Draft Cleanup Action Plan

Former Alderwood Laundry and Dry Cleaners
3815 196th Street SW
Lynnwood, Washington
VCP NW3066

for
Lynnwood Public Facilities District

December 22, 2021

GeoEngineers

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File No. 17787-001-15

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ACRONYMS AND ABBREVIATIONS

ALDC	Alderwood Laundry and Dry Cleaners
ARARs	applicable or relevant and appropriate requirements
BETX	benzene, ethylbenzene, toluene and total xylenes
bgs	below ground surface
CAO	cleanup action objective
CAP	Cleanup Action Plan
CID	Contained-in Determination
City	City of Lynwood
COC	contaminants of concern
DCA	Disproportionate Cost Analysis
DCE	dichloroethylene
Ecology	Washington State Department of Ecology
FS	Feasibility Study
ft/ft	feet per foot
HVOC	halogenated volatile organic compound
MTCA	Model Toxics Control Act
NAVD	North American Vertical Datum
PCE	tetrachloroethylene
PFD	Public Facilities District
RCW	Revised Code of Washington
RI	Remedial Investigation
ROW	Right-of-Way
SEPA	State Environmental Policy Act
TCE	trichloroethylene
TCH	Thermal Conduction Heating
TEE	Terrestrial Ecological Evaluation
WAC	Washington Administrative Code
WES	Washington Energy Services
µg/m^3	micrograms per cubic meter
µg/L	micrograms per liter

1.0 INTRODUCTION

This document presents the draft Cleanup Action Plan (DCAP) for the former Alderwood Laundry and Dry Cleaners (ALDC) Site (Site) located at 3815 - 196th Street SW in Lynnwood, Washington (Figure 1). The Lynnwood Public Facilities District (PFD) is conducting an independent cleanup of the Site under the Washington State Department of Ecology's (Ecology's) Voluntary Cleanup Program (VCP No. NW3066) in accordance with the requirements of the Model Toxics Control Cleanup Act (MTCA). The Site is defined as the locations where contamination is present from historical releases of dry cleaner-related chlorinated solvents associated with the former ALDC operations. Based on the results of environmental studies performed to date, soil, soil vapor and groundwater contamination at the Site primarily consists of tetrachloroethylene (PCE), and to a lesser extent with PCE breakdown products, including trichloroethylene (TCE) and cis- and trans-1,2-dichloroethylene (DCE).

This CAP has been prepared pursuant to the requirements of the MTCA administered by Ecology under Chapter 173-340 of the Washington Administrative Code (WAC). This CAP provides a description of the proposed cleanup action and sets forth functional requirements that the cleanup must meet to achieve the cleanup action objectives for the Site.

1.1. General Property/Site Information

The Site is contained within Snohomish County Tax Parcels 372600400602, 372600401603 and 372600401604 owned by the Lynnwood PFD (herein referred to as the "PFD Property") and extends into the eastern portion of the west-adjacent Washington Energy Services (WES) Property located at 3909 - 196th Street SW (Snohomish County Tax Parcel 372600401701). Figure 2 shows these tax parcel locations relative to the former ALDC footprint. The PFD Property comprises a total area of approximately 13 acres while the west-adjacent WES Property comprises approximately 2.5 acres. The PFD Property is currently developed with the Lynnwood Convention Center and with other structures used by restaurants, retail spaces and offices. Significant portions of the PFD Property are developed with surface parking. An approximately 100-foot-long by 60-foot-wide by 26-foot-deep underground stormwater infiltration facility is present beneath the parking area located west of the Convention Center building (Figure 2). The west-adjacent WES Property is developed with a commercial office and warehouse building used by WES for heating/cooling/ plumbing product sale and services.

The PFD Property is situated in the southwest quarter of Section 15, Township 27, and Range 4. The PFD Property is platted within the Alderwood Manor block in Snohomish County, Washington. Addresses of current businesses located on the PFD Property include 3711, 3715, 3717, 3805, 3815 and 3819 - 196th Street SW, Lynnwood, Washington. The PFD's mailing address is 3711 - 196th Street SW, Lynnwood, Washington. The geographic coordinates of the PFD Property are N 47° 49' 18.77"and W 122° 17' 06.09".

1.2. Regulatory Framework

Environmental studies completed at the Site since 2001 have identified dry cleaner-related chlorinated solvents (PCE, TCE and DCE) associated with former ALDC operations in soil, soil vapor and groundwater at concentrations of regulatory concern. The PFD is undertaking an independent cleanup under Ecology's Voluntary Cleanup Program (VCP No. NW3066). The Site is also identified in Ecology's database with Facility Site ID Number 17078 and Cleanup Site ID Number 12845.

Activities completed to date include evaluating the nature and extent of contamination in the affected media on a Site-wide basis (Remedial Investigation [RI]), and developing and evaluating cleanup alternatives for addressing the identified contamination in the affected media (Feasibility Study [FS]). Detailed descriptions of the previous environmental studies completed, evaluation of the nature and extent of contamination, and selection process for a preferred remedial alternative meeting the MTCA threshold requirements as well as other MTCA requirements (e.g., use of permanent solutions to the maximum extent practicable, reasonable restoration time frames and considerations for public concerns) are presented in the RI Report (GeoEngineers 2018), subsequent RI Addenda (GeoEngineers 2019 and GeoEngineers 2021a), and FS Report (GeoEngineers 2021b). These reports have been reviewed and commented by Ecology through the VCP.

1.3. Purpose and Objectives

A CAP is required as part of the Site cleanup process under MTCA regulations (Chapter 173-340 WAC). The purpose of the CAP is to identify the proposed final cleanup action for the Site. More specifically, this CAP presents the following:

- Description of the Site.
- Summary of current Site conditions.
- Summary of the cleanup action alternatives considered in the remedy selection process.
- Description of the selected cleanup action for the Site and the rational for selecting the alternative.
- Identification of Site-specific cleanup levels and points of compliance for each hazardous substance and media of concern for the proposed cleanup action.
- Identification of applicable state and federal laws for the proposed cleanup action.
- Identification of residual contamination expected to remain in place after the active cleanup and restrictions on future uses and activities to ensure continued protection of human health and the environment.
- Discussion of compliance monitoring requirements.
- Schedule for implementing the selected cleanup action.

1.4. Cleanup Action Determination

The selected cleanup action presented in the FS (further discussed below) complies with the requirements for remedy selection under WAC 173-340-360. These requirements include a cleanup action that will be protective of human health and the environment, comply with federal and state requirements that are applicable or relevant and appropriate, comply with cleanup standards, provide for compliance monitoring, use permanent solutions to the maximum extent practicable, provide for a reasonable restoration time frame, and consider public concerns.

2.0 SUMMARY OF SITE CONDITIONS

2.1. Historical Operations and Land Use

The PFD Property was initially developed with residences in the late 1940s. In the early 1960s, the residences were removed and commercial buildings, including the existing office/retail space building along the western margin of the PFD Property and multi-tenant retail strip mall buildings located in the southwest portion of the PFD Property, were constructed. By the mid-1970s, two additional retail/commercial buildings were constructed in the northern and eastern portions of the PFD Property. The Lynnwood Convention Center was constructed in 2004. Office, retail, commercial, strip mall and Convention Center building locations are shown relative to the Site on Figure 2.

Between 1963 and 1982, a laundry and dry-cleaning facility operated in the southernmost tenant space of the strip mall building in the southwest portion of the PFD Property. The dry cleaner business used various names including "Alderwood Highland Center Laundry" and "Alderwood Laundry and Dry Cleaners." The initial lease signed in 1963 indicated the use of the facility as an "automatic laundry and dry-cleaning establishment" which included the use of coin-operated machines.

The physical address of the ALDC varied over the years, however, there is no indication the ALDC relocated to any tenant space other than the one at the south end of the strip mall building. Prior ALDC addresses included 3811, 3815 and 3817- 196th Street SW, and some architectural drawings were mis-filed under the address 3805 - 196th Street SW, which is the address of the standalone restaurant building now occupied by Kona Kitchen.

2.2. Current Operations and Land Use

Office/retail/commercial use of the strip mall has continued to the present day with multiple different business tenants over the years. Currently, the Bamboo Tree restaurant occupies the southern tenant space of the strip mall building, corresponding approximately to the footprint of the former ALDC. Other current strip mall tenants in spaces situated north of the restaurant are Carniceria Grocery, Tropical Tan Salon and an administrative office. A significant portion of the PFD Property comprises paved surface parking which is used by the strip mall building tenants and visitors and Convention Center guests. None of the building structures at the Site have below-grade basements.

In 2018, the building previously occupied by the Alderwood Veterinary Clinic situated immediately south of the strip mall building and west of the Kona Kitchen restaurant (parcels 00372600401603 and 00372600401604; Figure 2) was demolished. Following demolition, fill material was placed within the footprint of the former building and graded to match surrounding grades and the area was paved for use as surface parking.

2.3. Future Land Use

According to the City of Lynnwood's (City) zoning map, the PFD Property and adjacent properties are zoned as City Center Core. This zoning corresponds to mixed use, business and residential. The PFD plans to demolish the strip mall building within approximately the next two years. The long-term redevelopment plans for the PFD Property have not yet been established but could include construction of new hospitality-related structures and/or mixed-use commercial/residential structures. Currently, there are no redevelopment plans for the WES Property, and it is anticipated for the purposes of this DCAP that this property will continue to be used for heating/cooling/plumbing products sale and services.

2.4. Environmental Studies

Multiple phases of environmental studies have been completed to evaluate Site conditions and characterize the nature and extent of contamination resulting from historical releases from the former ALDC. The RI Report describes environmental studies performed prior to 2017. Subsequent environmental studies performed in May 2019 (GeoEngineers 2019), February 2020 (GeoEngineers 2020) and April 2021 (GeoEngineers 2021) were completed to further evaluate soil, soil vapor and groundwater conditions at the Site. Additionally, a pilot-scale study to evaluate in-situ treatment using enhanced bioremediation and biochemical reduction technologies has recently been completed. In-situ treatment and monitoring activities completed as part of the pilot scale study to date are summarized in the Post-Injection Remedial Pilot Study Groundwater Monitoring Results Report (Appendix A). Preliminary results from the pilot scale study are being used to provide an evaluation of the radius of influence (ROI) to support planning and design for the full-scale cleanup action (discussed in Section 5.0).

The purpose of the RI was to collect and evaluate sufficient information to allow the development and selection of an appropriate cleanup action for the Site. Site conditions based on the RI are summarized in the following sections (Section 2.4.1 through 2.4.4). The nature and extent of PCE and TCE contamination in soil, soil vapor and groundwater based on the RI through April 2021 are shown in plan view on Figures 3 through 5, and in generalized geologic cross-sections on Figures 6 through 9.

2.4.1. Surface Conditions

Ground surface elevations at the Site and surrounding area range between approximately 430 and 450 feet (North American Vertical Datum [NAVD] 88; Figure 2). Ground surface elevations are highest (Elevation 450 feet) at the northwest corner of the WES Property and gradually slope downward to the south and southeast toward 196th Street SW. The southeast portion of the PFD Property is at approximately Elevation 430 feet. Between the WES and PFD Properties, there is an approximate 8-foot grade change with the WES Property being higher than the PFD Property. A vegetated slope separates the PFD Property boundary and west-adjacent WES Property. The vegetated slope ranges from approximately 10 to 20 feet wide along the property boundary with the widest section located west of the former dry cleaner space. A timber wall and a rockery wall support slope stability in the northwest and southwest portions of the PFD Property.

2.4.2. Soil Conditions

Site soils consist of a shallow fill layer extending from the ground surface to a depth ranging between approximately 3 and 6 feet below ground surface (bgs) overlying native glacial till deposits. The fill layer generally consists of silty sand with occasional gravel. The underlying glacial till deposits consist of medium dense silty sand with varying gravel content and occasional cobbles, becoming very dense with depth. The upper portion of the glacial till is weathered and may represent reworked native soil/fill. Weathered glacial till is generally encountered within the upper 8 to 15 feet and decreases in thickness from northwest to southeast. The glacial till extends to the base of the completed explorations to approximate depths of 40 to 58 feet bgs. Sand-rich beds or zones within the glacial till were encountered at approximate depths of 35 to 40 feet, which correspond to observed groundwater at the Site (further discussed in Section 2.4.4). As part of the most recent field investigation in April 2021, a significant silt/confining layer was encountered at approximately 58 feet bgs at MW-3-Deep (Figure 6).

Soil samples collected as part of the RI were submitted for chemical analysis to evaluate the nature and extent of contamination at the Site. PCE and breakdown were detected in soil samples obtained in the vicinity of the former dry cleaner at concentrations greater than MTCA cleanup levels at depths ranging from approximately 2 to 45 feet bgs. The nature and extent of soil contamination based on the results of the RI are shown on Figures 3 and 6 through 9.

2.4.3. Soil Vapor Conditions

2.4.3.1. PFD Property

Sub-slab soil gas sampling was conducted in April 2021 at the PFD Property strip mall building to evaluate the potential for vapor intrusion (VI). As part of this investigation, seven sub-slab soil vapor samples, SV-1 through SV-7, were obtained beneath the strip mall concrete slab-on-grade (Figure 4). Results of the sub-slab sampling identified concentrations of PCE in soil vapor samples SV-2, SV-3, SV-4 and SV-7 at concentrations exceeding the sub-slab soil vapor screening levels for commercial (1,700 micrograms per cubic meter [µg/m^3]) and residential (320 µg/m^3) use. The detected concentration of TCE in one sample, SV-2, also exceeded the sub-slab soil vapor screening levels for commercial (110 µg/m^3) and residential (11 µg/m^3) use. Other PCE breakdown products were not detected in the April 2021 sub-slab soil vapor samples collected. In general, the detected PCE/TCE concentrations in sub-slab soil vapor were the highest along the western portion of the strip mall building in the vicinity of the former ALDC and north adjacent tenant spaces.

Although the results of the April 2021 sub-slab soil vapor investigation identified exceedances of the residential and commercial sub-slab screening levels, indoor air samples collected in 2013 representing "worst case" locations within the strip mall building were less than the indoor air cleanup levels (see Section 3.1.2) except for vinyl chloride (VC) detected within the Carniceria Grocery at a concentration that only slightly exceeded the indoor air cleanup level. However, VC has not been detected in soil, soil vapor or groundwater samples collected from the Site, and therefore, is not likely attributed to historical dry cleaner releases. An evaluation of indoor air and soil vapor is underway as of November 2021. The results of the indoor air study will be used to verify worker protection based on current Site use (i.e., commercial worker scenario) and to support planning and design for the full-scale cleanup action (discussed in Section 5.0).

Sub-slab soil vapor and indoor/outdoor air quality monitoring results for the strip mall building based on the RI through April 2021 are shown on Figure 4.

2.4.3.2. WES Property

In September 2016, GeoEngineers obtained a soil vapor sample at SG-1 (Figure 4) at a depth of approximately 5 feet bgs which corresponded to the location of monitoring well MW-7 in which PCE was detected in groundwater at a concentration greater than the MTCA screening level for the protection of indoor air. At this location, PCE in the soil vapor sample was detected at a concentration of 14,800 µg/m^3 which exceeded the sub-slab soil vapor screening level for both commercial and residential use. Subsequent sub-slab soil vapor sampling beneath the WES building in March 2019 identified concentrations of PCE greater than the sub-slab soil vapor screening level for both commercial and residential use at multiple locations within the footprint of the building (Figure 4). Concentrations of TCE were below the MTCA sub-slab soil vapor screening level for both commercial and residential use at each of the locations sampled.

In conjunction with the sub-slab soil vapor sampling, indoor and outdoor air samples were also collected to evaluate risk for VI into the WES building. March 2019 and February 2020 indoor and outdoor air sampling

results for the WES Building were less than the MTCA cleanup levels for indoor air, except for location IA-1 positioned in the southern portion of the WES building (Figure 4). However, the detected PCE and TCE concentrations at this location were less than the acceptable indoor air exposure thresholds of 51 and 3.2 µg/m^3, respectively, calculated for a commercial worker which assumes an adult operating within the building for 10 hours per day, 250 days a year for 20 years. In addition, analytical modeling to predict indoor air concentrations for the WES building based on the sub-slab soil vapor concentration at SG-1 yielded a result of 19 µg/m^3 for PCE which is also less than the acceptable indoor air exposure threshold for a commercial worker.

Sub-slab soil vapor and indoor/outdoor air quality monitoring results for the WES Building based on the RI are shown on Figure 4.

2.4.4. Groundwater Conditions

Two water-bearing zones were identified at the Site as follows:

- A shallow water-bearing zone perched within the weathered glacial till layer located between approximately 8 and 21 feet bgs, and
- A deeper water-bearing zone contained in the identified sand-rich beds of the glacial till layer located between approximately 35 to 58 feet bgs.

Based on the results of the RI, the perched zone appears to be discontinuous in nature. The deeper water-bearing zone has a relatively flat gradient with groundwater elevations ranging between 398.61 and 402.26 feet. The deeper water-bearing zone is located above a confining silt-rich layer identified at MW-3-Deep which is suspected to be continuous across the Site. Within the deeper water-bearing zone, groundwater flow direction is generally oriented to the west/southwest, with a horizontal hydraulic gradient of 0.0005 feet per foot (ft/ft) based on data from MW-1 and MW-10. The corresponding estimated average linear groundwater velocity calculated based on the available data and soil type range between approximately 0.0026 and 0.0029 feet per day (approximately 0.95 to 1.08 feet/year).

Groundwater samples collected as part of the RI identified concentrations of PCE and related contaminants exceeding MTCA cleanup levels beneath the former dry cleaner. PCE contaminated groundwater extends to the north and south and to the west beneath the eastern portion of the WES Property. The results of the groundwater monitoring data coupled with the presence of dense glacial till soil, a relatively flat groundwater gradient and number of years since the dry cleaner last operated (more than 30 years ago), suggest that contaminants in groundwater have likely reached equilibrium conditions.

The nature and extent of groundwater contamination based on the RI is shown on Figures 5 through 9.

2.5. Human Health and Environmental Concerns

2.5.1. Source of Contamination

Based on the results of the RI, the source of PCE and associated breakdown products detected in soil, soil vapor and groundwater at the Site is historical releases from the former ALDC which operated at the southern portion of the strip mall building between approximately 1963 and 1982. No other obvious sources of PCE were identified at the western-adjacent WES Property.

PCE at the Site was likely introduced into the subsurface through one or more of the following:

- Leaks from dry cleaning equipment inside the building;
- Spent solvents discharged to sewer drains with leaky underground piping (possible clay pipes or from fissures, cracks or at pipe joints);
- Poor housekeeping practices whereby spent solvents may have been dumped on the pavement directly outside the dry cleaner back door or onto nearby unpaved areas;
- Leaks, spills, drips or leaching of spent solvent from used dry cleaning equipment filters or solvent containers placed into the refuse dumpster in the southwest portion of the PFD Property near the former dry cleaner space; and/or
- Stormwater runoff contacting spent solvent residues on the ground or in the dumpster and flowing into the storm drain in the southwest portion of the PFD Property near the former dry cleaner space (followed by leaks from the storm drain at cracks or pipe joints).

The RI results indicate that the dry-cleaner solvents (primarily PCE and to a lesser extent its breakdown products TCE and DCE) released at the source area (former ALDC) leached through the soil column contacting the discontinuous shallow perched and deeper water-baring zones and then migrated downgradient from the source area.

The highest PCE concentrations in soil are detected at depths ranging from 4 to 45 feet bgs, beneath and in the immediate vicinity of the former ALDC footprint. The highest PCE concentrations in groundwater are detected in areas located downgradient of the former dry cleaner. The presence of PCE as dense non-aqueous phase liquid (DNAPL) has not been identified beneath the former dry cleaner building or nearby areas at the Site and is unlikely to be present based on the concentrations of PCE found in soil and groundwater at the Site.

2.5.2. Contaminants of Concern

Contaminants of concern (COCs) include potentially hazardous or toxic compounds, which have a history of use at the Site, or which were detected in environmental media during environmental investigations. Potential COCs were evaluated during the RI including benzene, ethylbenzene, toluene and xylenes (BETX), petroleum hydrocarbons (gasoline-, diesel- and lube oil-range hydrocarbons) and chlorinated solvents (HVOCs). The findings of the RI confirmed that petroleum hydrocarbons and BETX are not Site COCs. The findings for the RI also confirmed that PCE is the most frequently detected chlorinated solvent, followed by TCE, cis-DCE and trans-DCE and each of these is retained as a Site COC. Although VC was not detected in soil, soil vapor or groundwater during prior RI studies, VC is retained as a Site COC because it is a breakdown product of PCE.

2.5.3. Media of Concern

Soil and groundwater are media of concern. Additionally, soil vapor which has the potential for intrusion and inhalation by commercial workers, site visitors and/or future occupants is also a media of concern for the Site.

2.5.4. Potential Exposure Pathways and Receptors

Based on current conditions and anticipated future Site use, potential exposure pathways and receptors for Site COCs include:

- **Site workers, visitors and/or future occupants in contact with soil** – The majority of the Site is covered by pavement or buildings except for a few localized areas of landscaping, which has at least 3 or more inches of topsoil or vegetative cover at the surface. The opportunity for direct contact exposures to soil under current conditions is limited to construction or utility workers involved in underground utility work at the Site. Although the opportunity for direct exposure to individuals other than Site workers is limited, the soil PCULs are based on unrestricted land use to be protective of visitors and/or future occupants that may come in contact with the soil under future Site uses.
- **Soil to groundwater transport pathway** – PCE and breakdown products likely leached from soil through the vadose zone to the water table. Dissolved-phase PCE was identified in discontinuous zones of perched groundwater at approximate depths of 8 to 21 feet bgs and in deeper groundwater at approximate depths of 27 to 51.5 feet bgs.
- **Site workers in contact with groundwater** – Groundwater at the Site is not currently nor anticipated to be a future source of drinking water. Therefore, the opportunity for direct contact exposures to groundwater is limited to construction or utility workers involved in underground utility work at the Site. Construction workers could be exposed to groundwater during future Site redevelopment.
- **Ingestion of groundwater as drinking water** – Although groundwater is not a current source of drinking water, it cannot be ruled out as a potential future source.
- **Soil vapor intrusion and indoor air inhalation by commercial workers, visitors and/or future occupants** – Soil vapor (i.e., the air in the pore space between soil grains in the unsaturated zone) can be affected by volatilization of PCE and other breakdown products from soil or groundwater. The risk of exposure from soil vapor is by intrusion/seepage from the source area into the indoor air and subsequent inhalation by commercial workers, visitors and/or future occupants.

A terrestrial ecological evaluation (TEE) performed as part of the RI determined that the Site is excluded from the MTCA TEE requirement because "there is less than 1.5 acres of contiguous, undeveloped land on the Site or within 500 feet of any area of the Site (WAC 173-340-7491[1][c][i])." Therefore, contamination at the Site does not pose a risk to terrestrial ecological receptors due to the extensive commercial development and surface pavement present in the surrounding area.

3.0 CLEANUP REQUIREMENTS

3.1. Cleanup Standards

3.1.1. Soil Cleanup Standards

Soil screening levels were developed during the RI based on zoning (i.e., City Center Core/commercial and retail), current and anticipated future land use, and the potential exposure pathways and receptors described in Section 2.5.4. Soil screening levels were selected based on the most conservative (lowest) published values from the following:

- MTCA Method A soil cleanup level for Unrestricted Land Use.
- MTCA Method B cleanup level for direct contact (lowest of carcinogen or non-carcinogen, as appropriate) where there is no Method A cleanup level for a particular compound.

- MTCA Method B vadose zone formula value (Eq. 747-1) for the protection of groundwater where there is no Method A cleanup level for a particular compound.

For the ALDC Site, soil screening levels developed during the RI are established as the soil cleanup levels for the Site.

Soil screening levels considered, and the selected cleanup levels for the ALDC Site are summarized in the following table.

