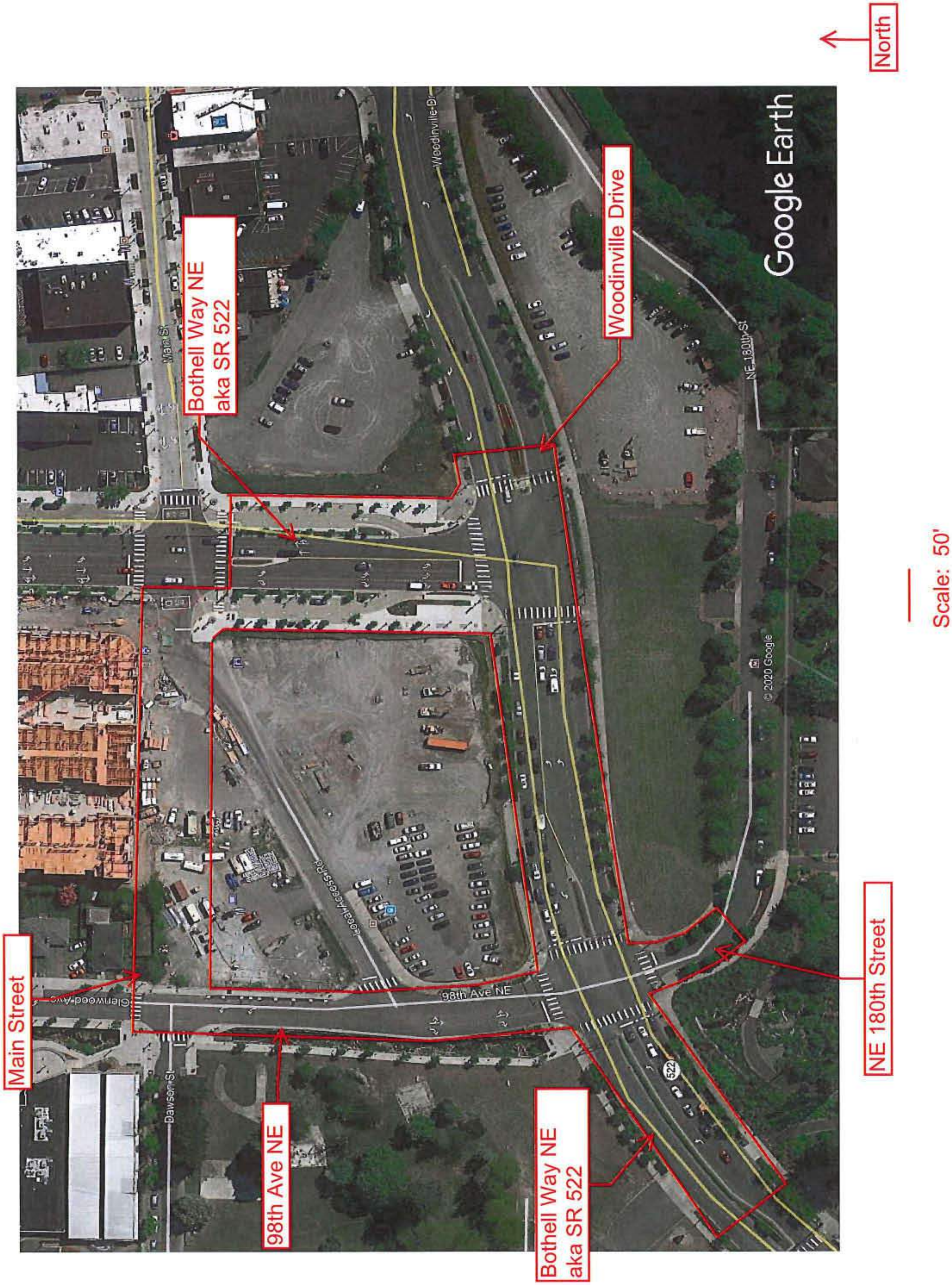
NE 180th Street

NE 180th Street 100 feet south from Bothell Way NE including the intersection at NE 180th Street and Bothell Way NE