SOIL CLEANUP LEVEL

MTCA Cleanup Level[1]	Units	PCE	TCE	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	VC
Soil Method A – Unrestricted Land Use	mg/kg	0.05	0.03	NE	NE	NE	NE
Soil Method B – Direct Contact	mg/kg	n/a	n/a	4,000	160	1,600	0.67
Soil Method B – Protection of Groundwater	mg/kg	n/a	n/a	0.046	0.078	0.52	0.0017
Selected Soil Cleanup Level	**mg/kg**	**0.05**	**0.03**	**0.046**	**0.078**	**0.52**	**0.0017**

Notes:
[1] MTCA cleanup levels referenced for Ecology's CLARC database (revised February 2021).
mg/kg = milligrams per kilogram
n/a = Not Applicable (cleanup level is based on the Method A value)
NE = Not Established

In accordance with WAC 173-340-740(6)(d), the point of compliance for protection of human health via direct contact is from the ground surface to 15 feet bgs. However, because contaminated groundwater is present at the Site, the point of compliance is throughout the soil column.

3.1.2. Indoor Air Cleanup Standard

Screening levels for indoor air were developed during the RI based on current land use (i.e., commercial), anticipated future land use (i.e., commercial) and per Ecology's December 31, 2019, Opinion Letter (Ecology 2019). The indoor air screening levels were selected based on the most conservative (lowest) published values from the following:

- MTCA Method B indoor air cleanup levels for unrestricted land use.

In addition to the MTCA Method B cleanup levels for unrestricted land use, indoor air screening levels based on a commercial worker scenario were also considered when evaluating potential exposure based on the current land use (see Section 2.4.2.2). In accordance with WAC 173-340-750(1)(b), the cleanup level to protect air quality shall be based on estimates of the reasonable maximum exposure expected to occur under both current and future site use conditions. Therefore, indoor air cleanup levels based on unrestricted land use are established as the cleanup levels based on anticipated future Site use. However,

indoor air screening levels under the commercial worker scenario will be used to evaluate worker protection based on current Site use.

Indoor air cleanup levels and sub-slab screening levels based on current and future site use conditions for the ALDC Site are summarized in the following table.

INDOOR AIR CLEANUP AND SUB-SLAB/GROUNDWATER SCREENING LEVELS

MTCA Cleanup Level[1]	Units	PCE	TCE	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	VC
Indoor Air Method B – Unrestricted Use	µg/m³	9.6	0.33	91.4	NE	18.3	0.28
Indoor Air Method B - Commercial Worker[2]	µg/m³	51	3.2	700	NE	140	1.5
Sub-Slab Soil Gas Method B Screening Level – Unrestricted Use	µg/m³	320	11	3,000	NE	610	9.5
Sub-Slab Soil Gas Method B Screening Level - Commercial Worker[2]	µg/m³	1,700	110	23,000	NE	4,700	50
Groundwater Method B Screening Level – Unrestricted Use	µg/L	24	1.4	130	NE	77	0.34
Groundwater Method B Screening Level – Commercial Worker[2]	µg/L	128	13	993	NE	587	77

Notes:

[1] MTCA cleanup and screening levels referenced for Ecology's CLARC database (revised February 2021).

[2] Commercial worker assumes an adult operating within an occupied space for 10 hours per day, 250 days a year for 20 years.

µg/m³ = micrograms per cubic meter

µg/L = micrograms per liter

NE = Not Established

The point of compliance is ambient air throughout the Site (WAC 173-340-750[6]).

MTCA Method B sub-slab soil gas screening levels and/or MTCA Method B groundwater screening levels (lowest of carcinogen or non-carcinogen, as appropriate for each) will be used in conjunction with the indoor air cleanup level to evaluate potential exposure based on current and future site use conditions (as appropriate).

3.1.3. Groundwater Cleanup Standards

Groundwater screening levels were developed during the RI based on zoning (i.e., City Center Core/commercial and retail), current and anticipated future land use, and the potential exposure pathways

and receptors described in Section 2.5.4. Groundwater screening levels were selected based on the most conservative (lowest) published values from the following:

- MTCA Method A groundwater cleanup level.
- MTCA Method B Standard Formula value (Eq. 720-1 and 720-2) for drinking water (lowest of carcinogen or non-carcinogen, as appropriate) where there is no Method A cleanup level for a particular compound.

For the ALDC Site, groundwater screening levels developed during the RI are established as the groundwater cleanup levels for the Site.

Groundwater screening levels considered, and the selected cleanup levels for the ALDC Site are summarized in the following table.

MTCA Cleanup Level[1]	Units	PCE	TCE	1,1-DCE	Cis-1,2-DCE	Trans-1,2-DCE	VC
Groundwater Method A – Unrestricted Use	µg/L	5	5	NE	NE	NE	0.2
Groundwater Method B Standard Formula Value	µg/L	n/a	n/a	400	16	160	n/a
Selected Groundwater Cleanup Level	**µg/L**	**5**	**5**	**400**	**16**	**160**	**0.2**

Notes:
[1] MTCA cleanup levels referenced for Ecology's CLARC database (revised February 2021).
µg/L = micrograms per liter
n/a = Not Applicable (cleanup level is based on the Method A value)
NE = Not Established

The standard point of compliance for groundwater based on use as a source of drinking water is throughout the Site from the top of the saturated zone to the lowest depth which could be affected by the Site (WAC 173-340-720(8)(b)).

3.2. Applicable and Appropriate Regulatory Requirements

Other regulatory requirements must be considered in the selection and implementation of the cleanup action in addition to the cleanup standards developed through the MTCA process (Section 3.1). MTCA requires the cleanup standards to be "at least as stringent as all applicable state and federal laws" (WAC 173 340-700[6][a]). Besides establishing minimum requirements for cleanup standards, applicable state and federal laws may also impose certain technical and procedural requirements for performing cleanup actions (WAC 173-340-710). Applicable or Relevant and Appropriate Requirements (ARARs) identified for the Site include:

- MTCA and its implementing Cleanup Regulation (RCW 70A.305; Chapter 173-340 WAC)

- Minimum standards for well construction and decommissioning (RCW 18.104; Chapter 173-160 WAC)
- State Environmental Policy Act (SEPA) (RCW 43.21C, Chapters 197-11 and 173-802 WAC)
- Water Pollution Control Act (RCW 90.48)
- National Pollution Discharge Elimination System Program (Chapter 173-220 WAC)
- Solid and Hazardous Waste Management Act (RCW 70A.300)
- Dangerous Waste Regulations (173-303 WAC)
- Washington Clean Air Act (RCW 70A.15)
- Ambient Air Quality Standards (Chapter 173-746 WAC)
- General Regulations for Air Pollution Sources (WAC 173-400)
- Regulation I, Articles 5 and 6 of the Puget Sound Clean Air Agency
- Washington Industrial Safety and Health Act (RCW 49.17)
- Federal Occupational Safety and Health Act (29 Code of Federal Regulations 1910, 1926)
- National Historic Preservation Act (16 USC 470 et seq. Section 106)
- Lynnwood Public Works Permits (wastewater, utilities, Right-of-Way [ROW], industrial waste discharge) and other City requirements as appropriate

In addition to the ARARs listed above, Ecology's underground injection control (UIC) program (Chapter 173-218 WAC) regulates the injection of fluids, as authorized by the Safe Drinking Water Act. Cleanup action alternatives with proposed injection elements will be subject to UIC regulation. Individual injection wells must be registered with Ecology and either receive a program rule authorization or a state discharge permit in order to operate.

4.0 CLEANUP ACTION SELECTION AND ANALYSIS

Development and evaluation of cleanup action alternatives for the Site are presented in the FS Report and are summarized in the following sections.

4.1. Cleanup Action Objectives

The Cleanup Action Objectives (CAOs) consist of chemical- and media-specific goals for the protection of human health and the environment and are intended to assist in the development and evaluation of remedial alternatives. The objective of the cleanup action is to eliminate, reduce, or otherwise control to the extent feasible and practicable, unacceptable risks to human health and the environment that are posed by hazardous substances in contaminated media in accordance with the MTCA cleanup regulation (WAC 173-340) and other applicable regulatory requirements.

Specific CAOs for the Site are to mitigate risks associated with the following potential exposure routes and receptors:

- Direct contact (dermal, incidental ingestion or inhalation) with contaminated soil by construction and/or utilities workers.

- Leaching and migration of contaminants through the soil column to groundwater.
- Direct contact (dermal or incidental ingestion) with contaminated groundwater by commercial workers, visitors and/or future occupants.
- Contaminant migration of soil vapor via vapor intrusion and inhalation by commercial workers, visitors and/or future occupants.

CAOs form the basis for evaluating and selecting remedial technologies and cleanup actions that will be successful and consist of location-, chemical- and media specific goals for protecting human health and the environment. Areas and media requiring cleanup action, remedial technologies screened to meet the CAOs, and selection of the preferred remedy are discussed in the following sections (Sections 4.2 through 4.4).

4.2. Areas Requiring Cleanup Action Evaluation

The results of the RI were used to delineate the nature and extent of Site COCs exceeding the cleanup standards described in Section 3.1. The areas and media requiring remedial alternative evaluation were identified based on locations and concentrations of the PCE and/or breakdown products exceeding the cleanup standards. The media requiring cleanup action evaluation included soil, soil vapor and groundwater. Areas requiring cleanup action evaluation are shown on Figures 3 through 9.

4.3. Remedial Technologies and Cleanup Action Alternatives Considered

Potentially applicable remedial technologies for media of concern (i.e., soil, soil vapor and groundwater) were screened and evaluated for developing cleanup action alternatives in accordance with MTCA requirements (WAC 173-340-350). The screening process identified the most appropriate technologies and process options for addressing Site COCs in the media of concern based on their implementability, reliability, and relative cost. Based on the results of screening, the following remedial technologies were retained for development of cleanup action alternatives:

- Removal of contaminants through soil excavation and offsite permitted disposal.
- Containment and capping including low permeability caps comprised of asphalt or concrete pavement with drainage controls to restrict groundwater flow and contaminant migration.
- In-situ treatment including enhanced anaerobic bioremediation and biochemical reduction, air sparging (AS) and soil vapor extraction (SVE), and thermal conduction heating (TCH).
- Institutional controls including environmental covenants, land use restrictions, groundwater use restrictions and notice to workers, visitors and/or future occupants of site conditions to prevent exposure.
- Monitored attenuation (natural and enhanced) of contaminants in groundwater over time.

From the remedial technology screening process, four alternatives were developed to address Site contamination that meet the MTCA threshold requirements including compliance with the cleanup standards and applicable laws, provision for a reasonable restoration time frame, and use of permanent solutions to the maximum extent practicable.

For the ALDC Site, the following alternatives were evaluated:

- **Alternative 1 (Shallow Source Area Removal and Capping with Institutional Controls and Monitored Natural Attenuation)** consists of shallow source area material removal followed by site restoration in conjunction with containment (i.e., protective caps) and institutional controls to prevent direct contact and the migration of remaining contaminants contained in the subsurface. Soil removal would address the source area on the PFD Property which will be readily accessible following strip mall demolition and allow for worker protection during future redevelopment of the PFD Property. While remediation of residual contamination remaining in place beneath portions of the PFD and WES Properties following source removal relies on natural attenuation processes. Long-term groundwater and vapor monitoring would then be performed to verify plume stability and overall contaminant mass reduction over time, and to evaluate the potential exposure to commercial workers, visitors and/or future occupants from residual contamination remaining in place.
- **Alternative 2 (Shallow Source Area Removal and Capping with In-Situ Enhanced Bioremediation, Biochemical Reduction and Institutional Controls)** consists of shallow source area material removal followed by site restoration in conjunction with in-situ treatment utilizing enhanced bioremediation and biochemical reduction technologies, containment (i.e., protective caps) and institutional controls to prevent direct contact and the migration of remaining contaminants contained in the subsurface. In-situ treatment would focus on the accessible portions of the Site with the highest observed contaminant concentrations (i.e., PFD Property and area east of the WES building) while remediation of residual groundwater contamination beneath the WES building relies on both the transport of biological and chemical reagents in groundwater downgradient from the injection area, and on natural attenuation processes. Performance monitoring would be completed during in-situ treatment to evaluate enhanced bioremediation performance and overall contaminant mass reduction within the treatment area. Long-term groundwater monitoring. Long-term groundwater and vapor monitoring would then be performed to verify plume stability and overall contaminant mass reduction over time, and to evaluate the potential exposure to commercial workers, visitors and/or future occupants from residual contamination remaining in place.
- **Alternative 3 (Shallow Source Area Removal and Capping with In-Situ Air Sparging/Soil Vapor Extraction and Institutional Controls)** consists of shallow source area material removal followed by site restoration in conjunction with AS and SVE, containment (i.e., protective caps) and institutional controls to prevent direct contact and the migration of remaining contaminants contained in the subsurface. In-situ treatment would focus on the accessible portions of the Site with the highest observed contaminant concentrations (i.e., PFD Property and area east of the WES building) while remediation of residual groundwater contamination beneath the WES building relies on both the AS/SVE treatment within the zone of influence and on natural attenuation processes. Performance monitoring would be completed during is-situ treatment to evaluate AS/SVE system performance and overall contaminant mass reduction within the treatment area. Long-term groundwater and vapor monitoring would then be performed to verify plume stability and overall contaminant mass reduction over time, and to evaluate the potential exposure to commercial workers, visitors and/or future occupants from residual contamination remaining in place.
- **Alternative 4 (In-Situ Thermal Conduction Heating with Soil Vapor Extraction, Capping, Monitored Natural Attenuation and Institutional Controls)** utilizes TCH and SVE to remediate soil and groundwater contamination, and institutional controls to prevent direct contact and the migration of remaining contaminants contained in the subsurface. In-situ treatment would focus on the accessible portions of the Site with the highest observed contaminant concentrations (i.e., PFD Property and area east of the WES building) while remediation of residual groundwater contamination beneath the WES building

relies on both thermal treatment within the zone of influence and on natural attenuation processes. Performance monitoring would be completed during in-situ treatment to evaluate THC/SVE system performance and overall contaminant mass reduction within the treatment area. Long-term groundwater and vapor monitoring would then be performed to verify plume stability and overall contaminant mass reduction over time, and to evaluate the potential exposure to commercial workers, visitors and/or future occupants from residual contamination remaining in place.

Specific details regarding alternative development and evaluation are presented in the FS Report.

4.4. Selected Remedy

Each of the cleanup action alternatives were screened relative to MTCA threshold and other requirements in accordance with WAC 173-340-360(2)(a) and (2)(b) and were evaluated according to disproportionate cost analysis (DCA) procedures in WAC 173-340-360(3)(e). Results of the evaluation identified Alternative 2 as the preferred alternative because it meets threshold requirements, uses permanent solutions to the maximum extent practicable, considers public concerns, and provides for a reasonable restoration time frame and is not disproportionate in cost relative to the other alternatives evaluated. In accordance with WAC 173-340-360(4)(f), active remedial measures to the extent practicable are being employed under each remedial alternative to reduce contaminant mass within the source area and prevent exposure to residual contamination remaining in place. However, longer restoration time frames are expected where residual contamination remains in place in inaccessible portions of the Site (i.e., residual contamination beneath the WES Building and at depth within the soil column).

Alternative 2 relies on the removal of shallow source area material to reduce contaminant migration to groundwater as well as prevent human exposure during future redevelopment of the PFD Property. In-situ injection of reagents would then be utilized to treat residual contamination beyond the source removal area within accessible portions of the Site. Remediation of residual contamination within inaccessible portions of the Site (i.e., beneath the WES building) relies on the transport of reagents downgradient of the injection area and natural attenuation processes. Implementation of institutional controls and long-term monitoring will limit potential human exposure and verify contaminant mass reduction over time. The selected cleanup action meets the minimum requirements under WAC 173-340-360(2)(a) as follows:

- **Protects Human Health and the Environment** – The selected remedy will protect human health and the environment on both a short-term and long-term basis. The remedy will permanently reduce the identified risks presently posed to groundwater quality, direct contact and vapor intrusion through a combination of source area removal, containment, in-situ treatment and natural attenuation.
- **Complies with Cleanup Standards** – The selected remedy will comply with the cleanup standards for soil and groundwater at the point of compliance within a reasonable time frame. The selected remedy will also reduce the potential for vapor intrusion that could otherwise affect commercial workers, visitors and/or future occupants. Indoor air conditions at the WES building comply with the screening levels based on the building's current use (commercial worker scenario).
- **Complies with Applicable State and Federal Laws** – The selected remedy will comply with applicable state and federal laws and regulations.
- **Provides Compliance Monitoring** – The selected remedy will include compliance monitoring for soil, soil vapor and groundwater to assess the effectiveness and permanence of the remedy.

The cleanup action also meets the other requirements under WAC 173-340-360(2)(b), as follows:

- **Uses Permanent Solutions to the Maximum Extent Practicable** – The selected remedy utilizes source removal in conjunction with engineering and institutional controls to:
  - Remove the contaminant mass that could otherwise be encountered during future redevelopment.
  - Treat the contaminant mass within the source area impacting groundwater.
  - Isolate and prevent direct contact to the residual contaminant mass remaining in place.
- **Provides for Reasonable Restoration Time Frame** – The restoration time frame for the selected remedy is estimated to be 5–7 years to complete design, permitting, contracting and construction to address shallow source area material within the upper soil horizon that could otherwise be encountered during future redevelopment, install new containment barriers, treat groundwater within the area of the highest observed concentrations through the injection of reagents and implement institutional controls to prevent human exposure to residual contamination remaining in place.
- **Considers Public Concerns** – Implementation of engineering and institutional controls following source area removal will protect human health and the environment and prevent contaminant exposure and thus offset the potential for significant public concerns for the selected remedy.

5.0 DESCRIPTION OF THE CLEANUP ACTION

As discussed in Section 4.4, the selected cleanup action comprises a combination of cleanup technologies which are described below. Specific details of the cleanup action will be developed and presented in an Engineering Design Report (EDR), which will be submitted for Ecology review. A conceptual level design for the selected cleanup action is presented on Figure 10.

5.1. Excavation and Off-Site Disposal of Contaminated Soil

Soil in which the highest concentrations of PCE and/or breakdown products at depths where contaminants could otherwise be encountered during future PFD Property redevelopment will be excavated to a depth of approximately 6 feet bgs following strip mall demolition. The remedial excavation area shown on Figure 10 will result in the removal of approximately 700 square yards of asphalt to access approximately 1,400 in-place cubic yards (yd^3) of contaminated soil exceeding the soil cleanup level. Soil removal activities will be performed using commonly available excavation techniques. During remedial excavation activities, existing utility infrastructure (power, phone, sewer, water, etc.) will be protected in place to the extent practicable and temporarily relocated as necessary to complete the soil removal activities. Shoring to facilitate the remedial excavation is not anticipated to be necessary.

Soil generated by the remedial excavation will be transported from the Site to an approved landfill facility for permitted disposal. Landfill disposal authorization will be obtained using the chemical analytical results from the existing environmental studies. However, additional characterization of the waste stream may be required by Ecology (to support a "Contained-In" determination (CID)) and/or the receiving facility. Additional soil characterization, if required, will be completed during the remedial design. A review of the RI data indicates that contaminant concentrations in the soil generated for disposal will be less than both the federal characteristic waste (WAC 173-303-090) and state-only criteria waste (WAC 173-303-100) thresholds and is therefore likely suitable for disposal to a Subtitle D landfill under a CID from Ecology.

Prior to remedial excavation backfilling activities and/or site redevelopment (future development plans have yet to be determined), soil samples will be obtained to document soil conditions at the final excavation limits. In addition, a vapor barrier/delineator may be placed at the base of excavation to assist in preventing recontamination of clean fill and further reduce the potential for vapor intrusion into any future structures if constructed. During backfilling activities, structurally suitable material will be placed in lifts throughout the remedial excavation area and compacted to meet compaction requirements determined during the remedial design.

5.2. In-Situ Enhanced Bioremediation and Biochemical Treatment

Following strip mall demolition and excavation activities, remaining groundwater contamination will be addressed using in-situ enhanced bioremediation and biochemical treatment methods. In-situ enhanced bioremediation and biochemical treatment has been demonstrated to be an effective treatment technology for chlorinated solvents. As part of the selected cleanup action, reagents (i.e., nutrients, oxygen, or other amendments) will be introduced into the subsurface through injection. The injected reagents are expected to enhance bioremediation of the chlorinated solvents through metabolic reactions and work in conjunction with iron-based reagents to promote in-situ biochemical reduction of PCE and its breakdown products. Reagents for injection will include a combined application of the following to treat the chlorinated solvents:

- **3-D Microemulsion®** is engineered to be applied as a dilute suspension with unique subsurface distribution characteristics. Once emplaced in the subsurface, 3-D Microemulsion is designed to provide a controlled release of organic acids to stimulate reductive dechlorination. 3-D Microemulsion incorporates Regenesis' Hydrogen Release Compound (HRC®) to provide a sequential release of electron donors.
- **Bio-Dechlor INOCULUM® Plus (BDI Plus)** is a natural microbial consortium containing species of Dehalococcoides sp. (DHC). This microbial consortium works to dechlorinate chlorinated ethenes (PCE, TCE, DCE and VC) during the in-situ bioremediation process.
- **Chemical Reducing Solution® (CRS)** is an iron-based reagent that facilitates biogeochemical in-situ chemical reduction of chlorinated ethenes. CRS is a pH-neutral agent that is directly applied with the 3-D Microemulsion solution and provides a soluble source of ferrous iron (Fe2+), which in combination with enhanced anaerobic conditions, can precipitate reduced iron sulfides, oxides, and/or hydroxides. These minerals are capable of treating chlorinated contaminants through abiotic chemical reduction pathways to improve overall efficiency of dechlorination process.

The targeted treatment area shown on Figure 10 encompasses the area with the highest observed soil and groundwater contamination and includes the readily accessible area between the source area and the WES building. Injection depth intervals would target both the shallow perched water-bearing zone (approximately 8 to 12 feet bgs) and the deeper water-bearing zone (approximately 35 to 58 feet bgs). It is anticipated that the zone of treatment influence would likely extend downgradient beneath the WES building through the dispersion and advection of reagents added to groundwater via the injection wells to be situated in the easternmost portion of the WES Property.

Injection equipment will generally consist of a truck- or trailer-mounted pump along with other ancillary equipment (e.g., hoses, valves, gauges, etc.), and portable tanks for mixing and storage of the treatment reagents. The specific equipment required for the injections, reagent quantities and spacing between the injection points will be determined during the remedial design.

The post-injection remedial pilot study groundwater monitoring event results (Appendix A) indicate that the injection of remedial chemicals at well RW-1 may have had some influence at well MW-2, which is located at the edge of the radius of influence for chemical injection. The anticipated radius of influence was 15-20 feet and well MW-2 is located approximately 20 feet from injection well RW-1.

To support remedial design, additional groundwater monitoring is recommended for spring of 2022, when groundwater elevations are likely to be at their highest, at wells MW-2 and RW-1 to further evaluate the change in concentrations of chlorinated solvents and presence/absence of anaerobic conditions along with other geochemical indicators. In addition, a second injection event could be performed at well RW-1 to confirm the radius of influence and efficacy of the chemical injection following demolition of the strip mall which would allow for the installation of a monitoring well in the former building footprint and source area that would be within 10 feet of well RW-1. Due to the number of utilities in the source area and immediate vicinity, many of which branch off the mains in the alley way to each tenant space, an alternative location for additional wells in and around the source area is not currently feasible without extensive preparation to expose the known and unknown utilities.

5.3. Containment of In-Place Contamination

The selected cleanup action for the Site is expected to remove the source area in the vicinity of the former ALDC footprint. Following completion of the source removal activities, in-situ injection of reagents as described above will be performed to treat soil and groundwater within portions of the Site with the highest observed contaminant concentrations and within areas that are readily accessible. For residual contamination remaining in place following in-situ treatment, engineering controls (i.e., pavement and/or buildings will be utilized for the purpose of limiting the direct contact exposure pathway (Section 2.5.4).