Woodinville Drive

Woodinville Drive extending approximately 50 feet east from the east edge of Bothell Way NE at the intersection of NE Bothell Way and Woodinville Drive

Exhibit A-2



North
Bothell Way NE aka SR 522
Woodinville Drive
Google Earth
Main St
Woodinville Dr
NE 180th St
Local Access Rd
98th Ave NE
Glenwood Ave
Dawson St
© 2020 Google
522
Main Street
98th Ave NE
Bothell Way NE aka SR 522
NE 180th Street
Scale: 50'

EXHIBIT B

THAT PORTION OF THE EXISTING BOTHELL WAY NE RIGHT-OF-WAY, SAID RIGHT-OF-WAY, LYING WITHIN THE EAST HALF OF SECTION 7, TOWNSHIP 26 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY WASHINGTON, SAID PORTION BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

INSTITUTIONAL CONTROL AREA:

BEGINNING AT THE MOST WESTERLY CORNER OF PARCEL #3 OF CITY OF BOTHELL BOUNDARY LINE ADJUSTMENT NO. BLA2014-05666, RECORDED UNDER KING COUNTY RECORDING NUMBER 20150819900001, SAID CORNER LYING ON THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF BOTHELL WAY NE;

THENCE LEAVING SAID SOUTHEASTERLY RIGHT-OF-WAY LINE, NORTH 71°04'06' WEST, A DISTANCE OF 79.09 FEET;

THENCE NORTH 21°34'43" EAST, A DISTANCE OF 110.01 FEET TO THE NORTHWESTERLY RIGHT-OF-WAY LINE OF SAID BOTHELL WAY NE, AND THE BEGINNING OF A NON-TANGENT CURVE TO THE RIGHT, HAVING A RADIUS OF 846.44 FEET, AND TO WHICH BEGINNING A LINE FROM THE RADIUS POINT BEARS NORTH 35°28'31" WEST;

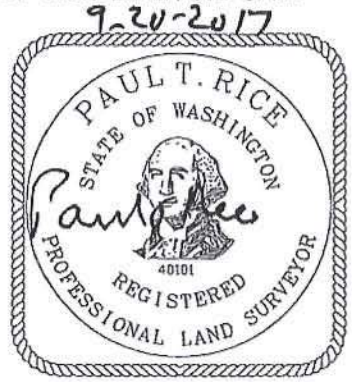
THENCE NORTHEASTERLY ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE AND SAID CURVE, AN ARC LENGTH OF 170.76 FEET THROUGH A CENTRAL ANGLE OF 11°33'33" TO ITS INTERSECTION WITH THE WESTERLY RIGHT-OF-WAY LINE OF 98TH AVENUE NE;

THENCE SOUTH 73°21'25" EAST, A DISTANCE OF 41.15 FEET;

THENCE SOUTH 00°53'03" EAST, A DISTANCE OF 104.64 FEET TO THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF SAID BOTHELL WAY NE, AND THE BEGINNING OF A NON-TANGENT CURVE TO THE LEFT, HAVING A RADIUS OF 723.44 FEET, AND TO WHICH BEGINNING A LINE FROM THE RADIUS POINT BEARS NORTH 24°40'56" WEST;

THENCE SOUTHWESTERLY ALONG SAID SOUTHEASTERLY RIGHT-OF-WAY LINE AND SAID CURVE, AN ARC LENGTH OF 167.25 FEET THROUGH A CENTRAL ANGLE OF 13°14'45", TO THE BEGINNING OF A NON-TANGENT CURVE TO THE LEFT, HAVING A RADIUS OF 833.50 FEET, AND TO WHICH BEGINNING A LINE FROM THE RADIUS POINT BEARS NORTH 36°46'24" WEST;

9-20-2017



THENCE SOUTHWESTERLY ALONG SAID SOUTHEASTERLY RIGHT-OF-WAY LINE AND SAID CURVE, AN ARC LENGTH OF 15.33 FEET, THROUGH A CENTRAL ANGLE OF 1°03'14" TO THE POINT OF BEGINNING.

SAID PORTION CONTAINS 28,122 SQUARE FEET, 0.6456 ACRES, MORE OR LESS.