Engineering controls will utilize new pavement or other impermeable materials placed within the footprint of the soil removal area and vegetated slope during site restoration, and existing asphalt/concrete pavement in other portions of the Site to prevent stormwater infiltration and contaminant leaching/migration through the underlying soil column as well as to provide a physical barrier to prevent direct contact. In conjunction with the engineering controls, institutional controls requiring maintenance of paved surfaces acting as physical barriers will be implemented as described below.

5.4. Institutional and Other Property Controls

Institutional controls are measures undertaken to limit or prohibit activities that may interfere with the integrity of the cleanup action or that may result in exposures to hazardous substances at the Site. Institutional controls in the form of an Environmental Covenant will be required for portions of the Site in which residual contamination remains in place following implementation of the selected remedy. The Environmental Covenant will impose restrictions to portions of the Site containing residual contamination. It is anticipated the Environmental Covenant will limit disturbances of contaminated soil and groundwater and provide procedures for notification to PFD and WES Property tenants, visitors and future occupants.

Ecology will prepare the Environmental Covenant consistent with WAC 173-340-440 and RCW 64.70 and in consultation with the grantor or other parties. In addition to the Environmental Covenant, Property controls will include an Engineering and Institutional Controls Monitoring and Maintenance Plan (EICMMP). The EICMMP will contain at least the following elements:

- A description of soil, soil vapor and groundwater conditions at the Site including identification of specific areas and depths where contamination remains in place and at what concentration(s).
- Specific handling and management procedures for future subsurface work in areas where contaminated soil and groundwater remains in place.
- Procedures for identifying, processing, and disposing of contaminated soil and/or groundwater encountered during development activities in areas not expected to be contaminated.
- Health and safety protocols specific to the soil and/or groundwater handling and management procedures.
- Protocols for providing necessary data to agencies involved in environmental permitting for future construction activities.
- A description of remedial elements (e.g., pavement and monitoring wells) that will require routine inspection and maintenance.
- The risk of vapor intrusion must be evaluated for any new buildings/structures.
- Vapor barrier is recommended when planning for the new building.

The procedures specified in the EICMMP will be applicable to future property redevelopment or maintenance that involves removal or disturbance of the in-place contaminated soil/groundwater, or disturbance of surface soils or other ground cover that may create opportunity for erosion, if warranted.

5.5. Compliance Monitoring

Compliance monitoring and contingency response actions (as needed) will be implemented in accordance with WAC 173-340-410, Compliance Monitoring Requirements. Detailed requirements will be described in a Compliance Monitoring Plan (CMP) to be prepared as a part of the EDR. The objective of the CMP is to confirm that CAOs have been achieved as well as verify the long-term effectiveness of cleanup action. The plan will discuss the duration and frequency of monitoring, the trigger for contingency response actions, and the rationale for termination of monitoring. The three types of compliance monitoring to be conducted are:

- **Protection Monitoring** to confirm that human health and the environment are adequately protected during the implementation of the cleanup action.
- **Performance Monitoring** to evaluate soil conditions during remedial excavation activities. Performance monitoring will also be performed to evaluate groundwater conditions following injection within the treatment area, document contaminant mass reduction and assess the need for additional round(s) of injection.
- **Confirmation Monitoring** to verify plume stability and attenuation performance of residual groundwater contamination over time as well as to evaluate the potential for vapor intrusion and protection for Site workers, visitors and/or future occupants.

5.5.1. Protection Monitoring

Protection monitoring will be performed to confirm that human health and the environment are adequately protected during implementation of the cleanup action. Personnel engaged in work that involves hazardous material excavation and handling will be required to comply with the provisions of WAC 173-340-810

(MTCA Cleanup Regulation, Worker Safety and Health) and be Hazardous Waste Operations and Emergency Response (HAZWOPER), OSHA, and WISHA certified. In addition, spill prevention, dust depression and pollution control measures will be implemented and maintained throughout the duration of the cleanup action including all necessary stormwater management, surface water runoff control, temporary erosion and sediment control measures to meet the substantive requirements of the applicable local, state and federal regulations.

5.5.2. Performance Monitoring

Performance monitoring will involve collecting samples from the base and sidewalls of the remedial excavation to document soil conditions prior to backfill with the objective of achieving compliance with the soil cleanup levels at the lateral extent of excavation. Based on the RI data, the vertical extent of soil contamination is to an approximate depth of 45 feet bgs; therefore, compliance with the soil cleanup levels will not be achieved vertically by excavation.

Performance monitoring will also include collection of groundwater samples within the treatment area and downgradient under the WES building, utilizing a network of monitoring wells following soil removal activities, restoration and injection of reagents. It is assumed that performance monitoring will initially be completed on a quarterly basis for up to one year following initial reagent injection. Performance monitoring would then be completed on a semi-annual basis targeting the wet season and dry season months to verify plume stability, document contaminant mass reduction over time resulting from in-situ treatment and whether additional injection of reagents is required.

5.5.3. Confirmation Monitoring

Confirmational monitoring will involve the collection of groundwater samples utilizing the existing network of monitoring wells (MW-1, MW-4 through MW-14 and MW-16 and MW-17), newly installed wells (WES building footprint locations and methods to be determined) and replacement monitoring wells (MW-2A and MW-3A) following implementation of the institutional controls for the WES and/or PFD Properties to verify plume stability and attenuation performance of the residual groundwater contamination. Performance criteria based on groundwater screening levels for the protection of vapor intrusion for commercial and unrestricted land use, established by the EDR as appropriate, will be used to evaluate long-term compliance with the cleanup standards. It is assumed that groundwater monitoring will be competed once per Ecology Five Year Periodic Review period over a 15-year duration targeting the dry season months. After this time period, Ecology would be consulted to determine additional groundwater monitoring requirements (if any) for the Site.

Confirmational monitoring will also involve the collection of indoor/outdoor air samples and/or sub-slab soil vapor samples to evaluate the potential for vapor intrusion. Performance criteria based on indoor/outdoor and/or sub-slab soil vapor cleanup/screening levels for commercial/unrestricted land use, established by the EDR as appropriate, will be used to evaluate compliance with the cleanup standards. It is assumed that indoor air and/or soil vapor monitoring would be performed once per Ecology Five Year Periodic Review period over a 15-year duration (consistent with long-term groundwater monitoring activities). After this time period, Ecology would be consulted to determine additional indoor air/sub-slab soil vapor monitoring requirements (if any) for the Site.

5.6. Implementation Schedule

The implementation schedule for the selected cleanup action is assumed to be on the order of approximately 5 to 7 years and will be initiated follow Ecology approval of this CAP and demolition of the strip mall building. During remedial design development, additional groundwater monitoring and/or installation of a new monitoring following building demolition followed by reagent injection and monitoring as proposed above (Section 5.2) would be utilized to refine the restoration time frame estimate as well as performance parameters for in-situ treatment. The selected cleanup action will require development of an EDR, CMP, and bidding/contract documents prior to construction. Following source removal, in-situ treatment, and implementation of the environmental covenant, long-term monitoring and maintenance activities would then be performed to ensure that the CAOs continue to be met.

5.7. Five-Year Review

Because the selected cleanup action described above will result in hazardous substances remaining at the Site at concentrations exceeding cleanup levels, institutional controls in the form of an environmental covenant is included as part of the remedy. It is anticipated that Ecology will conduct a periodic review of Site conditions every 5 years to ensure protection of human health and the environment. Consistent with the requirements of WAC 173-340-420, the 5-year review will include the following:

- A review of the title of the real property subject to the environmental covenant to verify that the covenant is properly recorded.
- A review of available monitoring data to verify the effectiveness of completed cleanup actions, including engineering and institutional controls, in limiting exposure to hazardous substances remaining at the Site.
- A review of new scientific information for individual hazardous substances or mixtures present at the Site.
- A review of new applicable state and federal laws for hazardous substances present at the Site.
- A review of current and projected future land and resource uses at the Site.
- A review of the availability and practicability of more permanent remedies.
- A review of the availability of improved analytical techniques to evaluate compliance with cleanup levels.

Ecology will publish a notice of all periodic reviews in the Site Register and will provide an opportunity for public review and comment. If Ecology determines that substantial changes in the cleanup action are necessary to protect human health and the environment at the Site, contingency actions will be developed in consultation with Ecology for implementation at the Site.

6.0 LIMITATIONS

We have prepared this report for use by the Lynnwood Public Facilities District for the Former Alderwood Laundry and Dry Cleaner Site located at 3815 - 196th Street SW in Lynnwood, Washington. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this document was prepared. No warranty or other conditions, express or implied, should be understood. This document (email, text, table and/or figure) and any attachments are only a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

7.0 REFERENCES

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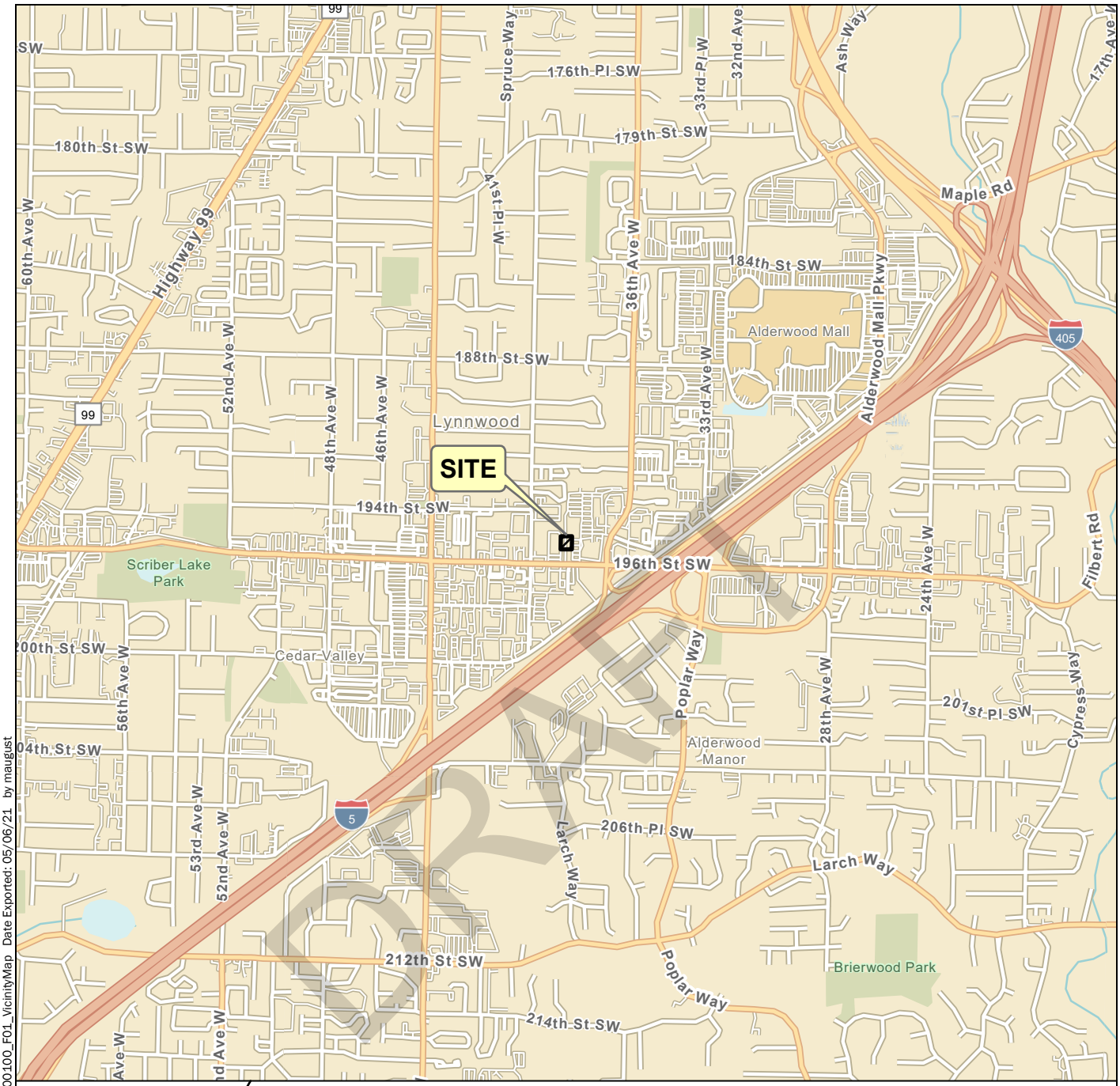

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: ESRI

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Vicinity Map

Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

GeoEngineers

Figure 1

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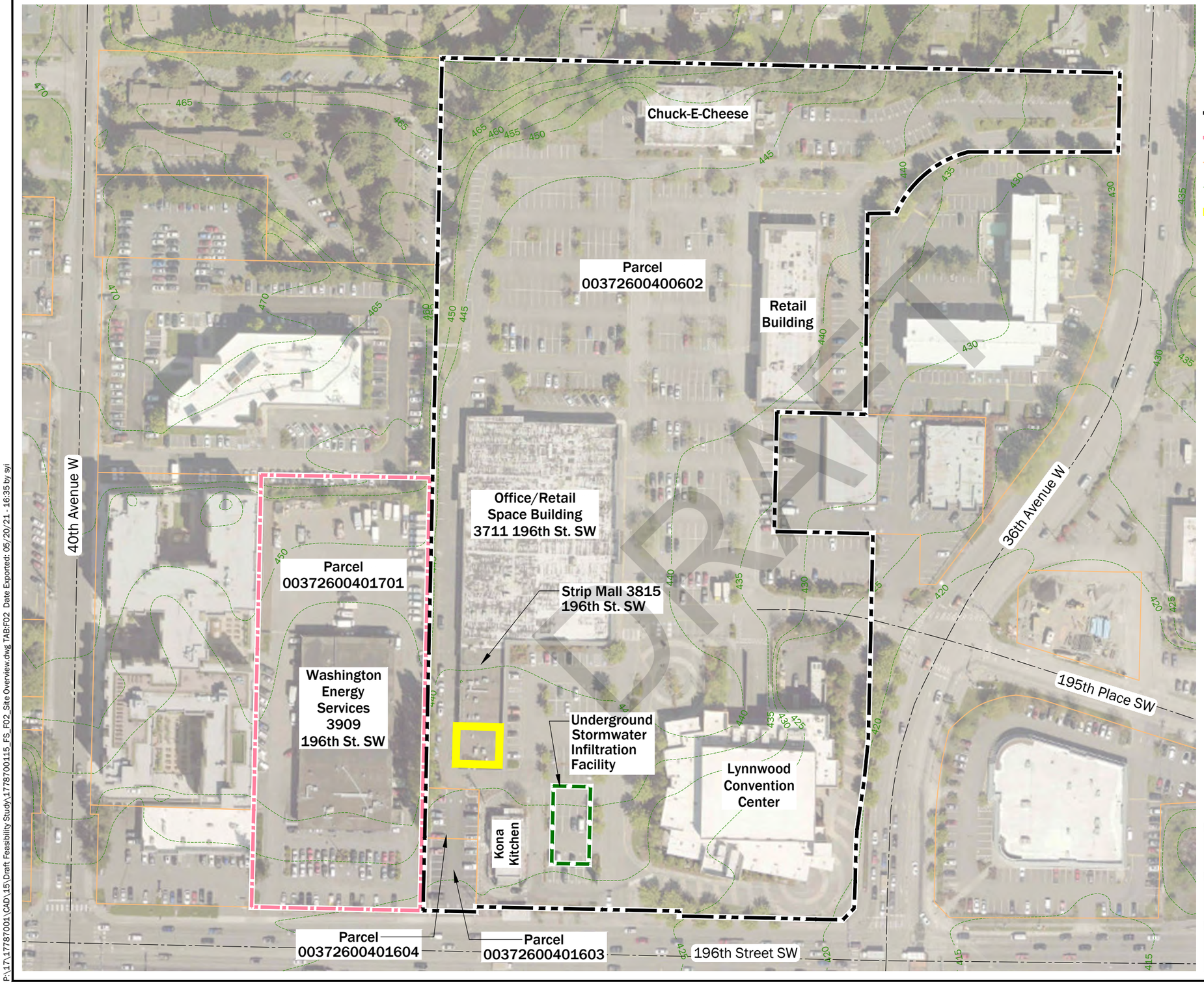

Legend

- Lynnwood Public Facilities District Property Boundary
- West Adjoining Property Boundary
- Parcel Boundary
- Topographic Contour (5-Ft. Interval)
- Approximate Footprint of Former Alderwood Laundry & Dry Cleaners

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial from King County dated 2019 and street centerlines. Topographic contours from Snohomish County GIS Data 2020.

Vertical Datum: NAVD 88.

Projection: NAD83 Washington State Planes, North Zone, US Foot.

N
W E
S

120 0 120
Feet

Site Overview

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

GeoEngineers

Figure 2

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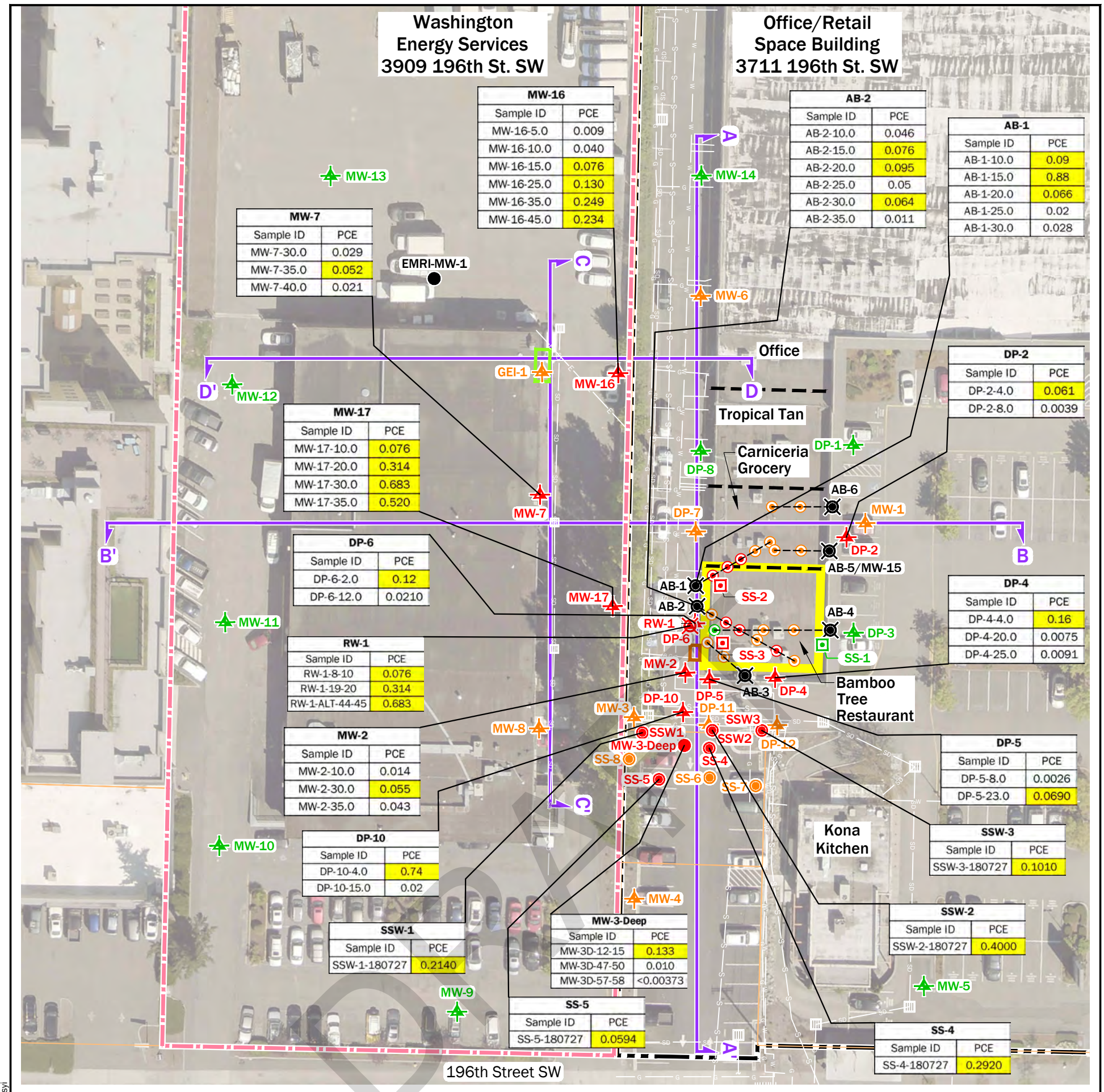


Legend

- DP-6/MW-2 — Exploration - MTCA Method A Cleanup Levels Exceedance for PCE/TCE in Soil
- DP-7/MW-4 — Exploration - HVOCs detected less than MTCA Method A Cleanup Levels in Soil
- DP-1/MW-9 — Exploration - HVOCs Not Detected
- AB-1 — Angled Boring by GeoEngineers, Inc.
- EMRI-MW-1 — Groundwater Monitoring Well by EMRI (1999)
- Soil Sample with PCE detection greater than MTCA Method A Cleanup Level
- Soil Sample with HVOC detections less than MTCA Method A or B Cleanup Levels
- Soil Sample with HVOCs Not Detected
- SSW1 — Confirmation Soil Sample
- MW-3-Deep — Deep Groundwater Assessment Boring with PCE/TCE detection greater than MTCA Method A Cleanup Level
- RW-1 — Pilot Study Injection Well with PCE/TCE detection greater than MTCA Method A Cleanup Level
- SS-2 — Sub Slab Soil Data April 2021 with PCE detection greater than MTCA Method A Cleanup Level
- SS-1 — Sub Slab Soil Data April 2021 with HVOCs Not Detected

- Lynnwood Public Facilities District Property Boundary
- West Adjoining Property Boundary
- Parcel Boundary
- Approximate Footprint of Former Alderwood Laundry & Dry Cleaners
- Backfilled Waste Oil UST Excavation
- Existing Concrete Grease Trap
- Existing Catch Basin
- Existing Storm Drain
- Existing Gas Line
- Existing Sewer Line
- Existing Water Line
- Electric Utility
- A — A' — Cross Section Location

Data Box Explanation:

PCE	Tetrachloroethylene
TCE	Trichloroethylene
ND	Not Detected
MTCA	Model Toxics Control Act
HVOC	Halogenated Volatile Organic Compounds
mg/kg	milligrams per kilogram
0.16	Shading indicates concentration greater than MTCA
DP-4-4.0	Sample Identification; Sample Depth in feet below ground surface

N W E S

50 0 50

Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial from King County dated 2019 and street centerlines. Vertical Datum: NAVD 88. Projection: NAD83 Washington State Planes, North Zone, US Foot.

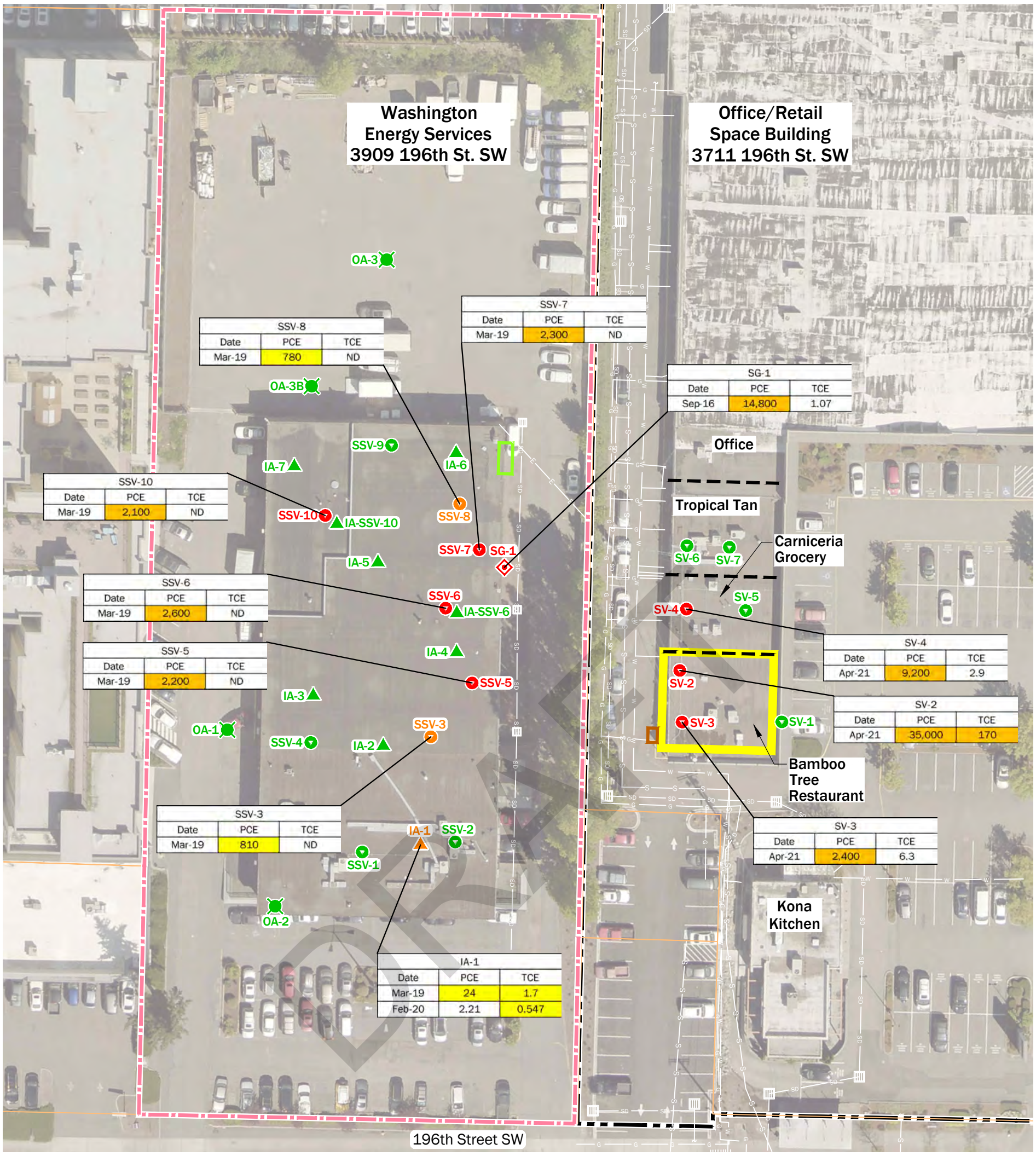
Soil Chemical Analytical Data

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

GeoEngineers

Figure 3

P:\17\17787001\CAD\15\Draft Feasibility Study\17787001115_FS_F04_Soil Chemical Analytical Data.dwg TAB:F04 Date Exported: 05/28/21 - 14:25 by syi



Legend

- SSV-5: Exceedance of the MTCA Soil Gas Screening Level or Indoor Air Cleanup Level for Commercial Workers
- SSV-8: Exceedance of the MTCA Soil Gas Screening Level or Indoor Air Cleanup Level
- SSV-1: No Exceedance of the MTCA Soil Gas Screening Level or Indoor Air Cleanup Level
- SG-1: Soil Vapor Sample Location
- SSV-8: Sub-Slab Soil Gas Sample Location
- IA-1: Indoor Air Vapor Sample Location
- OA-1: Outdoor Air Vapor Sample Location

- Lynnwood Public Facilities District Property Boundary
- West Adjoining Property Boundary
- Parcel Boundary
- Approximate Footprint of Former Alderwood Laundry & Dry Cleaners
- Backfilled Waste Oil UST Excavation
- Existing Concrete Grease Trap
- Existing Catch Basin
- Existing Storm Drain
- Existing Gas Line
- Existing Sewer Line
- Existing Water Line
- Electric Utility

Data Box Explanation:

PCE	Tetrachloroethylene
TCE	Trichloroethylene
ND	Not Detected
MTCA	Model Toxics Control Act
HVOC	Halogenated Volatile Organic Compounds
ug/m^3	microgram per cubic meter
810	Shading Indicates Concentration Greater Than MTCA Soil Gas Screening Level or Indoor Air Cleanup Level
35,000	Shading Indicates Concentration Greater Than MTCA Soil Gas Screening Level or Indoor Air Cleanup Level for Commercial Workers

N W E S

50 0 50
Feet

Notes:

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2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial from King County dated 2019 and street centerlines. Vertical Datum: NAVD 88. Projection: NAD83 Washington State Planes, North Zone, US Foot.

Soil Vapor Chemical Analytical Data

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

GeoEngineers

Figure 4

P:\17\17787001\CAD\15\Draft Feasibility Study\17787001115_FS_F10_Vapor RI Data.dwg TAB:F10 Date Exported: 05/27/21 - 20:33 by syi

Washington Energy Services
3909 196th St. SW

Office/Retail Space Building
3711 196th St. SW

Solvents Not Detected

Solvents Not Detected

EMRI-MW-1		
Date	PCE	TCE
Feb-17	15	ND
Aug-17	19.5	ND
Nov-17	18.0	ND
Feb-18	32.2	ND
May-18	34.6	ND
Nov-19	27.2	ND
Apr-21	37.8	ND

MW-16		
Date	PCE	TCE
May-19	93.1	0.638
Nov-19	90.2	ND
Apr-21	109	1.54

MW-6		
Date	PCE	TCE
Feb-17	33	ND
Aug-17	32.9	ND
Nov-17	35.2	ND
Feb-18	38.8	ND
May-18	35.0	ND
Nov-19	26.6	ND
Apr-21	20.5	0.051

MW-15		
Date	PCE	TCE
Feb-17	78	2.6
Aug-17	55.4	1.77
Nov-17	65.9	1.92
Feb-18	83.2	1.52
May-18	75.0	1.76
Nov-19	26.9	0.650
Apr-21	44.1	1.47
Oct-21	41.5	0.98

MW-12		
Date	PCE	TCE
Feb-17	ND	ND
Aug-17	ND	ND
Nov-17	ND	ND
Feb-18	ND	ND
May-18	ND	ND
Nov-19	ND	ND
Apr-21	0.112	ND

MW-7		
Date	PCE	TCE
Feb-17	230	4.0
Aug-17	309	6.11
Nov-17	296	4.88
Feb-18	321	3.59
May-18	389	7.00
Nov-19	258	4.13
Apr-21	267	5.69

MW-1		
Date	PCE	TCE
Feb-17	ND	ND
Aug-17	3.23	ND
Nov-17	3.24	ND
Feb-18	2.03	ND
May-18	5.60	ND
Nov-19	0.630	ND
Apr-21	1.73	ND

MW-17 Pearched		
Date	PCE	TCE
May-19	35.6	1.80
MW-17 Deep		
May-19	339	6.09
Nov-19	201	4.04
Apr-21	235	6.36
Oct-21	162	4.30

MW-3		
Date	PCE	TCE
Feb-17	84	2.9
Aug-17	192	8.96
Nov-17	129	4.43
Feb-18	119	2.47
May-18	129	4.60
Nov-19	74.3	2.61
Apr-21	107	5.12
Oct-21	74	3.15

RW-1		
Date	PCE	TCE
Apr-21	35.4	1.58

MW-2		
Date	PCE	TCE
Feb-17	210	7.7
Aug-17	196	6.60
Nov-17	222	8.03
Feb-18	192	4.26
May-18	307	9.54
Nov-19	218	8.25
Apr-21	73.3	2.64
Sep-21	99	4.65

MW-3-Deep-40' Grab		
Date	PCE	TCE
Apr-21	20.1	0.914
MW-3-Deep-50' Grab		
Apr-21	12.3	0.520
MW-3-Deep-60' Grab		
Apr-21	2.57	0.110
MW-3-Deep		
Apr-21	0.183	<0.0400

MW-8		
Date	PCE	TCE
Feb-17	47	2.2
Aug-17	46.3	3.00
Nov-17	35.9	3.25
Feb-18	50.7	2.35
May-18	57.2	4.12
Nov-19	62.9	5.26
Apr-21	94.0	6.15
Sep-21	98.7	7.23

MW-4		
Date	PCE	TCE
Feb-17	10	1.3
Aug-17	11.8	2.47
Nov-17	17.1	1.88
Feb-18	16.6	1.13
May-18	14.0	1.62
Nov-19	Not Sampled	
Apr-21	Not Sampled	

MW-9		
Date	PCE	TCE
Feb-17	0.25	ND
Aug-17	0.224	ND
Nov-17	0.424	ND
Feb-18	0.334	ND
May-18	ND	ND
Nov-19	0.748	ND
Apr-21	2.37	0.493

MW-5		
Date	PCE	TCE
Feb-17	1.2	ND
Aug-17	0.815	ND
Nov-17	0.867	ND
Feb-18	0.753	ND
May-18	1.05	ND
Nov-19	0.722	ND
Apr-21	0.287	ND

Solvents Not Detected

Solvents Not Detected

Solvents Not Detected

Not Sampled (Dry)

Office

Tropical Tan

Carniceria Grocery

Bamboo Tree Restaurant

Kona Kitchen

196th Street SW

MW-1 MW-2 MW-3 MW-3-Deep MW-4 MW-5 MW-6 MW-7 MW-8 MW-9 MW-10 MW-11 MW-12 MW-13 MW-14 MW-15 MW-16 MW-17 RW-1 EMRI-MW-1 ZZA-MW-2 ZZA-MW-3

A A' B B' C C' D D'

Legend

- MW-2 — Groundwater Sample with MTCA Method A Cleanup Level Exceedance for PCE/TCE
- MW-1 — Groundwater Sample with PCE/TCE less than MTCA Method A Cleanup Levels
- MW-9 — Groundwater Sample - Solvents Not Detected
- MTCA — Model Toxics Control Act
- HVOC — Halogenated Volatile Organic Compounds
- Extent PCE > 5 ug/L in Groundwater
- Lynnwood Public Facilities District Property Boundary
- West Adjoining Property Boundary
- Parcel Boundary
- Approximate Footprint of Former Alderwood Laundry & Dry Cleaners
- Existing Concrete Grease Trap
- MW-3-Deep — Deep Groundwater Assessment Boring with PCE/TCE detection greater than MTCA Method A Cleanup Level
- RW-1 — Pilot Study Injection Well with PCE/TCE detection greater than MTCA Method A Cleanup Level
- A A' — Cross Section Location
- Existing Catch Basin
- Existing Storm Drain
- Existing Gas Line
- Existing Sewer Line
- Existing Water Line
- Electric Utility

Data Box Explanation:

PCE	Tetrachloroethylene
TCE	Trichloroethylene
ND	Not Detected
ug/L	micrograms per liter

Data boxes are provided for monitoring wells with detections of PCE/TCE.

Shading indicates concentration greater than MTCA.

All concentrations are in micrograms per liter.

N W E S

50 0 50
Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial from King County dated 2019 and street centerlines.. Vertical Datum: NAVD 88. Projection: NAD83 Washington State Planes, North Zone, US Foot.

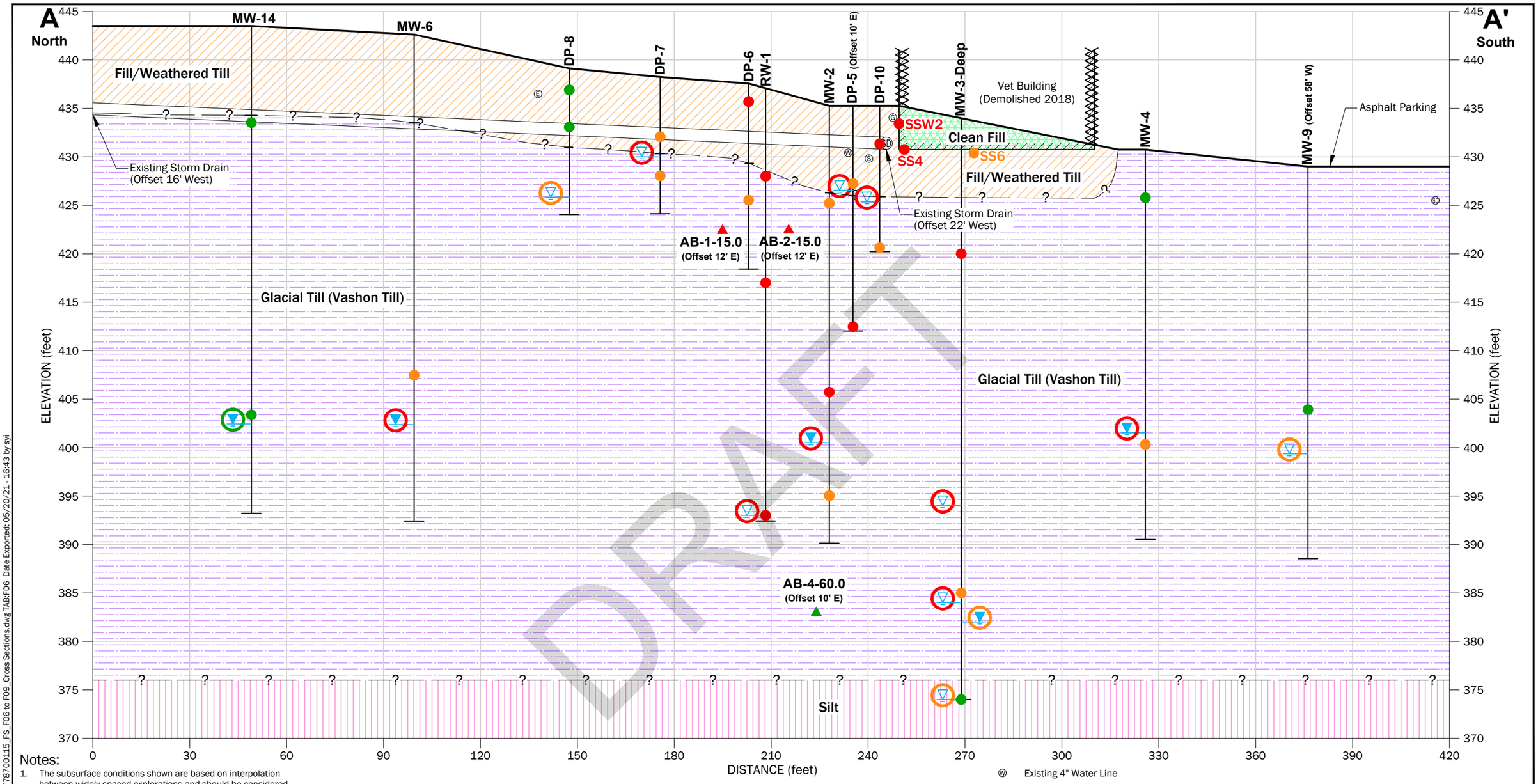
Groundwater Chemical Analytical Data
As of October 2021 (Last Sampled)

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

GeoEngineers

Figure 5

P:\17\17787001\CAD\15\Draft Feasibility Study\17787000115_FS_F05_Groundwater Chemical Analytical Data.dwg TAB:F05 Date Exported: 05/28/21 - 15:35 by syi



DRAFT

Notes:

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Groundwater elevations and chemical data shown are from March 2013, February 2017, and/or April 2021, whichever reflects the most current data available.
4. For clarity of figure, 0 - 5 ' BGS utilities running parallel to the cross section are not shown.

Datum: NAVD 88, unless otherwise noted.

Legend

DP-7 — Exploration and Approximate Location

? — Interpreted Soil Unit Contact Line

Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level

Soil Sample - HVOCs detection less than MTCA Method A Cleanup Level

Soil Sample - HVOCs Not Detected

Angled Boring Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level

Angled Boring Soil Sample - HVOCs Not Detected

Grab Groundwater Sample

Groundwater Sample from Monitoring Well

MTCA — Model Toxics Control Act

PCE/TCE detections greater than MTCA Method A Cleanup Level

PCE/TCE detection less than MTCA Method A Cleanup Level

HVOCs Not Detected

PCE — Tetrachloroethylene

TCE — Trichloroethylene

HVOC — Halogenated Volatile Organic Compounds

Ⓦ Existing 4" Water Line

Ⓢⓓ Existing Storm Drain (Depth Approximated)

Ⓢ Existing 8" Sanitary Sewer Line (Depth Approximated)

Ⓖ Existing Gas Line

Ⓔ Electric Utility

30 0 30
Horizontal Scale in Feet

10 0 10
Vertical Scale in Feet
Vertical Exaggeration: 3X

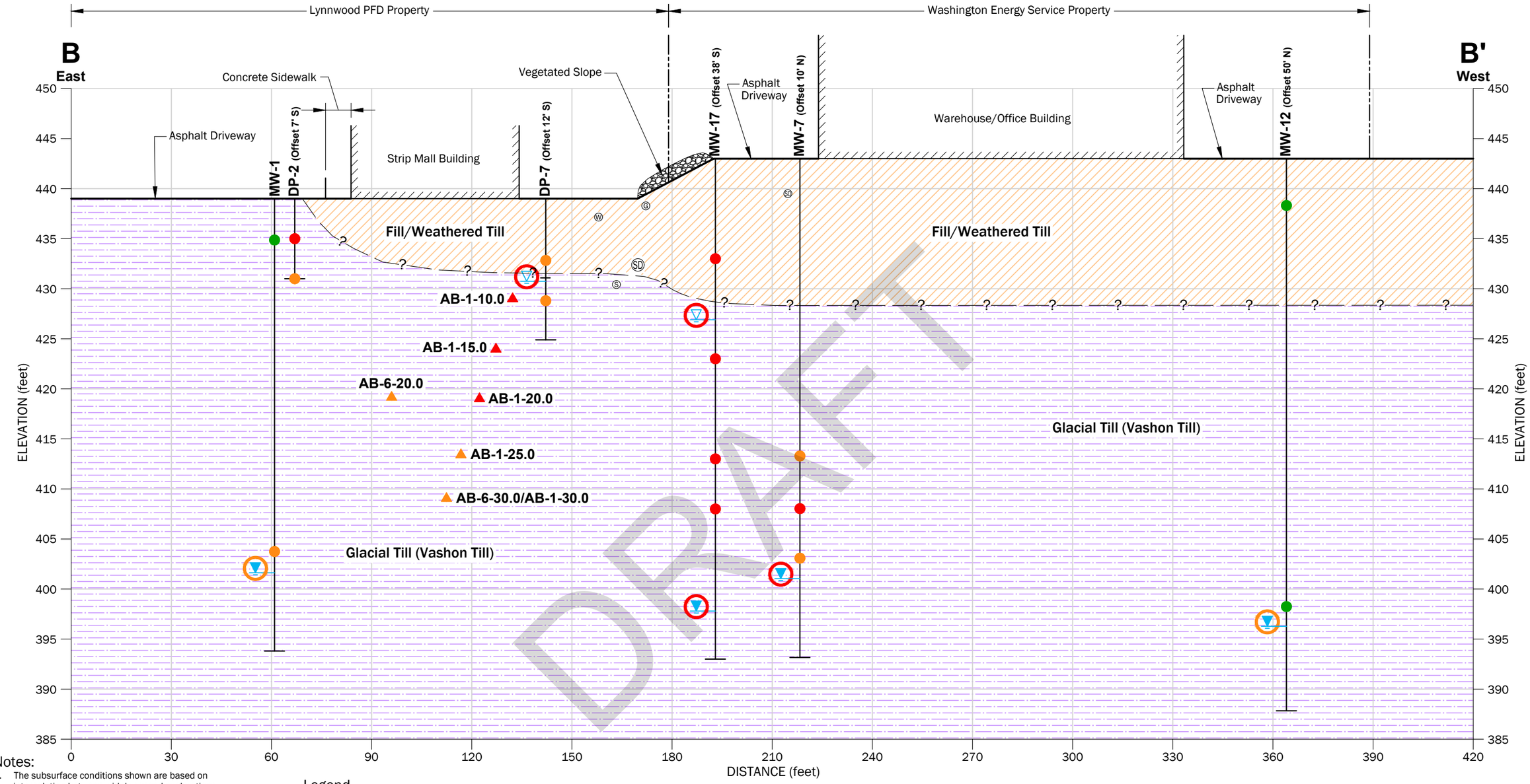
Cross Section A-A'

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

GeoEngineers

Figure 6

P:\17\17787001\CAD\15\Draft Feasibility Study\17787700115_FS_F06 to F09_Cross Sections.dwg TAB:F06 Date Exported: 05/20/21 - 16:43 by syi



Notes:

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Groundwater elevations and chemical data shown are from March 2013, February 2017, and/or April 2021, whichever reflects the most current data available.

Datum: NAVD 88, unless otherwise noted.

Legend

- DP-7 — Exploration and Approximate Location
- ? — Interpreted Soil Unit Contact Line
- Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level
- Soil Sample - HVOCs detection less than MTCA Method A Cleanup Level
- Soil Sample - HVOCs Not Detected
- Angled Boring Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level
- Angled Boring Soil Sample - HVOCs detection less than MTCA Method A Cleanup Level
- Grab Groundwater Sample
- Groundwater Sample from Monitoring Well
- PCE/TCE detections greater than MTCA Method A Cleanup Level
- PCE/TCE detection less than MTCA Method A Cleanup Level

PCE	Tetrachloroethylene
TCE	Trichloroethylene
MTCA	Model Toxics Control Act
HVOC	Halogenated Volatile Organic Compounds

- Ⓦ Existing 4" Water Line
- Ⓔ Electric Utility
- Ⓢⓓ Existing Storm Drain (Depth Approximated)
- Ⓢ Existing 8" Sanitary Sewer Line (Depth Approximated)
- Ⓖ Existing Gas Line

30 0 30
Horizontal Scale in Feet

10 0 10
Vertical Scale in Feet
Vertical Exaggeration: 3X

Cross Section B-B'

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

GeoEngineers

Figure 7

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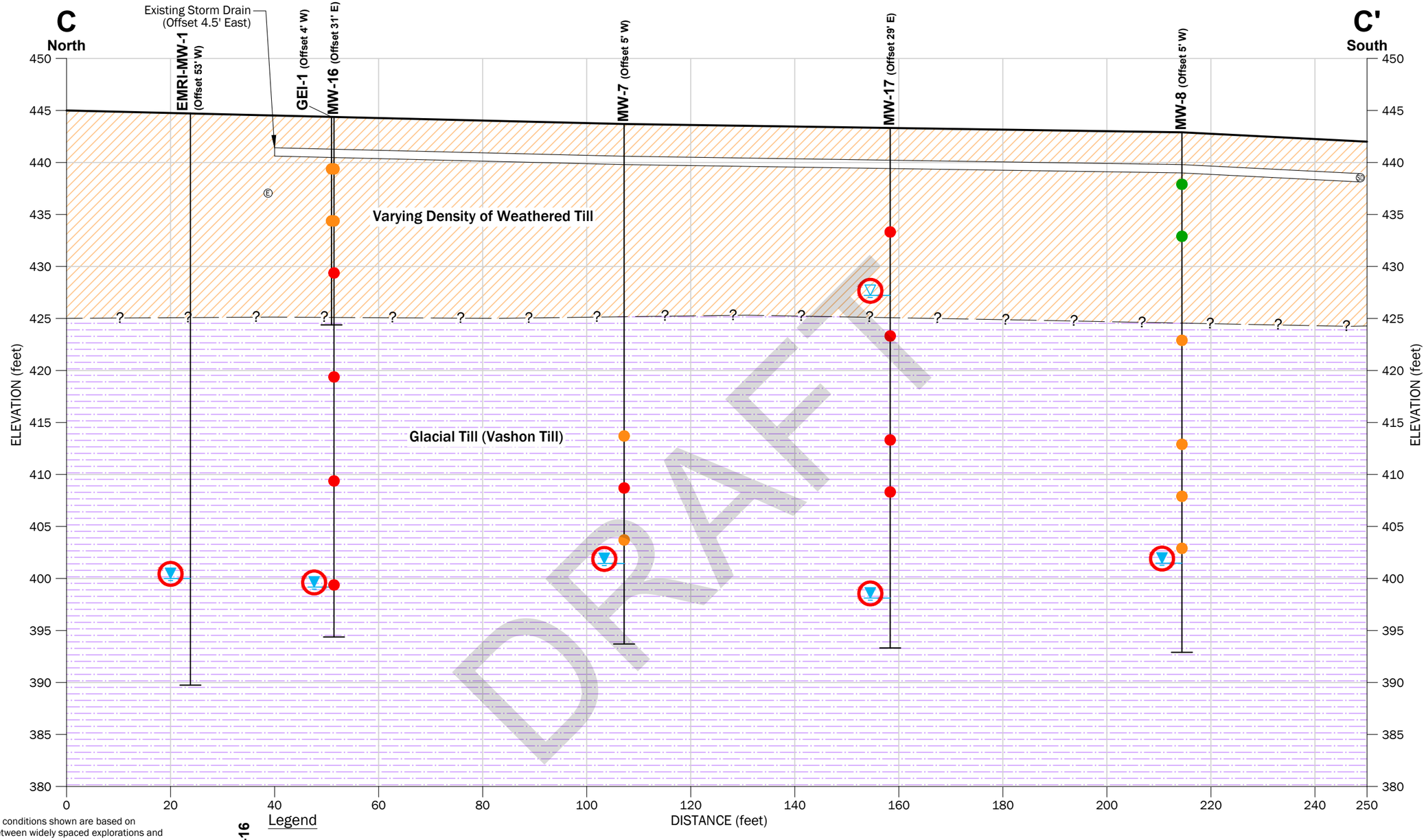

Notes:

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
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3. Groundwater elevations and chemical data shown are from March 2013, February 2017, and/or April 2021, whichever reflects the most current data available.