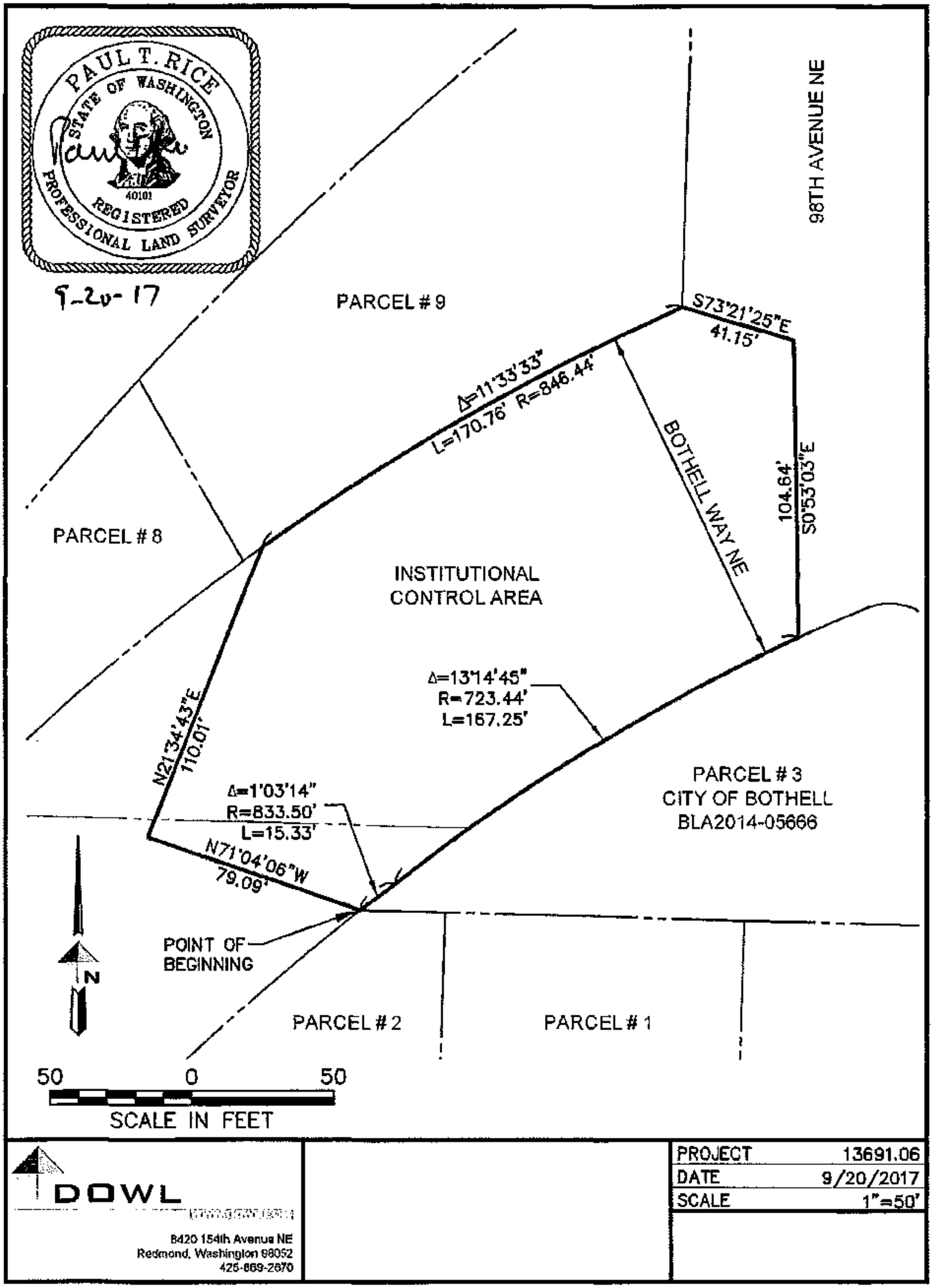

PAUL T. RICE
STATE OF WASHINGTON
40101
REGISTERED
PROFESSIONAL LAND SURVEYOR
9-20-17
PARCEL # 9
98TH AVENUE NE
S73°21'25"E
41.15'
Δ=11°33'33"
L=170.76' R=846.44'
BOTHELL WAY NE
104.64'
S0°53'03"E
PARCEL # 8
INSTITUTIONAL
CONTROL AREA
Δ=13°14'45"
R=723.44'
L=167.25'
N21°34'43"E
110.01'
PARCEL # 3
CITY OF BOTHELL
BLA2014-05666
Δ=1°03'14"
R=833.50'
L=15.33'
N71°04'06"W
79.09'
POINT OF
BEGINNING
N
PARCEL # 2
PARCEL # 1
50 0 50
SCALE IN FEET
DOWL
8420 154th Avenue NE
Redmond, Washington 98052
425-869-2670
PROJECT 13691.06
DATE 9/20/2017
SCALE 1"=50'

EXHIBIT C

THAT PORTION OF THE EXISTING NE BOTHELL WAY RIGHT-OF-WAY, SAID RIGHT-OF-WAY LYING WITHIN THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 7, TOWNSHIP 26 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY WASHINGTON, SAID PORTION BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

INSTITUTIONAL CONTROL AREA:

COMMENCING AT THE MOST NORTHERLY CORNER OF PARCEL # 6 OF CITY OF BOTHELL BOUNDARY LINE ADJUSTMENT NO. BLA2014-05666, RECORDED UNDER KING COUNTY RECORDING NUMBER 20150819900001, SAID CORNER LYING ON THE SOUTHERLY RIGHT-OF-WAY LINE OF MAIN STREET;

THENCE SOUTH 85°18'53" WEST, ALONG SAID SOUTHERLY RIGHT-OF-WAY LINE, A DISTANCE OF 68.82 FEET TO A CURVE TO THE LEFT HAVING A RADIUS OF 15.00 FEET;

THENCE SOUTHWESTERLY ALONG SAID CURVE, AN ARC LENGTH OF 21.85 FEET THROUGH A CENTRAL ANGLE OF 83°28'40" TO THE EASTERLY RIGHT-OF-WAY LINE OF NE BOTHELL WAY;

THENCE SOUTH 01°50'13" WEST, ALONG SAID EASTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 132.91 FEET;

THENCE NORTH 81°17'09" WEST, A DISTANCE OF 79.22 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUING NORTH 81°17'09" WEST, A DISTANCE OF 42.71 FEET;

THENCE NORTH 0°07'50" EAST, A DISTANCE OF 76.27 FEET;

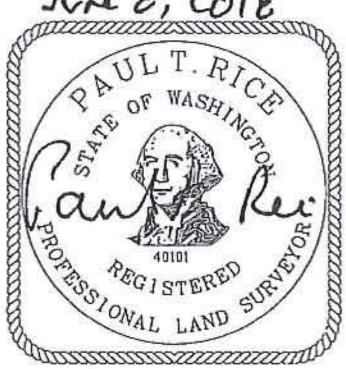
THENCE NORTH 39°05'13" EAST, A DISTANCE OF 7.46 FEET;