Datum: NAVD 88, unless otherwise noted.

Legend

- MW-16 — Exploration and Approximate Location
- ? — Interpreted Soil Unit Contact Line
- Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level
- Soil Sample - HVOCs detection less than MTCA Method A Cleanup Level
- Soil Sample - HVOCs Not Detected
- Grab Groundwater Sample
- Groundwater Sample from Monitoring Well
- PCE/TCE detections greater than MTCA Method A Cleanup Level

PCE	Tetrachloroethylene
TCE	Trichloroethylene
MTCA	Model Toxics Control Act
HVOC	Halogenated Volatile Organic Compounds
SD	Existing Storm Drain (Depth Approximated)
E	Electric Utility

20 0 20
Horizontal Scale in Feet

10 0 10
Vertical Scale in Feet
Vertical Exaggeration: 2X

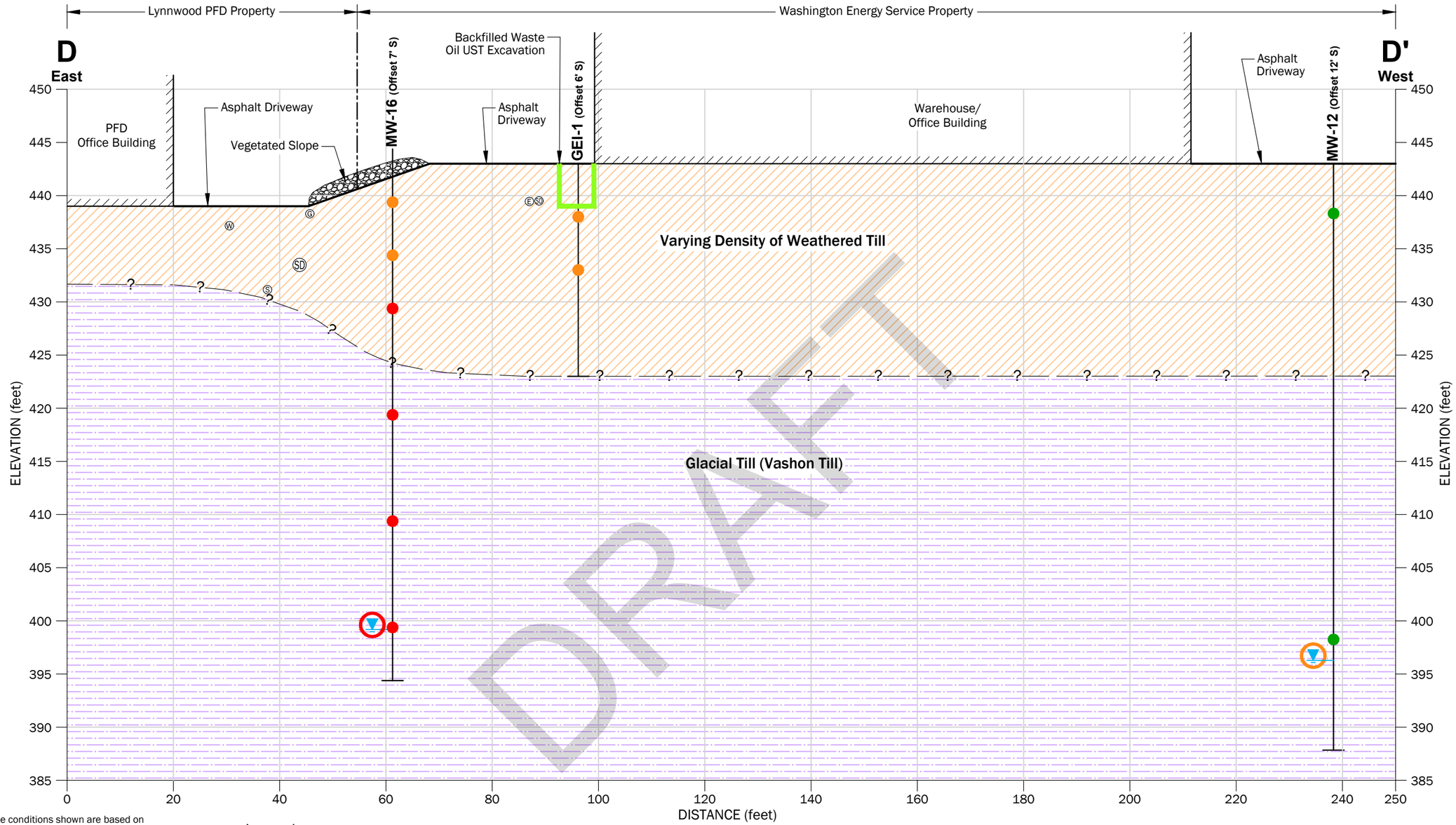
Cross Section C-C'

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

GeoEngineers

Figure 8

P:\17\17787001\CAD\15\Draft Feasibility Study\17787001115_FS_F06 to F09_Cross Sections.dwg TAB:F08 Date Exported: 05/20/21 - 16:44 by syi



Notes:

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Groundwater elevations and chemical data shown are from March 2013, February 2017, and/or April 2021, whichever reflects the most current data available.

Datum: NAVD 88, unless otherwise noted.

Legend

- MW-16 — Exploration and Approximate Location
- ? — Interpreted Soil Unit Contact Line
- Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level
- Soil Sample - HVOCs detection less than MTCA Method A Cleanup Level
- Soil Sample - HVOCs Not Detected
- Subslab Soil Vapor Sample
- Grab Groundwater Sample
- Groundwater Sample from Monitoring Well
- PCE/TCE detections greater than MTCA Method A Cleanup Level
- PCE/TCE detection less than MTCA Method A Cleanup Level
- PCE Tetrachloroethylene
- TCE Trichloroethylene
- MTCA Model Toxics Control Act
- HVOC Halogenated Volatile Organic Compounds
- Ⓦ Existing 4" Water Line
- Ⓢⓓ Existing Storm Drain (Depth Approximated)
- Ⓢ Existing 8" Sanitary Sewer Line (Depth Approximated)
- Ⓖ Existing Gas Line
- Ⓔ Electric Utility

20 0 20
Horizontal Scale in Feet
10 0 10
Vertical Scale in Feet
Vertical Exaggeration: 2X

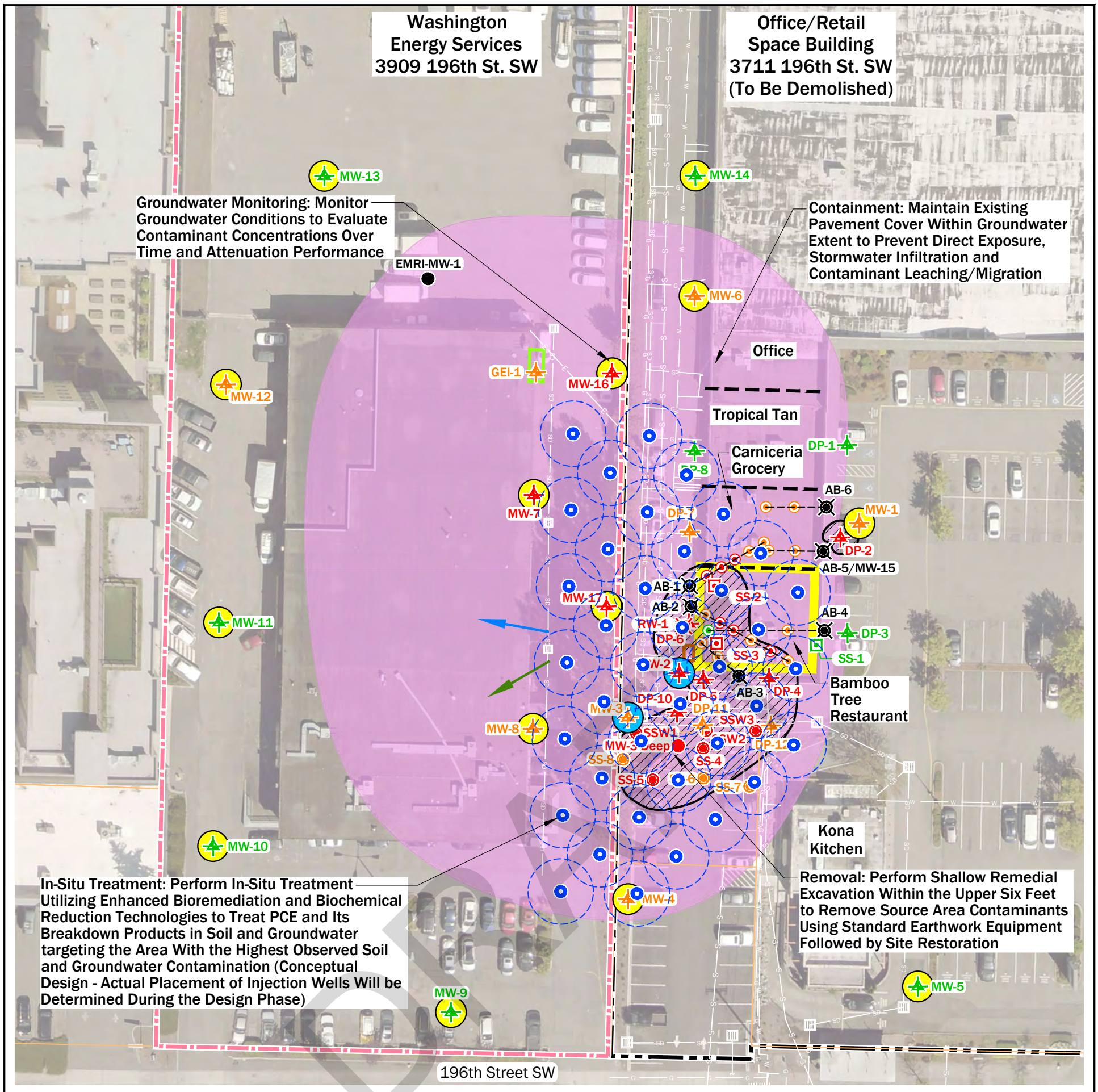
Cross Section D-D'

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

GeoEngineers

Figure 9

P:\17\17787001\CAD\15\Draft Feasibility Study\17787001l5_FS_F06 to F09_Cross Sections.dwg TAB:F09 Date Exported: 05/20/21 - 16:44 by syi



Legend

- DP-6/MW-2 — Exploration - MTCA Method A Cleanup Levels Exceedance for PCE/TCE in Soil
- DP-7/MW-4 — Exploration - HVOCs detected less than MTCA Method A Cleanup Levels in Soil
- DP-1/MW-9 — Exploration - HVOCs Not Detected
- AB-1 — Angled Boring by GeoEngineers, Inc.
- EMRI-MW-1 — Groundwater Monitoring Well by EMRI (1999)
- Soil Sample with PCE detection greater than MTCA Method A Cleanup Level
- Soil Sample with HVOC detections less than MTCA Method A or B Cleanup Levels
- Soil Sample with HVOCs Not Detected
- SSW1 — Confirmation Soil Sample
- MW-3-Deep — Deep Groundwater Assessment Boring with PCE/TCE detection greater than MTCA Method A Cleanup Level
- RW-1 — Pilot Study Injection Well with PCE/TCE detection greater than MTCA Method A Cleanup Level
- SS-2 — Sub Slab Soil Data April 2021 with PCE detection greater than MTCA Method A Cleanup Level
- SS-1 — Sub Slab Soil Data April 2021 with HVOCs Not Detected

- Lynnwood Public Facilities District Property Boundary
- West Adjoining Property Boundary
- Parcel Boundary
- Approximate Footprint of Former Alderwood Laundry & Dry Cleaners
- Backfilled Waste Oil UST Excavation
- Existing Concrete Grease Trap
- Existing Catch Basin
- Existing Storm Drain
- Existing Gas Line
- Existing Sewer Line
- Existing Water Line
- Electric Utility

- Extent PCE > 5 ug/L in Groundwater
- Proposed Soil Excavation Area
- Proposed Performance/Compliance Monitoring Well
- Proposed Replacement Performance/Compliance Monitoring Well
- Proposed In-Situ Injection Point
- Estimated Zone of Influence
- Inferred Groundwater Flow Direction (Wet Season)
- Inferred Groundwater Flow Direction (Dry Season)

N W E S

50 0 50

Feet

Alternative 2 - Source Removal with Capping and In-Situ Enhanced Bioremediation/ Biochemical Reduction

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

GeoEngineers

Figure 10

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial from King County dated 2019 and street centerlines. Vertical Datum: NAVD 88. Projection: NAD83 Washington State Planes, North Zone, US Foot.

P:\17\17787001\CAD\15\Draft Feasibility Study\17787001115_FS_F12_Alternative 2.dwg TAB:F12 Date Exported: 05/28/21 - 15:46 by syi

APPENDIX A
Post-Injection Remedial Pilot Study Groundwater Monitoring Results

GeoEngineers
17425 NE Union Hill Road, Suite 250
Redmond, Washington 98052
425.861.6000

November 10, 2021

Lynnwood Public Utilities District
3815 196th Street SW, Suite 136
Lynnwood, Washington 98036

Attention: Janet Pope

Subject: Post-Injection Remedial Pilot Study Groundwater Monitoring Results
Former Alderwood Laundry and Dry Cleaner
3815 196th Street SW
Lynnwood, Washington
VCP Number NW3066
GeoEngineers File No. 17787-001-15

INTRODUCTION

This summary letter presents the post-injection remedial pilot study groundwater monitoring for the former Alderwood Laundry and Dry Cleaner (ALDC) Site. The Lynnwood Public Facilities District (PFD) is conducting an independent cleanup action at the Site under the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP) (VCP Number NW3066).

The current schedule for routine Site-wide groundwater monitoring is approximately once every 18 months. TA Site-wide groundwater monitoring event was performed in May 2021 as part of the recent data gap study and to provide "baseline" groundwater data for evaluation purposes with regard to the planned remediation pilot study. During the data gap study a remedial injection well (RW-1) was installed for the remediation pilot study of chemical injection technologies. Following the May 2021 Site-wide groundwater monitoring event and injection well installation, a remediation injection event was performed in well RW-1 on May 24, 2021. The purpose of the pilot study is to evaluate the potential effectiveness of the injection technology including the radius of influence[1] during and after chemical injection.

Three types of remedial chemicals were injected during the May 2021 pilot study including 3-D MicroEmulsion® (3-DME), Chemical Reducing Solution® (CRS) and Bio-Dechlor INOCULUM® Plus (BDI Plus). The remedial chemicals, which have been proven in many studies to be successful, are intended to provide

[1] Radius of influence reference to the distance laterally that the chemicals migrate in the subsurface during a pressurized injection and shortly after once equilibrium is reached. Long-term migration of chemicals in the subsurface is generally very slow; chemicals typically do not migrate any appreciable distance beyond the radius of influence before they are no longer active or beneficial from a remediation perspective.

an environment suitable for anaerobic biodegradation of chlorinated solvents as well as provide chemicals suitable for abiotic degradation.

INJECTION EVENT OBSERVATIONS

The May 2021 pilot study injection event was performed in accordance with the Biochemical Injection Pilot Study Work Plan, dated May 18, 2021, with no significant deviations noted. Due to the presence of underground utilities that restricted drilling locations, the monitoring well closest to RW-1 (MW-2, 20 feet away from RW-1) is slightly beyond the anticipated injection radius of influence of 10-15 feet. Monitoring of well MW-2 during the injection event did not indicate field evidence of influence; however, well RW-1 accepted the entire planned quantity of chemicals (over 1,200 gallons) within a period of 6 hours, indicating the subsurface will readily accept chemical injection, which is often the challenge for in-situ remediation. Further field data will be required to confirm the radius of influence for injection design purposes.

POST-INJECTION GROUNDWATER MONITORING RESULTS

GeoEngineers completed groundwater monitoring on September 29 and October 4, 2021, approximately 4 months after completion of the chemical injection event at RW-1. Monitoring activities included measuring depths to groundwater and collecting groundwater samples for chemical analyses of dry cleaning-related volatile organic compounds (VOCs), including tetrachloroethene (PCE), trichloroethene (TCE), cis and trans-1,2-dichloroethene (DCE) and vinyl chloride (VC) at select wells in the vicinity of recently installed remediation well RW-1. In addition, the wells sampled were analyzed for geochemical indicators including the following:

- Ammonia by SM 4500-NH3
- TOC by SM 5310B
- Biological Oxygen Demand (BOD) by SM 5210B
- Total and dissolved iron and manganese by EPA Method 6010
- Nitrate and nitrite by EPA Method 353.2
- Sulfate by EPA Method 9056
- Dissolved methane, ethane and ethene by Method RSK-175

Groundwater monitoring field procedures are presented in Appendix A. Depth to groundwater and groundwater elevation data are summarized in Table 1. Groundwater chemical analytical data are summarized in Tables 2 and 3. The lab data for the October 2021 sampling event is attached in Appendix B.

Groundwater samples were collected from wells MW-2, MW-3, MW-8, MW-15 and MW-17.

A summary of the post-injection groundwater monitoring data and data trends for Site groundwater are as follows:

- The detected concentrations of PCE, TCE and associated breakdown products in the wells sampled were generally consistent with previous results (Table 2). No statistically significant changes in concentrations were observed that would strongly indicate influence from the May 24, 2021 injection event.
- Geochemical indicators in the well (MW-2) closest to injection well RW-1 increased significantly for iron; iron is a component of at least one of the remedial chemicals injected.
- Other geochemical indicators measured did not indicate a significant change in the environment suggestive of anaerobic conditions at well MW-2. Anaerobic conditions are required for optimal biochemical breakdown of chlorinated solvents.
- Geochemical indicators in the other wells sampled did not exhibit significant increases in iron; in addition, other indicators measured did not indicate influence from the remedial chemicals injected or significant change in the environment suggestive of anaerobic conditions.
- The wells monitored during the post remedial pilot study were the closest wells available. Therefore, the results indicate that well MW-2 may be on the edge of the radius of influence for chemical injection. Based on the data collected a 10-15 feet radius for chemical injection is likely feasible.

CONCLUSIONS AND RECOMMENDATIONS

The post-injection remedial pilot study groundwater monitoring event results indicate that the injection of remedial chemicals at well RW-1 may have had some influence at well MW-2, which is located at the edge of the radius of influence for chemical injection. The anticipated radius of influence was 15-20 feet and well MW-2 is located approximately 20 feet from injection well RW-1.

We recommend performing an additional monitoring event in spring of 2022, when groundwater elevations are likely to be at their highest, at wells MW-2 and RW-1 to evaluate the change in concentrations of chlorinated solvents and presence/absence of anaerobic conditions along with other geochemical indicators.

Due to the number of utilities in the source area and immediate vicinity, many of which branch off the mains in the alley way to each tenant space, an alternative location for additional wells in and around the source area is not feasible without extensive preparation to expose the known and unknown utilities. Demolition of the strip mall and capping of the utilities at the mains in the alley way would allow for installation of a monitoring well in the former building footprint and source area that would be within 10 feet of well RW-1. Following installation of a new well, a second injection event could be performed at well RW-1 to confirm the radius of influence and efficacy of the chemical injection. Results of the second injection would be used for engineering design purposes.

LIMITATIONS

We have prepared this report for the exclusive use of Lynnwood PFD and their authorized agents for the former ALDC site. This report may be provided to regulatory agencies for review.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. The conclusions and opinions presented in this report are based on our professional knowledge, judgment and experience and based on discrete samples obtained from specific wells sampled. Contaminants may be present in areas of the site not sampled or tested. No warranty or other conditions, express or implied, should be understood.

Please call if you have any questions or require additional information.

Sincerely,
GeoEngineers, Inc.

Cris J. Watkins
Senior Environmental Scientist

Dana L. Carlisle, PE
Principal

CJW:DAC:kjb

Attachments:
Table 1. Summary of Groundwater Elevation Data
Table 2. Summary of Groundwater Chemical Analytical Data
Table 3. Summary of Groundwater Geochemical Indicators
Figure 1. Exploration Locations
Appendix A. Field Procedures
Appendix B. Laboratory Analytical Reports

Table 1

Summary of Groundwater Elevation Data

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

Monitoring Well ID	Date Measured	Top of Casing Elevation[1] (feet)	Depth to Groundwater (feet below top of casing)	Groundwater Elevation[2] (feet)
MW-1	8/9/2013	438.62	38.81	399.81
	3/27/2014		38.85	399.77
	2/11/2016		38.24	400.38
	4/5/2016		37.58	401.04
	8/3/2016		39.07	399.55
	10/3/2016		39.83	398.79
	2/16/2017		36.98	401.64
	8/31/2017		38.71	399.91
	11/29/2017		38.96	399.66
	2/13/2018		37.91	400.71
	5/23/2018		37.79	400.83
	11/26/2019		38.99	399.63
	4/30/2021		36.53	402.09
	10/4/2021		38.67	399.95
MW-2	8/9/2013	435.90	36.12	399.78
	3/27/2014		36.17	399.73
	2/11/2016		35.54	400.36
	4/5/2016		34.91	400.99
	8/3/2016		36.40	399.50
	10/3/2016		37.16	398.74
	2/17/2017		34.57	401.33
	8/31/2017		36.02	399.88
	11/29/2017		36.28	399.62
	2/13/2018		35.04	400.86
	5/23/2018		35.12	400.78
	11/27/2019		36.24	399.66
	4/30/2021		33.94	401.96
	10/4/2021		36.00	399.90
MW-3	8/9/2013	435.34	35.58	399.76
	3/27/2014		36.17	399.17
	2/11/2016		34.94	400.40
	4/5/2016		34.35	400.99
	8/3/2016		35.86	399.48
	10/3/2016		36.62	398.72
	2/17/2017		34.04	401.30
	8/31/2017		35.49	399.85
	11/29/2017		35.73	399.61
	2/13/2018		34.56	400.78
	5/23/2018		34.59	400.75
	11/27/2019		35.81	399.53
	4/30/2021		33.43	401.91
	10/4/2021		35.53	399.81
MW-3-Deep	4/30/2021	433.65	31.65	402.00
	10/4/2021		33.76	399.89

Monitoring Well ID	Date Measured	Top of Casing Elevation[1] (feet)	Depth to Groundwater (feet below top of casing)	Groundwater Elevation[2] (feet)
MW-4	8/9/2013	430.27	30.61	399.66
	3/27/2014		30.58	399.69
	2/11/2016		29.98	400.29
	4/5/2016		29.36	400.91
	8/3/2016		30.90	399.37
	10/3/2016		31.66	398.61
	2/16/2017		28.91	401.36
	8/31/2017		30.47	399.80
	11/28/2017		30.72	399.55
	2/14/2018		29.43	400.84
	5/24/2018		29.63	400.64
	11/26/2019		NM[3]	NM
	4/30/2021		NM[3]	NM
	10/4/2021		NM[3]	NM
MW-5	4/5/2016	428.45	27.44	401.01
	8/3/2016		29.06	399.39
	10/3/2016		29.82	398.63
	2/17/2017		27.03	401.42
	8/31/2017		28.70	399.75
	11/29/2017		28.97	399.48
	2/13/2018		27.55	400.90
	5/23/2018		27.80	400.65
	11/26/2019		29.02	399.43
	4/30/2021		26.49	401.96
	10/4/2021		28.57	399.88
MW-6	4/5/2016	440.96	40.00	400.96
	8/3/2016		41.38	399.58
	10/3/2016		42.12	398.84
	2/17/2017		39.74	401.22
	8/31/2017		41.00	399.96
	11/29/2017		41.26	399.70
	2/13/2018		39.97	400.99
	5/23/2018		40.08	400.88
	11/27/2019		41.28	399.68
	4/30/2021		38.76	402.20
	10/4/2021		40.97	399.99

Monitoring Well ID	Date Measured	Top of Casing Elevation[1] (feet)	Depth to Groundwater (feet below top of casing)	Groundwater Elevation[2] (feet)
MW-7	4/5/2016	443.15	42.26	400.89
	8/3/2016		43.67	399.48
	10/3/2016		44.43	398.72
	2/16/2017		41.97	401.18
	8/31/2017		43.26	399.89
	11/28/2017		43.51	399.64
	2/14/2018		42.49	400.66
	5/24/2018		42.40	400.75
	11/26/2019		43.57	399.58
	4/30/2021		41.21	401.94
	10/4/2021		43.29	399.86
MW-8	4/5/2016	442.30	41.43	400.87
	8/3/2016		42.88	399.42
	10/3/2016		43.64	398.66
	2/16/2017		41.08	401.22
	8/31/2017		42.47	399.83
	11/28/2017		42.71	399.59
	2/14/2018		41.60	400.70
	5/24/2018		41.59	400.71
	11/26/2019		42.82	399.48
	4/30/2021		40.42	401.88
	10/4/2021		42.27	400.03
MW-9	4/5/2016	430.09	29.22	400.87
	8/3/2016		30.74	399.35
	10/3/2016		31.46	398.63
	2/16/2017		28.88	401.21
	8/31/2017		30.32	399.77
	11/28/2017		30.59	399.50
	2/14/2018		29.43	400.66
	5/24/2018		29.43	400.66
	11/26/2019		30.62	399.47
	4/30/2021		28.22	401.87
	10/4/2021		30.35	399.74
MW-10	10/3/2016	437.38	38.62	398.76
	2/17/2017		36.19	401.19
	8/31/2017		37.50	399.88
	11/28/2017		37.75	399.63
	2/14/2018		36.71	400.67
	5/24/2018		36.65	400.73
	11/26/2019		37.87	399.51
	4/30/2021		35.47	401.91
	10/4/2021		37.51	399.87
MW-11	10/3/2016	443.18	44.42	398.76
	2/16/2017		42.06	401.12
	8/31/2017		43.24	399.94
	11/28/2017		43.51	399.67
	2/14/2018		42.58	400.60
	5/24/2018		42.40	400.78
	11/26/2019		43.63	399.55

Monitoring Well ID	Date Measured	Top of Casing Elevation[1] (feet)	Depth to Groundwater (feet below top of casing)	Groundwater Elevation[2] (feet)
	4/30/2021		41.28	401.90
	10/4/2021		42.27	400.91

Monitoring Well ID	Date Measured	Top of Casing Elevation[1] (feet)	Depth to Groundwater (feet below top of casing)	Groundwater Elevation[2] (feet)
MW-12	10/3/2016	445.21	46.41	398.80
	2/16/2017		44.24	400.97
	8/31/2017		45.22	399.99
	11/28/2017		45.48	399.73
	2/14/2018		44.47	400.74
	5/24/2018		44.29	400.92
	11/26/2019		45.32	399.89
	4/30/2021		43.18	402.03
	10/4/2021		45.25	399.96
MW-13	10/3/2016	450.32	51.47	398.85
	2/16/2017		49.60	400.72
	8/31/2017		50.29	400.03
	11/28/2017		50.56	399.76
	2/14/2018		49.83	400.49
	5/24/2018		49.43	400.89
	11/26/2019		50.62	399.70
	4/30/2021		48.38	401.94
	10/4/2021		NM[4]	NM[4]
MW-14	10/3/2016	442.98	41.77	401.21
	2/16/2017		40.72	402.26
	8/31/2017		40.66	402.32
	11/28/2017		40.90	402.08
	2/13/2018		40.95	402.03
	5/23/2018		39.74	403.24
	11/27/2019		41.29	401.69
	4/30/2021		37.74	405.24
	10/4/2021		40.11	402.87
MW-15[2]	2/16/2017	438.60	34.5	404.1
	8/31/2017		36.1	402.5
	11/28/2017		36.3	402.3
	2/13/2018		34.9	403.7
	5/23/2018		34.0	404.6
	11/26/2019		34.9	403.7
	4/30/2021		34.0	404.6
	10/4/2021		33.2	405.4
MW-16	5/7/2019	444.28	43.40	400.88
	11/26/2019		44.74	399.54
	4/30/2021		42.31	401.97
	10/4/2021		44.37	399.91
MW-17	5/7/2019	443.14	42.29	400.85
	11/26/2019		43.58	399.56
	4/30/2021		41.21	401.93
	10/4/2021		43.29	399.85

Monitoring Well ID	Date Measured	Top of Casing Elevation[1] (feet)	Depth to Groundwater (feet below top of casing)	Groundwater Elevation[2] (feet)
RW-1	4/30/2021	437.46	35.34	402.12
	10/4/2021		37.60	399.86
EMRI-MW-1	8/3/2016	443.44	43.98	399.46
	10/3/2016		44.72	398.72
	2/16/2017		42.56	400.88
	8/31/2017		43.52	399.92
	11/28/2017		43.78	399.66
	2/14/2018		42.86	400.58
	5/24/2018		41.89	401.55
	11/26/2019		43.10	400.34
	4/30/2021		41.54	401.90
	10/4/2021		NM[4]	NM[4]
ZZA-MW-2	8/3/2016	429.30	12.93	416.37
	10/3/2016		Dry	---
	2/28/2017		6.29	423.01
	8/31/2017		Dry	--
	11/28/2017		12.41	416.89
	2/13/2018		8.16	421.14
	5/23/2018		7.32	421.98
	11/27/2019		Dry	--
	4/30/2021		10.51	418.79
	10/4/2021		13.51	415.79
ZZA-MW-3	8/3/2016	429.89	11.78	418.11
	10/3/2016		13.10	416.79
	2/28/2017		5.02	424.87
	8/31/2017		11.67	418.22
	11/28/2017		11.90	417.99
	2/13/2018		5.86	424.03
	5/23/2018		5.01	424.88
	11/27/2019		13.26	416.63
	4/30/2021		9.44	420.45
	10/4/2021		8.42	421.47

Notes:

[1] Elevations in feet (NAV88) as referenced to Arcadis well MW-13 casing rim elevation of 427.80 feet.

[2] MW-15 is an angled monitoring well completed at a 45-degree angle relative to the existing ground surface; distance to water was measured inside the angled well casing. The calculation used to convert to a vertical depth-to-groundwater value for reporting in this table is: measured distance to water multiplied by Cosine 45°. Reported depth to groundwater and groundwater elevation should be considered approximate for this well because the actual drilling angle is approximate. Therefore, values for MW-15 are reported only to the nearest tenth of a foot.

[3] The well was apparently paved over during redevelopment of the new parking lot in this area.

[4] The well was inaccessible because is was obstructed by a parked vehicle.

NM = Not Measured

Table 2

Summary of Groundwater Chemical Analytical Data[1]

Halogenated Volatile Organic Compounds (HVOCs)

Former Alderwood Laundry and Dry Cleaners

Lynnwood, Washington

Sample Identification	Sample Date	VOCs[2] (µg/L)				
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	cis-1,2-Dichloro-ethene (DCE)	trans-1,2-Dichloro-ethene (DCE)	Vinyl Chloride (VC)
MW-2	7/23/2013	**83**	**3.0**	**1.9**	<0.2	*
	3/27/2014	**98**	**3.5**	**1.6**	<1.0	*
	2/11/2016	**150**	**4.3**	**3.2**	<1.0	*
	8/3/2016[4]	**180**	**5.6**	**3.4**	<1.0	*
	2/16/2017	**210**	**7.7**	**7.3**	<1.0	*
	8/31/2017	**196**	**6.60**	**4.17**	**0.246**	<0.118
	11/29/2017	**222**	**8.03**	**4.20**	**0.314**	<0.118
	2/13/2018	**192**	**4.26**	**2.57**	**0.208**	<0.118
	5/23/2018	**307**	**9.54**	**8.38**	**0.393**	<0.118
	11/27/2019	**218**	**8.25**	**5.24**	<0.500	<0.129
	4/20/2021	**73.3**	**2.64**	**1.59**	<0.200	<0.100
	9/29/2021	**98.8**	**4.65**	**1.69**	<0.200	<0.100
MW-3	7/23/2013	**110**	**6.0**	**21.0**	**0.41**	*
	3/27/2014	**48**	**2.1**	**4.3**	**0.20**	*
	2/11/2016	**80**	**2.9**	**7.0**	<0.8	*
	8/3/2016[4]	**110**	**5.2**	**16**	**1.8**	*
	2/16/2017	**84**	**2.9**	**3.5**	<0.4	<0.2
	8/31/2017	**192**	**8.96**	**21.0**	**0.420**	<0.118
	11/29/2017	**129**	**4.43**	**6.45**	**0.204**	<0.118
	2/13/2018	**119**	**2.47**	**3.29**	<0.152	<0.118
	5/23/2018	**129**	**4.60**	**6.65**	<0.152	<0.118
	11/27/2019	**74.3**	**2.61**	**1.88**	<0.500	<0.129
	4/20/2021	**107**	**5.12**	**5.19**	<0.200	<0.100
	10/4/2021	**73.9**	**3.15**	**2.81**	<0.200	<0.100
MW-8	4/5/2016	**33**	**1.5**	**14**	<0.2	*
	8/3/2016	**40**	**1.8**	**13**	**0.36**	*
	2/16/2017	**47**	**2.2**	**14**	<0.2	<0.2
	8/30/2017	**46.3**	**3.00**	**16.9**	<0.152	<0.118
	11/28/2017	**35.9**	**3.25**	**17.3**	<0.152	<0.118
	2/14/2018	**50.7**	**2.35**	**16.5**	<0.152	<0.118
	5/24/2018	**57.2**	**4.12**	**16.5**	**0.156**	<0.118
	11/26/2019	**62.9**	**5.26**	**17.9**	<0.500	<0.129
	4/20/2021	**94.0**	**6.15**	**13.1**	**0.255**	<0.100
	9/29/2021	**98.7**	**7.23**	**11.80**	**0.255**	<0.100

Sample Identification	Sample Date	VOCs[2] (µg/L)				
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	cis-1,2-Dichloro-ethene (DCE)	trans-1,2-Dichloro-ethene (DCE)	Vinyl Chloride (VC)
MW-15[3]	2/16/2017	**78**	**2.6**	**0.49**	<0.2	<0.2
	8/31/2017	**55.4**	**1.77**	**0.251**	<0.152	<0.118
	11/28/2017	**65.9**	**1.92**	**0.238**	<0.152	<0.118
	2/13/2018	**83.2**	**1.52**	**0.278**	<0.152	<0.118
	5/24/2018	**75.0**	**1.76**	**0.194**	<0.152	<0.118
	11/26/2019	**26.9**	**0.650**	<0.500	<0.500	<0.129
	4/19/2021	**44.1**	**1.47**	**0.120**	<0.200	<0.100
	10/4/2021	**41.5**	**0.979**	<0.100	<0.200	<0.100
MW-17	5/7/2019	**339**	**6.09**	**4.48**	<0.500	<0.500
	11/26/2019	**201**	**4.04**	**0.857**	<0.500	<0.129
	4/20/2021	**235**	**6.36**	**2.52**	**0.231**	<0.100
	10/4/2021	**162**	**4.30**	**1.02**	<0.200	<0.100
MTCA Method A/B Cleanup Levels		5	5	16[4]	160[4]	0.2

Notes:

[1] Chemical analyses performed by OnSite Environmental of Redmond, Washington or ESC Labs of Mt. Juliette, Tennessee. Chemical analytical laboratory reports included in Appendix B.

[2] Select VOCs (PCE, TCE, cis - and trans DCE and VC were analyzed by U.S. Environmental Protection Agency (EPA) Method 8260D.

[3] Monitoring well was completed at a 45 degrees angle relative to the existing ground surface. The groundwater sample represents groundwater beneath the northeast portion of the former Alderwood Laundry and Dry Cleaner facility's footprint.

[4] MTCA Method B Cleanup Level

[5] The May 4th sample was collected during drilling from the perched groundwater.

[6] Well MW-4 could not be located during the November 2019 and April 2021 sampling event and appears to have been paved over during recent site improvements.

MTCA = Model Toxics Control Act

µg/L = micrograms per liter

Bolded value indicates analyte detected at the listed concentration.

Shaded value represents concentration greater than the MTCA cleanup level.

-- = not analyzed

* = not tabulated prior to 2017

Table 3

Summary of Groundwater Geochemical Indicators[1]

Former Alderwood Laundry and Dry Cleaners
Lynnwood, Washington

Monitoring Well Identification	Sample Identification	Sample Date	Geochemical Indicators (µg/L)											
			Iron, Total	Iron, Dissolved	Manganese, Total	Manganese, Dissolved	Ammonia (Total as N)	BIOLOGICAL OXYGEN DEMAND	Ethane	Ethylene	Methane	Sulfate	Total Nitrogen	Total Organic Carbon
MW-2	MW2-210420	4/20/2021	**1,750**	<100	**56.0**	<10.0	<250	<3,330	<13.0	<13.0	<10.0	**6,260**	**381**	<1,000
	MW2-210929	9/29/2021	**8,460**	<100	**248**	<10.0	<250	<3,330	<13.0	<13.0	<10.0	**13,200**	**1,230**	**1,300**
MW-3	MW3-210420	4/20/2021	**10,200**	<100	**296**	<10.0	<250	<3,330	<13.0	<13.0	<10.0	<5,000	**413**	<1,000
	MW3-211004	10/4/2021	**4,620**	<100	**179**	<10.0	<250	<3,330	<13.0	<13.0	<10.0	<5,000	**603**	<1,000
MW-8	MW8-210420	4/20/2021	**20,600**	<100	**1,340**	**308**	<250	<3,330	<13.0	<13.0	<10.0	**21,100**	**521**	**1,440**
	MW8-210929	9/29/2021	**7,450**	<100	**1,130**	**805**	<250	<3,330	<13.0	<13.0	<10.0	**23,200**	**635**	**5,260**
MW-14	MW14-210419	4/19/2021	**202**	<100	<10.0	<10.0	<250	<3,330	<13.0	<13.0	<10.0	**30,300**	**872**	**1,030**
MW-15	MW15-210419	4/19/2021	**1,450 J**	<100	**36.0 J**	<10.0	<250	<3,330	<13.0	<13.0	<10.0	**8,360**	**6,200**	**1,230**
	DUP-210419-1	4/19/2021	**863 J**	<100	**21.2 J**	<10.0	<250	<3,330	<13.0	<13.0	<10.0	**8,070**	**6,400**	**1,170**
	MW15-211004	10/4/2021	**4,240**	<100	**152**	<10.0	<250	<3,330	<13.0	<13.0	<10.0	**6,620**	**2,860**	<1,000
MW-17	MW17-210420	4/20/2021	**10,100**	<100	**211**	<10.0	<250	<3,330	<13.0	<13.0	<10.0	**12,600**	**2,010**	<1,000
	MW17-211004	10/4/2021	**9,380**	<100	**288**	**10.6**	<250	<3,330	<13.0	<13.0	<10.0	**8,080**	**1,170**	<1,000
RW-1	RW1-210426	4/26/2021	**185,000**	<100	**6,160**	**139**	<250	<33,330	<13.0	<13.0	**133**	**14,500**	**928 J**	**2,820**

Notes:

[1] Chemical analyses performed by Pace National Labs of Mt. Juliet, Tennessee. Chemical analytical laboratory reports included in Appendix B.

µg/L = microgram per liter; J = estimated result.

Bolded value indicates analyte detected at the listed concentration.

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Legend

- MW-1 Monitoring Well Location
- SS-1 Sub-Slab Soil Sample Location
- SV-1 Sub-Slab Soil Vapor Sample Location
- CatchBasin
- Approximate Footprint of Former Alderwood Laundry & Dry Cleaners
- Lynnwood Public Facilities District Property Boundary
- West Adjoining Property Boundary
- GreaseTrap
- Existing Storm Drain
- Existing Gas Line
- Existing Sewer Line
- Existing Water Line
- Electric Utility

N W E S

50 0 50

Feet

Exploration Locations

Former Alderwood Laundry and Dry Cleaners
3815 196th Street SW, Lynnwood, Washington

GeoEngineers

Figure 1

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Groundwater Sample results are based on April 2021 data.

Data Source: King County 2019 image and street centerlines.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

APPENDIX A
Field Procedures

APPENDIX A
FIELD PROCEDURES

Depth to Groundwater

Depths to groundwater were measured prior to well purging. Depths to groundwater were measured to the nearest 0.01 foot relative to the notch in the monitoring well casing rim using an electronic water level indicator. Groundwater elevations for surveyed wells were calculated by subtracting the depth-to-water measurement from the surveyed casing rim elevation. The electronic water level indicator was decontaminated with LiquiNox® solution wash and a distilled water rinse prior to use in each well.

Groundwater Sampling

Following depth to groundwater measurements, groundwater samples were collected from the monitoring wells consistent with the U.S. Environmental Protection Agency's (EPA) low-flow groundwater sampling procedure, as described in EPA (1996) and Puls and Barcelona (1996). Disposable polyethylene tubing and a down-well bladder pump were used for groundwater purging and sampling. During purging activities, water quality parameters, including pH, temperature, conductivity, dissolved oxygen and turbidity were measured using a multi-parameter meter equipped with a flow-through cell. Groundwater samples were collected after either: (1) water quality parameters stabilized; or (2) a maximum purge time of 30 minutes, whichever occurred first. If the well went dry during purging, it was allowed to recharge as long as possible during the sampling day before collecting a grab groundwater sample using the peristaltic pump and tubing. Water quality parameter stabilization criteria included the following:

- Turbidity: ±10 percent for values greater than 5 nephelometric turbidity units (NTU)
- Conductivity: ±3 percent
- pH: ±0.1 unit
- Temperature: ±3 percent
- Dissolved oxygen: ±10 percent

Field water quality measurements were recorded on a Well Purging-Field Water Quality Measurement Form. The groundwater samples were transferred in the field to laboratory-prepared sample containers and kept cool during transport to the testing laboratory. Chain-of-custody procedures were observed from the time of sample collection to delivery to the testing laboratory.

Decontamination Procedures

The objective of the decontamination procedure was to minimize the potential for cross contamination. A designated decontamination area was established for decontamination of reusable sampling equipment. Sampling or measurement equipment was decontaminated in accordance with the following procedures before each sampling attempt or measurement:

- Brush equipment with a wire brush, if necessary, to remove large particulate matter.
- Rinse with potable tap water.
- Wash with non-phosphate detergent solution (LiquiNox® and potable tap water).

- Rinse with potable tap water.
- Rinse with distilled water.

Handling of Investigation-Derived Waste (IDW)

IDW (purge water) was placed in U.S. Department of Transportation (DOT) approved 55-gallon drums. The drums were labeled with the exploration number, general contents and date. All IDW generated on site to date was placed in drums and is pending pickup for disposal at an appropriate facility.

Disposable items, such as sample tubing, gloves and paper towels, etc., were placed in plastic bags after use and deposited in trash receptacles for disposal.

REFERENCES

Puls, Robert W. and Michael J. Barcelona. 1996. Low Flow (Minimal Drawdown) Ground-Water Sampling Procedures. U.S. Environmental Protection Agency, EPA/540/S-95/504.

U.S. Environmental Protection Agency (EPA). 1996. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. Quality Assurance Unit, EPA-Region 1, North Chelmsford, MA. July 30, 1996, revised January 19, 2010.