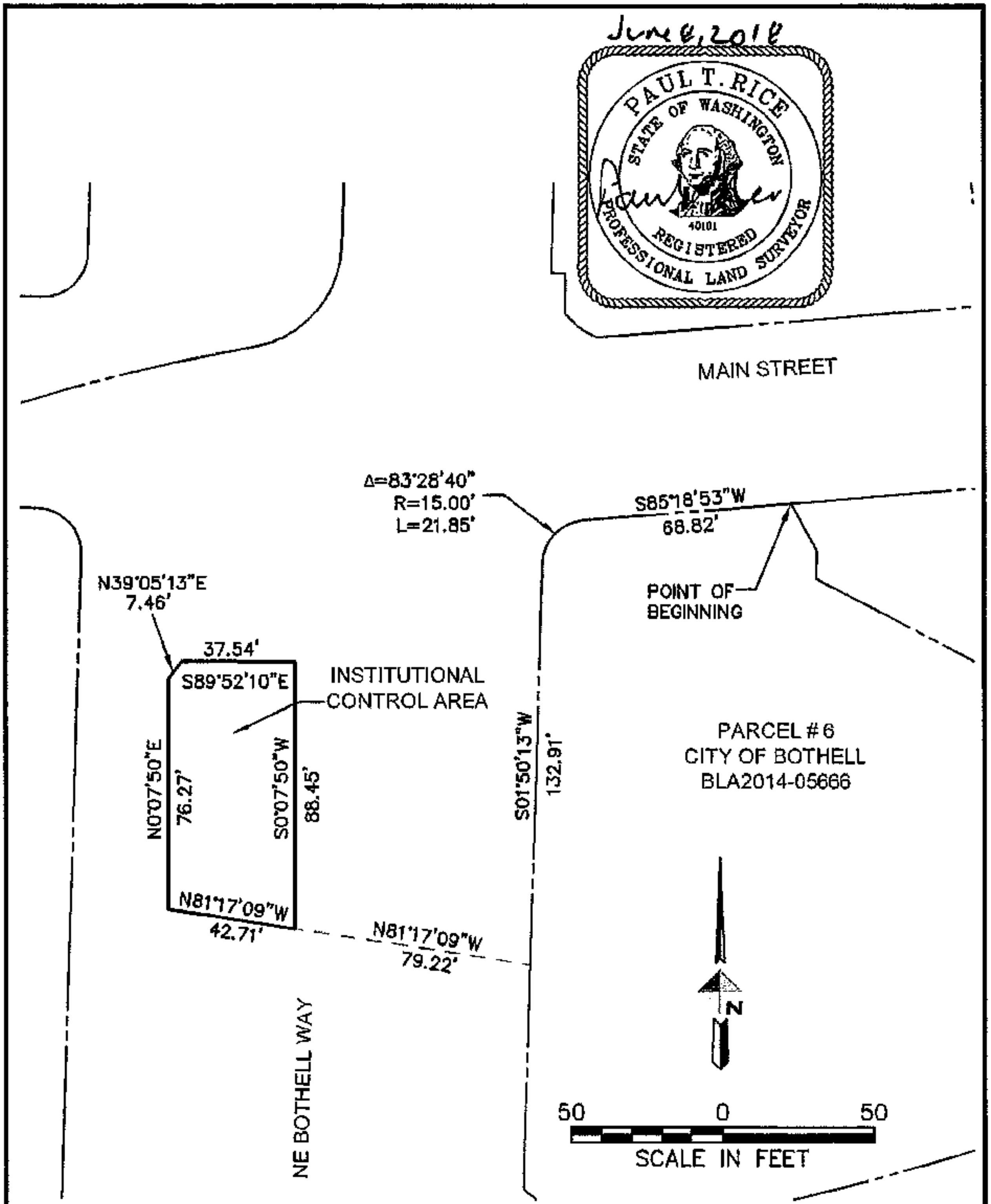
THENCE SOUTH 89°52'10" EAST, A DISTANCE OF 37.54 FEET;

THENCE SOUTH 0°07'50" WEST, A DISTANCE OF 88.45 FEET TO THE POINT OF BEGINNING;

SAID PORTION CONTAINS 3,587 SQUARE FEET, 0.0823 ACRES, MORE OR LESS.

June 8, 2018





DOWL

8420 154th Avenue NE
Redmond, Washington 98052
425-869-2670

PROJECT	13691.06
DATE	6/08/2018
	1"=50'

Exhibit D
Cleanup Agreements and Hazardous Substances in Listed Segments

Bothell Paint & Decorating Site Agreed Order No. DE 15748 (May 31, 2018)

Petroleum hydrocarbons in groundwater
Arsenic in groundwater
Petroleum hydrocarbons in soil

Bothell Former Hertz Site Agreed Order No. DE 15747 (May 31, 2018)

Petroleum hydrocarbons in groundwater
Arsenic in groundwater
Halogenated volatile organic compounds in groundwater
Halogenated volatile organic compounds in soil

Bothell Landing Site Agreed Order No. DE 15746 (June 11, 2018)

Arsenic in groundwater
Petroleum hydrocarbons in soil

Bothell Service Center Simon and Sons Site First Amended Consent Decree No. 18-2-02852-3-SEA (October 31, 2019)

Halogenated volatile organic compounds in groundwater
Petroleum hydrocarbons in groundwater