APPENDIX B
Laboratory Analytical Reports

ANALYTICAL REPORT

October 13, 2021

GeoEngineers- Portland, OR

Sample Delivery Group:	L1411725
Samples Received:	10/01/2021
Project Number:	17787-001-15
Description:	Alderwood Laundry and Dry Cleaners

Report To:

Cris Watkins
4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Entire Report Reviewed By: Brian Ford

Brian Ford
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

MW-2-210929 L1411725-01 GW

Collected by: Brittany Davis
Collected date/time: 09/29/21 14:25
Received date/time: 10/01/21 09:00

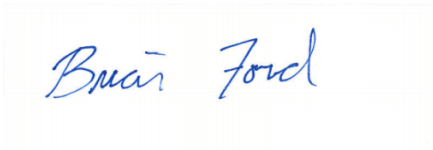
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 353.2	WG1752364	1	10/08/21 00:46	10/08/21 00:46	SDL	Mt. Juliet, TN
Wet Chemistry by Method 5210 B-2011	WG1749811	1	10/01/21 14:13	10/06/21 09:54	KFO	Mt. Juliet, TN
Wet Chemistry by Method 5310 B-2011	WG1751646	1	10/05/21 18:37	10/05/21 18:37	MJA	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1752392	1	10/06/21 19:39	10/06/21 19:39	ELN	Mt. Juliet, TN
Wet Chemistry by Method SM 4500-NH3 G-2011	WG1751553	1	10/05/21 13:48	10/05/21 13:48	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1752523	1	10/06/21 17:40	10/07/21 00:06	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1752531	1	10/06/21 23:22	10/07/21 12:10	CCE	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method RSK175	WG1752973	1	10/07/21 16:00	10/07/21 16:00	CMS	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1753008	1	10/08/21 02:26	10/08/21 02:26	DWR	Mt. Juliet, TN

MW-8-210929 L1411725-02 GW

Collected by: Brittany Davis
Collected date/time: 09/29/21 15:35
Received date/time: 10/01/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 353.2	WG1752364	1	10/08/21 00:51	10/08/21 00:51	SDL	Mt. Juliet, TN
Wet Chemistry by Method 5210 B-2011	WG1749811	1	10/01/21 14:33	10/06/21 09:59	KFO	Mt. Juliet, TN
Wet Chemistry by Method 5310 B-2011	WG1751646	1	10/05/21 19:28	10/05/21 19:28	MJA	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1752392	1	10/06/21 20:05	10/06/21 20:05	ELN	Mt. Juliet, TN
Wet Chemistry by Method SM 4500-NH3 G-2011	WG1751553	1	10/05/21 13:50	10/05/21 13:50	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1752523	1	10/06/21 17:40	10/07/21 00:09	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1752531	1	10/06/21 23:22	10/07/21 12:13	CCE	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method RSK175	WG1752973	1	10/07/21 16:09	10/07/21 16:09	CMS	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1753008	1	10/08/21 08:07	10/08/21 08:07	DWR	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Brian Ford
Project Manager

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate-Nitrite	1230		100	1	10/08/2021 00:46	WG1752364

Wet Chemistry by Method 5210 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
BOD	ND	B1	3330	1	10/06/2021 09:54	WG1749811

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
TOC (Total Organic Carbon)	1300	B	1000	1	10/05/2021 18:37	WG1751646

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	13200		5000	1	10/06/2021 19:39	WG1752392

Wet Chemistry by Method SM 4500-NH3 G-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Ammonia Nitrogen	ND		250	1	10/05/2021 13:48	WG1751553

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Iron	8460		100	1	10/07/2021 00:06	WG1752523
Iron,Dissolved	ND		100	1	10/07/2021 12:10	WG1752531
Manganese	248		10.0	1	10/07/2021 00:06	WG1752523
Manganese,Dissolved	ND		10.0	1	10/07/2021 12:10	WG1752531

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Methane	ND		10.0	1	10/07/2021 16:00	WG1752973
Ethane	ND		13.0	1	10/07/2021 16:00	WG1752973
Ethene	ND		13.0	1	10/07/2021 16:00	WG1752973

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,1-Dichloroethene	ND		0.100	1	10/08/2021 02:26	WG1753008
cis-1,2-Dichloroethene	1.69		0.100	1	10/08/2021 02:26	WG1753008
trans-1,2-Dichloroethene	ND		0.200	1	10/08/2021 02:26	WG1753008
Tetrachloroethene	98.8		0.100	1	10/08/2021 02:26	WG1753008
Trichloroethene	4.65	C5 J4	0.0400	1	10/08/2021 02:26	WG1753008
Vinyl chloride	ND		0.100	1	10/08/2021 02:26	WG1753008
(S) Toluene-d8	*94.7*		*75.0-131*		*10/08/2021 02:26*	WG1753008
(S) 4-Bromofluorobenzene	*105*		*67.0-138*		*10/08/2021 02:26*	WG1753008
(S) 1,2-Dichloroethane-d4	*116*		*70.0-130*		*10/08/2021 02:26*	WG1753008

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate-Nitrite	635		100	1	10/08/2021 00:51	WG1752364

Wet Chemistry by Method 5210 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
BOD	ND	B1	3330	1	10/06/2021 09:59	WG1749811

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
TOC (Total Organic Carbon)	5260		1000	1	10/05/2021 19:28	WG1751646

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	23200		5000	1	10/06/2021 20:05	WG1752392

Wet Chemistry by Method SM 4500-NH3 G-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Ammonia Nitrogen	ND		250	1	10/05/2021 13:50	WG1751553

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Iron	7450		100	1	10/07/2021 00:09	WG1752523
Iron,Dissolved	ND		100	1	10/07/2021 12:13	WG1752531
Manganese	1130		10.0	1	10/07/2021 00:09	WG1752523
Manganese,Dissolved	805		10.0	1	10/07/2021 12:13	WG1752531

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Methane	ND		10.0	1	10/07/2021 16:09	WG1752973
Ethane	ND		13.0	1	10/07/2021 16:09	WG1752973
Ethene	ND		13.0	1	10/07/2021 16:09	WG1752973

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,1-Dichloroethene	ND		0.100	1	10/08/2021 08:07	WG1753008
cis-1,2-Dichloroethene	11.8		0.100	1	10/08/2021 08:07	WG1753008
trans-1,2-Dichloroethene	0.255		0.200	1	10/08/2021 08:07	WG1753008
Tetrachloroethene	98.7		0.100	1	10/08/2021 08:07	WG1753008
Trichloroethene	7.23	C5 J4	0.0400	1	10/08/2021 08:07	WG1753008
Vinyl chloride	ND		0.100	1	10/08/2021 08:07	WG1753008
(S) Toluene-d8	*94.0*		*75.0-131*		*10/08/2021 08:07*	WG1753008
(S) 4-Bromofluorobenzene	*102*		*67.0-138*		*10/08/2021 08:07*	WG1753008
(S) 1,2-Dichloroethane-d4	*132*	J1	*70.0-130*		*10/08/2021 08:07*	WG1753008

Method Blank (MB)

(MB) R3713864-1 10/08/21 00:34

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Nitrate-Nitrite	U		50.0	100

L1408721-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1408721-02 10/08/21 00:37 • (DUP) R3713864-3 10/08/21 00:38

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Nitrate-Nitrite	7100	7040	2	0.849		20

L1413166-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1413166-05 10/08/21 01:14 • (DUP) R3713864-7 10/08/21 01:15

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Nitrate-Nitrite	409	410	1	0.244		20

Laboratory Control Sample (LCS)

(LCS) R3713864-2 10/08/21 00:35

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Nitrate-Nitrite	2500	2560	102	90.0-110	

L1411787-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1411787-02 10/08/21 00:58 • (MS) R3713864-4 10/08/21 01:00

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	ug/l	ug/l	ug/l	%		%	
Nitrate-Nitrite	2500	19200	21100	76.0	5	90.0-110	V

L1413166-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413166-01 10/08/21 01:06 • (MS) R3713864-5 10/08/21 01:07 • (MSD) R3713864-6 10/08/21 01:08

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Nitrate-Nitrite	2500	603	3020	3000	96.7	95.9	1	90.0-110			0.664	20

Method Blank (MB)

(MB) R3713035-1 10/06/21 11:36

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
BOD	378		200	200

L1411332-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1411332-01 10/06/21 08:58 • (DUP) R3713035-5 10/06/21 08:59

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
BOD	3800	ND	1	200	P1	30

L1411677-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1411677-01 10/06/21 09:34 • (DUP) R3713035-6 10/06/21 09:35

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
BOD	7900	9850	1	22		30

L1411725-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1411725-02 10/06/21 09:59 • (DUP) R3713035-7 10/06/21 10:00

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
BOD	ND	ND	1	0		30

L1411731-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1411731-01 10/06/21 10:24 • (DUP) R3713035-8 10/06/21 10:26

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
BOD	207000	209000	1	1		30

Laboratory Control Sample (LCS)

(LCS) R3713035-2 10/06/21 08:53

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
BOD	198000	196000	99.2	84.6-115	

Laboratory Control Sample (LCS)

(LCS) R3713035-3 10/06/21 09:57

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
BOD	198000	190000	95.8	84.6-115	

Laboratory Control Sample (LCS)

(LCS) R3713035-9 10/06/21 11:34

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
BOD	198000	209000	105	84.6-115	

QUALITY CONTROL SUMMARY

L1411725-01,02

Method Blank (MB)

(MB) R3712934-2 10/05/21 13:09

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
TOC (Total Organic Carbon)	291	J	102	1000

L1410407-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1410407-10 10/05/21 13:47 • (DUP) R3712934-3 10/05/21 14:00

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC	1400	1470	1	5.09		20

L1410685-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1410685-04 10/05/21 15:01 • (DUP) R3712934-4 10/05/21 15:14

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC	2270	2100	1	7.64		20

Laboratory Control Sample (LCS)

(LCS) R3712934-1 10/05/21 12:57

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TOC	75000	78700	105	85.0-115	

L1410685-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1410685-07 10/05/21 16:29 • (MS) R3712934-5 10/05/21 16:48 • (MSD) R3712934-6 10/05/21 17:06

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC	50000	3190	55800	56100	105	106	1	80.0-120			0.447	20

L1411725-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1411725-02 10/05/21 19:28 • (MS) R3712934-7 10/05/21 19:46 • (MSD) R3712934-8 10/05/21 20:04

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC	50000	5260	57600	57600	105	105	1	80.0-120			0.0347	20

QUALITY CONTROL SUMMARY

L1411725-01,02

Method Blank (MB)

(MB) R3714025-1 10/06/21 11:13

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

L1412507-12 Original Sample (OS) • Duplicate (DUP)

(OS) L1412507-12 10/06/21 13:55 • (DUP) R3714025-3 10/06/21 14:08

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	493000	493000	10	0.0727		15

L1413973-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1413973-01 10/06/21 17:00 • (DUP) R3714025-6 10/06/21 18:46

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	27600	27500	1	0.386		15

Laboratory Control Sample (LCS)

(LCS) R3714025-2 10/06/21 11:27

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	40800	102	80.0-120	

L1413889-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413889-01 10/06/21 15:01 • (MS) R3714025-4 10/06/21 15:14 • (MSD) R3714025-5 10/06/21 15:28

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	10300	61400	61700	102	103	1	80.0-120			0.422	15

L1411725-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1411725-01 10/06/21 19:39 • (MS) R3714025-7 10/06/21 19:52

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50000	13200	66300	106	1	80.0-120	

Method Blank (MB)

(MB) R3712587-1 10/05/21 13:09

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Ammonia Nitrogen	U		117	250

L1411867-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1411867-01 10/05/21 13:51 • (DUP) R3712587-5 10/05/21 13:53

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	ND	ND	1	0.000		10

L1407813-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1407813-01 10/05/21 14:14 • (DUP) R3712587-7 10/05/21 14:15

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	14000	13900	5	0.946		10

Laboratory Control Sample (LCS)

(LCS) R3712587-2 10/05/21 13:11

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Ammonia Nitrogen	7500	7680	102	90.0-110	

L1407813-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1407813-03 10/05/21 14:17 • (MS) R3712587-3 10/05/21 13:17 • (MSD) R3712587-4 10/05/21 13:18

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	5000	ND	5140	5000	103	100	1	90.0-110			2.66	10

L1412511-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1412511-01 10/05/21 13:54 • (MS) R3712587-6 10/05/21 13:56

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ammonia Nitrogen	5000	ND	5090	102	1	90.0-110	

Method Blank (MB)

(MB) R3713375-1 10/06/21 23:24

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Iron	U		18.0	100
Manganese	U		0.934	10.0

Laboratory Control Sample (LCS)

(LCS) R3713375-2 10/06/21 23:26

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Iron	10000	9980	99.8	80.0-120	
Manganese	1000	991	99.1	80.0-120	

L1411600-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1411600-01 10/06/21 23:29 • (MS) R3713375-4 10/06/21 23:35 • (MSD) R3713375-5 10/06/21 23:38

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	10000	563	10800	10800	103	102	1	75.0-125			0.157	20
Manganese	1000	1710	2630	2640	92.4	93.2	1	75.0-125			0.301	20

Method Blank (MB)

(MB) R3713645-1 10/07/21 12:21

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Iron,Dissolved	U		18.0	100
Manganese,Dissolved	U		0.934	10.0

Laboratory Control Sample (LCS)

(LCS) R3713645-2 10/07/21 12:24

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Iron,Dissolved	10000	9880	98.8	80.0-120	
Manganese,Dissolved	1000	979	97.9	80.0-120	

L1411600-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1411600-01 10/07/21 12:27 • (MS) R3713645-4 10/07/21 12:32 • (MSD) R3713645-5 10/07/21 12:35

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron,Dissolved	10000	ND	9600	9670	95.7	96.3	1	75.0-125			0.674	20
Manganese,Dissolved	1000	871	1830	1840	95.4	97.2	1	75.0-125			0.958	20

Method Blank (MB)

(MB) R3713770-2 10/07/21 12:55

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Methane	U		2.91	10.0
Ethane	U		4.07	13.0
Ethene	U		4.26	13.0

L1411242-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1411242-01 10/07/21 13:03 • (DUP) R3713770-3 10/07/21 14:49

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Methane	ND	ND	1	0.000		20
Ethane	ND	ND	1	0.000		20
Ethene	ND	ND	1	0.000		20

L1411600-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1411600-01 10/07/21 15:02 • (DUP) R3713770-4 10/07/21 16:20

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Methane	ND	ND	1	0.000		20
Ethane	ND	ND	1	0.000		20
Ethene	ND	ND	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3713770-1 10/07/21 12:48 • (LCSD) R3713770-7 10/07/21 16:45

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Methane	67.8	72.7	73.6	107	109	85.0-115			1.23	20
Ethane	129	135	130	105	101	85.0-115			3.77	20
Ethene	127	136	130	107	102	85.0-115			4.51	20

L1411600-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1411600-01 10/07/21 15:02 • (MS) R3713770-5 10/07/21 16:29 • (MSD) R3713770-6 10/07/21 16:40

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Methane	67.8	ND	82.9	84.7	122	125	1	50.0-150			2.15	20
Ethane	129	ND	140	144	109	112	1	50.0-150			2.82	20
Ethene	127	ND	138	143	109	113	1	50.0-150			3.56	20

Method Blank (MB)

(MB) R3715369-3 10/08/21 01:48

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
1,1-Dichloroethene	U		0.0200	0.100
cis-1,2-Dichloroethene	U		0.0276	0.100
trans-1,2-Dichloroethene	U		0.0572	0.200
Tetrachloroethene	U		0.0280	0.100
Trichloroethene	U		0.0160	0.0400
Vinyl chloride	U		0.0273	0.100
(S) Toluene-d8	*98.8*			*75.0-131*
(S) 4-Bromofluorobenzene	*105*			*67.0-138*
(S) 1,2-Dichloroethane-d4	*108*			*70.0-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3715369-1 10/08/21 00:32 • (LCSD) R3715369-2 10/08/21 00:51

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,1-Dichloroethene	5.00	5.82	5.32	116	106	65.0-131			8.98	20
cis-1,2-Dichloroethene	5.00	5.65	5.22	113	104	73.0-125			7.91	20
trans-1,2-Dichloroethene	5.00	5.74	5.39	115	108	71.0-125			6.29	20
Tetrachloroethene	5.00	5.15	4.75	103	95.0	70.0-136			8.08	20
Trichloroethene	5.00	6.33	5.85	127	117	76.0-126	J4		7.88	20
Vinyl chloride	5.00	6.22	5.73	124	115	63.0-134			8.20	20
(S) Toluene-d8				*96.3*	*93.9*	*75.0-131*				
(S) 4-Bromofluorobenzene				*102*	*99.4*	*67.0-138*				
(S) 1,2-Dichloroethane-d4				*107*	*110*	*70.0-130*				

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

Qualifier	Description
B	The same analyte is found in the associated blank.
B1	The blank depletion was greater than the recommended maximum depletion of 0.2mg/L.
C5	The reported concentration is an estimate. The continuing calibration standard associated with this data responded high. Data is likely to show a high bias concerning the result.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J4	The associated batch QC was outside the established quality control range for accuracy.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

[redacted]

Company Name/Address:
GeoEngineers- Portland, OR
4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Report to: **Cris Watkins**

Email To: **cwatkins@geoengineers.com**

Project Description: **Alderwood Laundry and Dry Cleaners**

City/State Collected: Lynnwood, WA

Please Circle: (PT) MT CT ET

Phone: **503-603-6661**

Client Project # **17787-001-15**

Lab Project # **GEOENGPOR-1778700115**

Collected by (print): BRITTANY DAVIS

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
✓ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day
Date Results Needed

Quote #

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	**BOD 500mlHDPE-NoPres	Ammonia, NO2+NO3 250mlHDPE-H2SO4	Diss Fe Mn 6010 250mlHDPE-NoPres	EEM RSK175 40mlAmb HCl	Sulfate 125mlHDPE-NoPres	TOC 5310B 250mlHDPE-HCl	Total Fe Mn 6010 250mlHDPE-HNO3	VOCs 8260D ULL* 40mlAmb-HCl	Nitrate + Nitrite (calc 353.2)		Remarks	Sample # (lab only)
MW-2-210929		GW	40'	9/29/21	1425	X	X	X	X	X	X	X	X	XX			61
MW-8-210929		GW	47'	9/29/21	1535	X	X	X	X	X	X	X	X	XX			62
TB-1-210929		GW	—	9/29/21													
		GW															
		GW															
		GW															
		GW															
		GW															
		GW															
		GW															

DRAFT

Chain of Custody Page ___ of ___

Pace Analytical®

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 141125

Table # D167

Acctnum: GEOENGPOR

Template: T194841

Prelogin: P872612

PM: 110 - Brian Ford

PB:

Shipped Via:

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: **BOD has a 48 hour holding time.
*VOC list =PCE, TCE, cis- and trans-1,2-DCE, 1,1-DCE and vinyl chloride only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y N
COC Signed/Accurate:		Y N
Bottles arrive intact:		Y N
Correct bottles used:		Y N
Sufficient volume sent:		Y N
If Applicable		
VOA Zero Headspace:		Y N
Preservation Correct/Checked:		Y N
RAD Screen <0.5 mR/hr:		Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: (Yes) No / HCl / MeoH / TBR	
Brittany Davis	09/29/21	1600		2	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0.3+0 °C 4.8-.1=4.7	Bottles Received: 22
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Bailey Rolen	Date: 10/1/21	Time: 0900

If preservation required by Login: Date/Time

Hold:

Condition: NCF / (OK)

ANALYTICAL REPORT

October 18, 2021

GeoEngineers- Portland, OR

Sample Delivery Group:	L1413166
Samples Received:	10/05/2021
Project Number:	17787-001-15
Description:	Alderwood Laundry and Dry Cleaners

Report To:

Cris Watkins
4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Entire Report Reviewed By:

Kelly Mercer
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

MW3-211004 L1413166-01 GW

Collected by: Brittany Davis | Collected date/time: 10/04/21 13:20 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 353.2	WG1752364	1	10/08/21 01:06	10/08/21 01:06	SDL	Mt. Juliet, TN
Wet Chemistry by Method 5210 B-2011	WG1751477	1	10/05/21 15:37	10/10/21 10:29	KFO	Mt. Juliet, TN
Wet Chemistry by Method 5310 B-2011	WG1753829	1	10/09/21 22:44	10/09/21 22:44	MJA	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1754259	1	10/11/21 04:54	10/11/21 04:54	ELN	Mt. Juliet, TN
Wet Chemistry by Method SM 4500-NH3 G-2011	WG1751960	1	10/06/21 18:25	10/06/21 18:25	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1753602	1	10/08/21 10:30	10/09/21 18:29	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1753617	1	10/09/21 07:05	10/09/21 12:20	EL	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method RSK175	WG1754186	1	10/11/21 10:35	10/11/21 10:35	DAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1753010	1	10/09/21 08:05	10/09/21 08:05	ADM	Mt. Juliet, TN

MW15-211004 L1413166-02 GW

Collected by: Brittany Davis | Collected date/time: 10/04/21 11:35 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 353.2	WG1752364	1	10/08/21 01:10	10/08/21 01:10	SDL	Mt. Juliet, TN
Wet Chemistry by Method 5210 B-2011	WG1751477	1	10/05/21 15:41	10/10/21 10:31	KFO	Mt. Juliet, TN
Wet Chemistry by Method 5310 B-2011	WG1753829	1	10/10/21 00:08	10/10/21 00:08	MJA	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1754259	1	10/11/21 05:12	10/11/21 05:12	ELN	Mt. Juliet, TN
Wet Chemistry by Method SM 4500-NH3 G-2011	WG1751960	1	10/06/21 17:51	10/06/21 17:51	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1753602	1	10/08/21 10:30	10/09/21 18:32	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1753617	1	10/09/21 07:05	10/09/21 12:23	EL	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method RSK175	WG1754186	1	10/11/21 10:40	10/11/21 10:40	DAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1753010	1	10/09/21 08:24	10/09/21 08:24	ADM	Mt. Juliet, TN

MW17-211004 L1413166-03 GW

Collected by: Brittany Davis | Collected date/time: 10/04/21 09:30 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 353.2	WG1752364	1	10/08/21 01:11	10/08/21 01:11	SDL	Mt. Juliet, TN
Wet Chemistry by Method 5210 B-2011	WG1751477	1	10/05/21 15:44	10/10/21 10:33	KFO	Mt. Juliet, TN
Wet Chemistry by Method 5310 B-2011	WG1753829	1	10/10/21 00:19	10/10/21 00:19	MJA	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1754259	1	10/11/21 05:29	10/11/21 05:29	ELN	Mt. Juliet, TN
Wet Chemistry by Method SM 4500-NH3 G-2011	WG1751960	1	10/06/21 17:53	10/06/21 17:53	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1753602	1	10/08/21 10:30	10/09/21 18:35	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1753617	1	10/09/21 07:05	10/09/21 12:25	EL	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method RSK175	WG1754186	1	10/11/21 10:43	10/11/21 10:43	DAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1753010	1	10/09/21 08:43	10/09/21 08:43	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1757538	10	10/14/21 23:50	10/14/21 23:50	ACG	Mt. Juliet, TN

DUP-1-211004 L1413166-04 GW

Collected by: Brittany Davis | Collected date/time: 10/04/21 20:00 | Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 353.2	WG1752364	1	10/08/21 01:12	10/08/21 01:12	SDL	Mt. Juliet, TN
Wet Chemistry by Method 5210 B-2011	WG1751477	1	10/05/21 15:46	10/10/21 10:34	KFO	Mt. Juliet, TN
Wet Chemistry by Method 5310 B-2011	WG1753829	1	10/10/21 00:32	10/10/21 00:32	MJA	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1754259	1	10/11/21 05:47	10/11/21 05:47	ELN	Mt. Juliet, TN
Wet Chemistry by Method SM 4500-NH3 G-2011	WG1751960	1	10/06/21 17:56	10/06/21 17:56	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1753602	1	10/08/21 10:30	10/09/21 18:43	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1753617	1	10/09/21 07:05	10/09/21 12:28	EL	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method RSK175	WG1754186	1	10/11/21 10:47	10/11/21 10:47	DAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1753010	1	10/09/21 09:03	10/09/21 09:03	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1757538	10	10/15/21 00:09	10/15/21 00:09	ACG	Mt. Juliet, TN

RB-1-211004 L1413166-05 GW

Collected by: Brittany Davis
Collected date/time: 10/04/21 15:00
Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 353.2	WG1752364	1	10/08/21 01:14	10/08/21 01:14	SDL	Mt. Juliet, TN
Wet Chemistry by Method 5210 B-2011	WG1751477	1	10/05/21 16:02	10/10/21 10:42	KFO	Mt. Juliet, TN
Wet Chemistry by Method 5310 B-2011	WG1753829	1	10/10/21 00:44	10/10/21 00:44	MJA	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1754259	1	10/11/21 06:05	10/11/21 06:05	ELN	Mt. Juliet, TN
Wet Chemistry by Method SM 4500-NH3 G-2011	WG1751960	1	10/06/21 18:04	10/06/21 18:04	JER	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1753602	1	10/08/21 10:30	10/09/21 18:46	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG1753617	1	10/09/21 07:05	10/09/21 11:41	EL	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method RSK175	WG1754192	1	10/11/21 07:30	10/11/21 07:30	DAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1753010	1	10/09/21 09:22	10/09/21 09:22	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1757538	1	10/14/21 21:54	10/14/21 21:54	ACG	Mt. Juliet, TN

TB-1-211004 L1413166-06 GW

Collected by: Brittany Davis
Collected date/time: 10/04/21 00:00
Received date/time: 10/05/21 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260D	WG1753010	1	10/09/21 07:26	10/09/21 07:26	ADM	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Kelly Mercer
Project Manager

Wet Chemistry by Method 353.2

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	603		100	1	10/08/2021 01:06	WG1752364

Wet Chemistry by Method 5210 B-2011

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
BOD	ND		3330	1	10/10/2021 10:29	WG1751477

Wet Chemistry by Method 5310 B-2011

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	ND		1000	1	10/09/2021 22:44	WG1753829

Wet Chemistry by Method 9056A

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Sulfate	6910		5000	1	10/11/2021 04:54	WG1754259

Wet Chemistry by Method SM 4500-NH3 G-2011

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		250	1	10/06/2021 18:25	WG1751960

Metals (ICP) by Method 6010D

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Iron	4620		100	1	10/09/2021 12:20	WG1753617
Iron,Dissolved	ND		100	1	10/09/2021 18:29	WG1753602
Manganese	179		10.0	1	10/09/2021 12:20	WG1753617
Manganese,Dissolved	ND		10.0	1	10/09/2021 18:29	WG1753602

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Methane	ND		10.0	1	10/11/2021 10:35	WG1754186
Ethane	ND		13.0	1	10/11/2021 10:35	WG1754186
Ethene	ND		13.0	1	10/11/2021 10:35	WG1754186

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
1,1-Dichloroethene	ND		0.100	1	10/09/2021 08:05	WG1753010
cis-1,2-Dichloroethene	2.81		0.100	1	10/09/2021 08:05	WG1753010
trans-1,2-Dichloroethene	ND		0.200	1	10/09/2021 08:05	WG1753010
Tetrachloroethene	73.9		0.100	1	10/09/2021 08:05	WG1753010
Trichloroethene	3.15		0.0400	1	10/09/2021 08:05	WG1753010
Vinyl chloride	ND		0.100	1	10/09/2021 08:05	WG1753010
(S) Toluene-d8	*97.4*		*75.0-131*		*10/09/2021 08:05*	WG1753010
(S) 4-Bromofluorobenzene	*103*		*67.0-138*		*10/09/2021 08:05*	WG1753010
(S) 1,2-Dichloroethane-d4	*107*		*70.0-130*		*10/09/2021 08:05*	WG1753010

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate-Nitrite	2860		100	1	10/08/2021 01:10	WG1752364

Wet Chemistry by Method 5210 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
BOD	ND		3330	1	10/10/2021 10:31	WG1751477

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
TOC (Total Organic Carbon)	ND		1000	1	10/10/2021 00:08	WG1753829

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	6620		5000	1	10/11/2021 05:12	WG1754259

Wet Chemistry by Method SM 4500-NH3 G-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Ammonia Nitrogen	ND		250	1	10/06/2021 17:51	WG1751960

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Iron	4240		100	1	10/09/2021 12:23	WG1753617
Iron,Dissolved	ND		100	1	10/09/2021 18:32	WG1753602
Manganese	152		10.0	1	10/09/2021 12:23	WG1753617
Manganese,Dissolved	ND		10.0	1	10/09/2021 18:32	WG1753602

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Methane	ND		10.0	1	10/11/2021 10:40	WG1754186
Ethane	ND		13.0	1	10/11/2021 10:40	WG1754186
Ethene	ND		13.0	1	10/11/2021 10:40	WG1754186

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,1-Dichloroethene	ND		0.100	1	10/09/2021 08:24	WG1753010
cis-1,2-Dichloroethene	ND		0.100	1	10/09/2021 08:24	WG1753010
trans-1,2-Dichloroethene	ND		0.200	1	10/09/2021 08:24	WG1753010
Tetrachloroethene	41.5		0.100	1	10/09/2021 08:24	WG1753010
Trichloroethene	0.979		0.0400	1	10/09/2021 08:24	WG1753010
Vinyl chloride	ND		0.100	1	10/09/2021 08:24	WG1753010
(S) Toluene-d8	*96.2*		*75.0-131*		*10/09/2021 08:24*	WG1753010
(S) 4-Bromofluorobenzene	*101*		*67.0-138*		*10/09/2021 08:24*	WG1753010
(S) 1,2-Dichloroethane-d4	*105*		*70.0-130*		*10/09/2021 08:24*	WG1753010

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate-Nitrite	1170		100	1	10/08/2021 01:11	WG1752364

Wet Chemistry by Method 5210 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
BOD	ND		3330	1	10/10/2021 10:33	WG1751477

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
TOC (Total Organic Carbon)	ND		1000	1	10/10/2021 00:19	WG1753829

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	8080		5000	1	10/11/2021 05:29	WG1754259

Wet Chemistry by Method SM 4500-NH3 G-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Ammonia Nitrogen	ND		250	1	10/06/2021 17:53	WG1751960

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Iron	9380		100	1	10/09/2021 12:25	WG1753617
Iron,Dissolved	ND		100	1	10/09/2021 18:35	WG1753602
Manganese	288		10.0	1	10/09/2021 12:25	WG1753617
Manganese,Dissolved	10.6		10.0	1	10/09/2021 18:35	WG1753602

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Methane	ND		10.0	1	10/11/2021 10:43	WG1754186
Ethane	ND		13.0	1	10/11/2021 10:43	WG1754186
Ethene	ND		13.0	1	10/11/2021 10:43	WG1754186

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,1-Dichloroethene	ND		0.100	1	10/09/2021 08:43	WG1753010
cis-1,2-Dichloroethene	1.02		0.100	1	10/09/2021 08:43	WG1753010
trans-1,2-Dichloroethene	ND		0.200	1	10/09/2021 08:43	WG1753010
Tetrachloroethene	162		1.00	10	10/14/2021 23:50	WG1757538
Trichloroethene	4.30		0.0400	1	10/09/2021 08:43	WG1753010
Vinyl chloride	ND		0.100	1	10/09/2021 08:43	WG1753010
(S) Toluene-d8	*95.7*		*75.0-131*		*10/09/2021 08:43*	WG1753010
(S) Toluene-d8	*95.9*		*75.0-131*		*10/14/2021 23:50*	WG1757538
(S) 4-Bromofluorobenzene	*102*		*67.0-138*		*10/09/2021 08:43*	WG1753010
(S) 4-Bromofluorobenzene	*99.1*		*67.0-138*		*10/14/2021 23:50*	WG1757538
(S) 1,2-Dichloroethane-d4	*107*		*70.0-130*		*10/09/2021 08:43*	WG1753010
(S) 1,2-Dichloroethane-d4	*110*		*70.0-130*		*10/14/2021 23:50*	WG1757538

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate-Nitrite	1160		100	1	10/08/2021 01:12	WG1752364

Wet Chemistry by Method 5210 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
BOD	ND		3330	1	10/10/2021 10:34	WG1751477

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
TOC (Total Organic Carbon)	ND		1000	1	10/10/2021 00:32	WG1753829

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	7930		5000	1	10/11/2021 05:47	WG1754259

Wet Chemistry by Method SM 4500-NH3 G-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Ammonia Nitrogen	ND		250	1	10/06/2021 17:56	WG1751960

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Iron	5160		100	1	10/09/2021 12:28	WG1753617
Iron,Dissolved	ND		100	1	10/09/2021 18:43	WG1753602
Manganese	238		10.0	1	10/09/2021 12:28	WG1753617
Manganese,Dissolved	ND		10.0	1	10/09/2021 18:43	WG1753602

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Methane	ND		10.0	1	10/11/2021 10:47	WG1754186
Ethane	ND		13.0	1	10/11/2021 10:47	WG1754186
Ethene	ND		13.0	1	10/11/2021 10:47	WG1754186

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,1-Dichloroethene	ND		0.100	1	10/09/2021 09:03	WG1753010
cis-1,2-Dichloroethene	0.991		0.100	1	10/09/2021 09:03	WG1753010
trans-1,2-Dichloroethene	ND		0.200	1	10/09/2021 09:03	WG1753010
Tetrachloroethene	165		1.00	10	10/15/2021 00:09	WG1757538
Trichloroethene	4.54		0.0400	1	10/09/2021 09:03	WG1753010
Vinyl chloride	ND		0.100	1	10/09/2021 09:03	WG1753010
(S) Toluene-d8	*98.4*		*75.0-131*		*10/09/2021 09:03*	WG1753010
(S) Toluene-d8	*95.9*		*75.0-131*		*10/15/2021 00:09*	WG1757538
(S) 4-Bromofluorobenzene	*101*		*67.0-138*		*10/09/2021 09:03*	WG1753010
(S) 4-Bromofluorobenzene	*99.2*		*67.0-138*		*10/15/2021 00:09*	WG1757538
(S) 1,2-Dichloroethane-d4	*102*		*70.0-130*		*10/09/2021 09:03*	WG1753010
(S) 1,2-Dichloroethane-d4	*111*		*70.0-130*		*10/15/2021 00:09*	WG1757538

Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Nitrate-Nitrite	409		100	1	10/08/2021 01:14	WG1752364

Wet Chemistry by Method 5210 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
BOD	ND		3330	1	10/10/2021 10:42	WG1751477

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
TOC (Total Organic Carbon)	ND		1000	1	10/10/2021 00:44	WG1753829

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Sulfate	ND		5000	1	10/11/2021 06:05	WG1754259

Wet Chemistry by Method SM 4500-NH3 G-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Ammonia Nitrogen	ND		250	1	10/06/2021 18:04	WG1751960

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Iron	ND		100	1	10/09/2021 11:41	WG1753617
Iron,Dissolved	ND		100	1	10/09/2021 18:46	WG1753602
Manganese	ND		10.0	1	10/09/2021 11:41	WG1753617
Manganese,Dissolved	ND		10.0	1	10/09/2021 18:46	WG1753602

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Methane	ND		10.0	1	10/11/2021 07:30	WG1754192
Ethane	ND		13.0	1	10/11/2021 07:30	WG1754192
Ethene	ND		13.0	1	10/11/2021 07:30	WG1754192

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,1-Dichloroethene	ND		0.100	1	10/09/2021 09:22	WG1753010
cis-1,2-Dichloroethene	ND		0.100	1	10/09/2021 09:22	WG1753010
trans-1,2-Dichloroethene	ND		0.200	1	10/09/2021 09:22	WG1753010
Tetrachloroethene	0.265		0.100	1	10/14/2021 21:54	WG1757538
Trichloroethene	ND		0.0400	1	10/09/2021 09:22	WG1753010
Vinyl chloride	ND		0.100	1	10/09/2021 09:22	WG1753010
(S) Toluene-d8	*98.9*		*75.0-131*		*10/09/2021 09:22*	WG1753010
(S) Toluene-d8	*98.1*		*75.0-131*		*10/14/2021 21:54*	WG1757538
(S) 4-Bromofluorobenzene	*99.6*		*67.0-138*		*10/09/2021 09:22*	WG1753010
(S) 4-Bromofluorobenzene	*96.2*		*67.0-138*		*10/14/2021 21:54*	WG1757538
(S) 1,2-Dichloroethane-d4	*106*		*70.0-130*		*10/09/2021 09:22*	WG1753010
(S) 1,2-Dichloroethane-d4	*108*		*70.0-130*		*10/14/2021 21:54*	WG1757538

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,1-Dichloroethene	ND		0.100	1	10/09/2021 07:26	WG1753010
cis-1,2-Dichloroethene	ND		0.100	1	10/09/2021 07:26	WG1753010
trans-1,2-Dichloroethene	ND		0.200	1	10/09/2021 07:26	WG1753010
Tetrachloroethene	ND		0.100	1	10/09/2021 07:26	WG1753010
Trichloroethene	ND		0.0400	1	10/09/2021 07:26	WG1753010
Vinyl chloride	ND		0.100	1	10/09/2021 07:26	WG1753010
(S) Toluene-d8	*94.7*		*75.0-131*		*10/09/2021 07:26*	WG1753010
(S) 4-Bromofluorobenzene	*105*		*67.0-138*		*10/09/2021 07:26*	WG1753010
(S) 1,2-Dichloroethane-d4	*109*		*70.0-130*		*10/09/2021 07:26*	WG1753010

QUALITY CONTROL SUMMARY

L1413166-01,02,03,04,05

Method Blank (MB)

(MB) R3713864-1 10/08/21 00:34

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Nitrate-Nitrite	U		50.0	100

L1408721-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1408721-02 10/08/21 00:37 • (DUP) R3713864-3 10/08/21 00:38

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Nitrate-Nitrite	7100	7040	2	0.849		20

L1413166-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1413166-05 10/08/21 01:14 • (DUP) R3713864-7 10/08/21 01:15

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Nitrate-Nitrite	409	410	1	0.244		20

Laboratory Control Sample (LCS)

(LCS) R3713864-2 10/08/21 00:35

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Nitrate-Nitrite	2500	2560	102	90.0-110	

L1411787-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1411787-02 10/08/21 00:58 • (MS) R3713864-4 10/08/21 01:00

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	ug/l	ug/l	ug/l	%		%	
Nitrate-Nitrite	2500	19200	21100	76.0	5	90.0-110	V

L1413166-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413166-01 10/08/21 01:06 • (MS) R3713864-5 10/08/21 01:07 • (MSD) R3713864-6 10/08/21 01:08

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Nitrate-Nitrite	2500	603	3020	3000	96.7	95.9	1	90.0-110			0.664	20

Method Blank (MB)

(MB) R3714479-1 10/10/21 11:14

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
BOD	U		200	200

L1413012-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1413012-02 10/10/21 09:38 • (DUP) R3714479-5 10/10/21 09:40

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
BOD	3400	4200	1	21		30

Original Sample (OS) • Duplicate (DUP)

(OS) • (DUP) R3714479-6 10/10/21 10:23

Analyte	Original Result	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
BOD		19300	1	12		30

L1413166-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1413166-05 10/10/21 10:42 • (DUP) R3714479-7 10/10/21 10:59

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
BOD	ND	ND	1	0		30

Laboratory Control Sample (LCS)

(LCS) R3714479-2 10/10/21 09:30

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
BOD	198000	179000	90.4	84.6-115	

Laboratory Control Sample (LCS)

(LCS) R3714479-3 10/10/21 10:40

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
BOD	198000	169000	85.4	84.6-115	

Laboratory Control Sample (LCS)

(LCS) R3714479-4 10/10/21 11:11

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
BOD	198000	169000	85.5	84.6-115	

Method Blank (MB)

(MB) R3714649-2 10/09/21 12:55

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
TOC (Total Organic Carbon)	310	J	102	1000

L1412631-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1412631-04 10/09/21 18:51 • (DUP) R3714649-3 10/09/21 19:11

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	24600	25600	2	4.03		20

L1413166-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1413166-05 10/10/21 00:44 • (DUP) R3714649-8 10/10/21 00:57

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	ND	ND	1	2.80		20

Laboratory Control Sample (LCS)

(LCS) R3714649-1 10/09/21 12:43

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TOC (Total Organic Carbon)	75000	76500	102	85.0-115	

L1412631-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1412631-09 10/09/21 21:13 • (MS) R3714649-4 10/09/21 21:31 • (MSD) R3714649-5 10/09/21 21:49

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	ND	50300	47700	100	94.8	1	80.0-120			5.29	20

L1413166-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413166-01 10/09/21 22:44 • (MS) R3714649-6 10/09/21 23:03 • (MSD) R3714649-7 10/09/21 23:20

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	ND	48100	47800	95.7	95.1	1	80.0-120			0.689	20

QUALITY CONTROL SUMMARY

L1413166-01,02,03,04,05

Method Blank (MB)

(MB) R3714837-1 10/10/21 20:17

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

L1412793-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1412793-01 10/10/21 22:19 • (DUP) R3714837-3 10/10/21 22:36

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	19200	19000	1	1.24		15

L1413166-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1413166-05 10/11/21 06:05 • (DUP) R3714837-6 10/11/21 06:23

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	ND	ND	1	0.217		15

Laboratory Control Sample (LCS)

(LCS) R3714837-2 10/10/21 20:35

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	39300	98.3	80.0-120	

L1412793-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1412793-02 10/10/21 22:54 • (MS) R3714837-4 10/10/21 23:12 • (MSD) R3714837-5 10/10/21 23:30

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50000	ND	47000	46400	92.2	91.1	1	80.0-120			1.23	15

L1413166-05 Original Sample (OS) • Matrix Spike (MS)

(OS) L1413166-05 10/11/21 06:05 • (MS) R3714837-7 10/11/21 06:41

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50000	ND	48800	96.1	1	80.0-120	

Method Blank (MB)

(MB) R3713291-1 10/06/21 17:23

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Ammonia Nitrogen	U		117	250

L1412891-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1412891-08 10/06/21 17:32 • (DUP) R3713291-5 10/06/21 17:33

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	1510	1540	1	2.29		10

L1413166-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1413166-04 10/06/21 17:56 • (DUP) R3713291-7 10/06/21 18:02

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	ND	ND	1	0.000		10

Laboratory Control Sample (LCS)

(LCS) R3713291-2 10/06/21 17:24

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Ammonia Nitrogen	7500	6980	93.1	90.0-110	

L1412830-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1412830-02 10/06/21 18:22 • (MS) R3713291-3 10/06/21 17:29 • (MSD) R3713291-4 10/06/21 17:30

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	5000	ND	4840	4770	96.7	95.5	1	90.0-110			1.29	10

L1413166-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L1413166-03 10/06/21 17:53 • (MS) R3713291-6 10/06/21 17:55

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ammonia Nitrogen	5000	ND	4730	94.7	1	90.0-110	

Method Blank (MB)

(MB) R3714490-1 10/09/21 17:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Iron,Dissolved	U		18.0	100
Manganese,Dissolved	U		0.934	10.0

Laboratory Control Sample (LCS)

(LCS) R3714490-2 10/09/21 17:37

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Iron,Dissolved	10000	9590	95.9	80.0-120	
Manganese,Dissolved	1000	1000	100	80.0-120	

L1411722-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1411722-01 10/09/21 17:40 • (MS) R3714490-4 10/09/21 17:46 • (MSD) R3714490-5 10/09/21 17:48

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron,Dissolved	10000	ND	9340	9610	93.4	96.1	1	75.0-125			2.83	20
Manganese,Dissolved	1000	ND	986	974	98.6	97.4	1	75.0-125			1.27	20

Method Blank (MB)

(MB) R3714501-1 10/09/21 11:36

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Iron	U		18.0	100
Manganese	U		0.934	10.0

Laboratory Control Sample (LCS)

(LCS) R3714501-2 10/09/21 11:38

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Iron	10000	9450	94.5	80.0-120	
Manganese	1000	936	93.6	80.0-120	

L1413166-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1413166-05 10/09/21 11:41 • (MS) R3714501-4 10/09/21 11:46 • (MSD) R3714501-5 10/09/21 11:49

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	10000	ND	9620	9620	95.9	95.9	1	75.0-125			0.0509	20
Manganese	1000	ND	957	964	95.7	96.4	1	75.0-125			0.733	20

Method Blank (MB)

(MB) R3714784-2 10/11/21 10:05

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Methane	U		2.91	10.0
Ethane	U		4.07	13.0
Ethene	U		4.26	13.0

L1412777-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1412777-09 10/11/21 10:12 • (DUP) R3714784-3 10/11/21 11:10

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Methane	ND	ND	1	0.000		20
Ethane	ND	ND	1	0.000		20
Ethene	ND	ND	1	0.000		20

L1414197-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1414197-04 10/11/21 11:19 • (DUP) R3714784-4 10/11/21 12:04

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Methane	742	753	1	1.47		20
Ethane	ND	ND	1	0.000		20
Ethene	ND	ND	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3714784-1 10/11/21 09:53 • (LCSD) R3714784-5 10/11/21 12:56

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
Methane	67.8	62.5	76.1	92.2	112	85.0-115			19.6	20
Ethane	129	117	131	90.7	102	85.0-115			11.3	20
Ethene	127	117	130	92.1	102	85.0-115			10.5	20

Method Blank (MB)

(MB) R3714653-2 10/11/21 07:26

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Methane	U		2.91	10.0
Ethane	U		4.07	13.0
Ethene	U		4.26	13.0

L1413166-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1413166-05 10/11/21 07:30 • (DUP) R3714653-3 10/11/21 08:38

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Methane	ND	ND	1	0.000		20
Ethane	ND	ND	1	0.000		20
Ethene	ND	ND	1	0.000		20

L1413227-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1413227-06 10/11/21 08:51 • (DUP) R3714653-4 10/11/21 09:47

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Methane	3130	3050	1	2.59		20
Ethane	ND	ND	1	0.000		20
Ethene	ND	ND	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3714653-1 10/11/21 07:00 • (LCSD) R3714653-5 10/11/21 09:53

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
Methane	67.8	64.8	62.5	95.6	92.2	85.0-115			3.61	20
Ethane	129	122	117	94.6	90.7	85.0-115			4.18	20
Ethene	127	121	117	95.3	92.1	85.0-115			3.36	20

Method Blank (MB)

(MB) R3716009-3 10/09/21 07:07

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
1,1-Dichloroethene	U		0.0200	0.100
cis-1,2-Dichloroethene	U		0.0276	0.100
trans-1,2-Dichloroethene	U		0.0572	0.200
Tetrachloroethene	U		0.0280	0.100
Trichloroethene	U		0.0160	0.0400
Vinyl chloride	U		0.0273	0.100
(S) Toluene-d8	*96.4*			*75.0-131*
(S) 4-Bromofluorobenzene	*105*			*67.0-138*
(S) 1,2-Dichloroethane-d4	*106*			*70.0-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3716009-1 10/09/21 05:50 • (LCSD) R3716009-2 10/09/21 06:09

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
1,1-Dichloroethene	5.00	5.14	5.32	103	106	65.0-131			3.44	20
cis-1,2-Dichloroethene	5.00	5.50	5.76	110	115	73.0-125			4.62	20
trans-1,2-Dichloroethene	5.00	5.65	5.83	113	117	71.0-125			3.14	20
Tetrachloroethene	5.00	4.86	4.94	97.2	98.8	70.0-136			1.63	20
Trichloroethene	5.00	5.52	5.81	110	116	76.0-126			5.12	20
Vinyl chloride	5.00	5.42	5.35	108	107	63.0-134			1.30	20
(S) Toluene-d8				*96.5*	*97.4*	*75.0-131*				
(S) 4-Bromofluorobenzene				*103*	*102*	*67.0-138*				
(S) 1,2-Dichloroethane-d4				*107*	*113*	*70.0-130*				

Method Blank (MB)

(MB) R3717808-3 10/14/21 21:15

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Tetrachloroethene	U		0.0280	0.100
(S) Toluene-d8	*97.4*			*75.0-131*
(S) 4-Bromofluorobenzene	*93.4*			*67.0-138*
(S) 1,2-Dichloroethane-d4	*106*			*70.0-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3717808-1 10/14/21 19:58 • (LCSD) R3717808-2 10/14/21 20:17

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Tetrachloroethene	5.00	5.37	5.56	107	111	70.0-136			3.48	20
(S) Toluene-d8				*96.8*	*95.9*	*75.0-131*				
(S) 4-Bromofluorobenzene				*94.2*	*99.1*	*67.0-138*				
(S) 1,2-Dichloroethane-d4				*110*	*108*	*70.0-130*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

J	The identification of the analyte is acceptable; the reported value is an estimate.
V	The sample concentration is too high to evaluate accurate spike recoveries.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company/Address:
GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Report to: **Cris Watkins**

Email To: **cwatkins@geoengineers.com**

Project Description: **Alderwood Laundry and Dry Cleaners**

City/State Collected: LYNNWOOD, WA

Please Circle: (PT) MT CT ET

Phone: **503-603-6661**

Client Project # **17787-001-15**

Lab Project # **GEOENGPOR-1778700115**

Collected by (print): BRITTANY DAVIS

Site/Facility ID #

P.O. #

Collected by (signature): Brittany Davis

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
✓ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	**BOD 500mlHDPE-NoPres	Ammonia, NO2+NO3 250mlHDPE-H2SO4	Diss Fe Mn 6010 250mlHDPE-NoPres	EEM RSK175 40mlAmb HCl	Sulfate 125mlHDPE-NoPres	TOC 5310B 250mlHDPE-HCl	Total Fe Mn 6010 250mlHDPE-HNO3	VOCs 8260D ULL* 40mlAmb-HCl	Nitrate/Nitrite EPA 353.2	Remarks	Sample # (lab only)
MW3-211004		GW		10/4/21	1320	11	X	X	X	X	X	X	X	X	X		-01
MW15-211004				10/4/21	1135	11											-02
MW17-211004				10/4/21	0930	11											-03
DUP-1-211004					0000												-04
RB-1-211004					1500	2											-05
~~TB-1-211004~~					1600												
TB-1-211004						1								X			-06

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:**BOD has a 48 hour holding time.
*VOC list =PCE, TCE, cis- and trans-1,2-DCE, 1,1-DCE and vinyl chloride only.

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS ✓ FedEx __ Courier _____

Tracking # 5717 3308 0191

Relinquished by : (Signature) Brittany Davis | Date: 10/4/21 | Time: 1515 | Received by: (Signature)

Relinquished by : (Signature) | Date: | Time: | Received by: (Signature)

Relinquished by : (Signature) | Date: | Time: | Received for lab by: (Signature) K. Hale | Date: 10/5/21 | Time: 9:45

Trip Blank Received: (Yes) / No
HCl / MeoH
TBR

Temp: 3.4 °C Bottles Received: 55
0.8+1=0.9

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Chain of Custody Page ___ of ___

Pace Analytical®

L14136 6

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # C011

Tat

Acctnum: GEOENGPOR
Template: T194841
Prelogin: P872612
PM: 110 - Brian Ford
PB:
Shipped Via: