FEBRUARY 2020 GROUNDWATER MONITORING REPORT

13.4-ACRE UNDEVELOPED PARCEL, 16720 WALLER ROAD EAST, PIERCE COUNTY, WASHINGTON

Prepared for
Pierce County Planning & Public Works

Prepared by
Herrera Environmental Consultants, Inc.

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Note:
Some pages in this document have been purposely skipped or blank pages inserted so that this document will copy correctly when duplexed.

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13.4-ACRE UNDEVELOPED PARCEL, 16720 WALLER ROAD EAST, PIERCE COUNTY, WASHINGTON

Prepared for
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February 26, 2020

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CERTIFICATE OF LICENSED HYDROGEOLOGIST

This document has been prepared under the supervision of a licensed hydrogeologist.

Bruce A. Carpenter
Name

February 26, 2020
Date

INTRODUCTION

This February 2020 Groundwater Monitoring Report (report) has been prepared by Herrera Environmental Consultants, Inc. (Herrera) for the 13.4-acre undeveloped parcel of land located at 16720 Waller Road East, parcel number 0319262074, in unincorporated Pierce County, Washington. The 13.4-acre parcel, hereafter referred to as the *Site*, abuts the northerly boundary of the Prairie Pit Maintenance Facility owned by Pierce County (County) and is being sold to the Bethel School District to be developed as an elementary school (Figure 1).

The County entered the Voluntary Cleanup Program administered by the Washington State Department of Ecology (Ecology) in July 2019 and is pursuing No Further Action (NFA) for the 13.4-acre undeveloped parcel. The February 2020 groundwater monitoring at wells MW-1 through MW-3 (Figure 2) was the third quarterly groundwater monitoring event completed to characterize groundwater conditions at the site in support of NFA.

The County is performing work at the Site to meet the requirements of the Model Toxics Control Act (MTCA) Cleanup Regulation, Washington Administrative Code (WAC) Chapter 173-340. The quarterly monitoring is being performed to collect data and information on the seasonal variability of conditions at the Site to inform the remedial investigation.

SITE DESCRIPTION AND BACKGROUND

A 34.9-acre property along Waller Road East consists of two parcels: the 13.4-acre vacant, undeveloped land on the north end (the Site), and the 21.5 acre of land on the south end used by the County as a maintenance facility (Prairie Pit Maintenance Facility; parcel number 0319263091). The property is situated in Section 26, Township 19 North, Range 3 East of the Willamette Meridian. Both parcels are located approximately 800 feet south of Military Road East, and directly adjacent to and west of Waller Road East, in unincorporated Pierce County, Washington. According to Pierce County's Public Geographic Information System (GIS) website, the Site is currently zoned Moderate Density Single-Family (Pierce County 2019).

The County property, including the Site being sold to the Bethel School District, is surrounded by a locked fence. Access to the Site is provided from Waller Road East and is restricted to Pierce County employees.

In May 2019, Shannon & Wilson conducted a limited Phase II Environmental Site Assessment (ESA) as part of due diligence investigations of the site associated with the Bethel School District's acquisition of the site (S&W 2019). The Phase II ESA identified soil contamination that triggered additional site characterization activities, site remediation work to excavate contaminated soils, and groundwater monitoring to characterize groundwater conditions and flow direction at the Site.

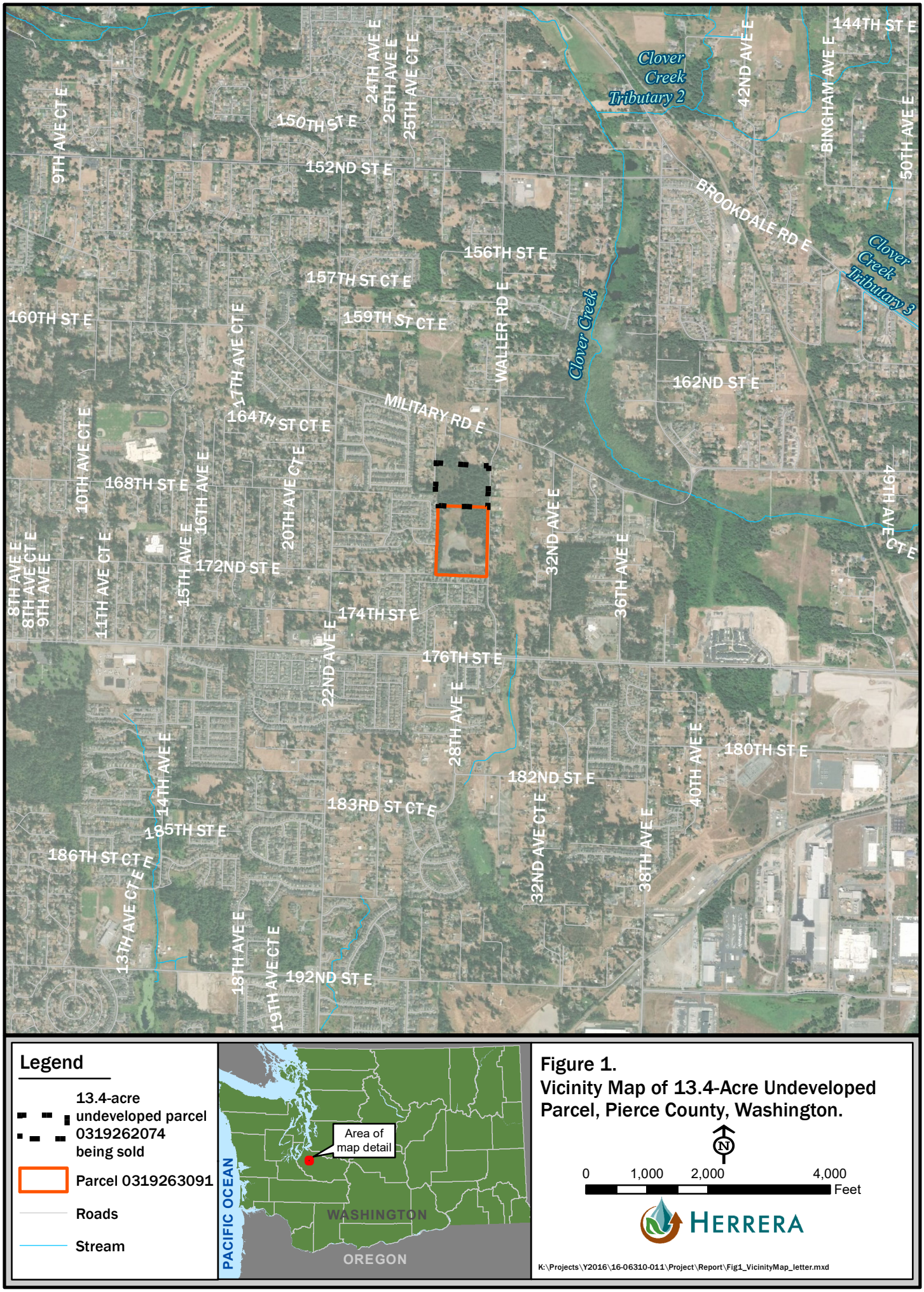
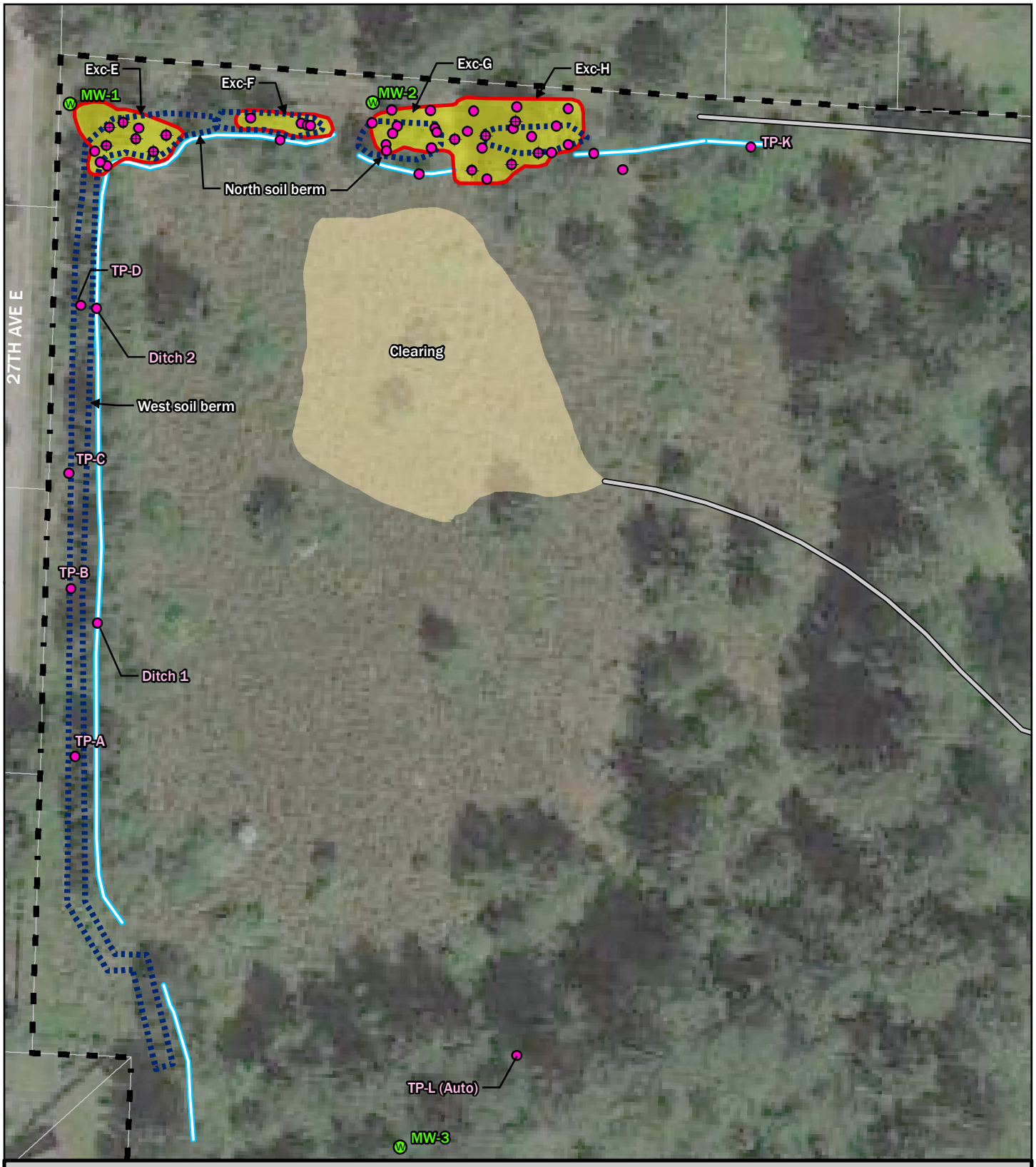


Figure 1.
Vicinity Map of 13.4-Acre Undeveloped Parcel, Pierce County, Washington.



Legend

- Monitoring well
- Discrete grab soil sample
- Composite soil sample
- Parcel 0319262074 being sold
- Excavation final boundary
- Parcel boundary
- Soil berm
- Clearing area
- Ditch
- Access road

Figure 2.
Test Pits, Excavations, and Monitoring Well Locations at the 13.4-Acre Undeveloped Parcel, Pierce County, Washington.

0 35 70 140 Feet

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Google Earth, Aerial (2018)

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In July and August 2019, additional site characterization activities and remedial activities were completed to remove contaminated soils from four remedial excavations at the Site. A total of 242.49 tons of soils designated as Dangerous Waste were disposed of at Chemical Waste Management in Arlington, Oregon, which is permitted to accept such waste; 759.28 tons of soils designated as petroleum-contaminated soil (PCS) were disposed of at LRI in Puyallup, Washington, which is permitted to accept PCS. The Site has been successfully remediated in compliance with Washington Administrative Code Chapter 173-340. The remedial action removed all contamination to levels below the ecological screening levels and/or Model Toxics Control Act Method A or B cleanup levels for unrestricted land use.

On January 30, 2020, Ecology issued an opinion letter to Pierce County regarding the Site characterization and cleanup actions completed thus far and listed remaining requirements needed to support No Further Action for the Site, including:

1. At least one additional groundwater monitoring event (i.e., February 2020).

2. All remaining Site data uploaded and accepted into Ecology's environmental information management system, as well as reviewed and approved by the site manager.

3. All current and future invoices for Ecology review will need to be paid.

Pending Ecology review of this report, and completion of items 2 and 3 above, it is anticipated that an unrestricted No Further Action finding will be issued for the Site.

METHODS

GROUNDWATER SAMPLING

On February 4, 2020, Herrera staff collected groundwater samples from three onsite monitoring wells (MW-1 through MW-3) depicted in Figure 2. Herrera hand delivered the samples to OnSite Environmental, Inc. in Redmond, Washington, for laboratory analysis of the following:

- Gasoline-range total petroleum hydrocarbons (TPH) by Ecology Method NWTPH-Gx.
- Diesel- and oil-range TPH by Ecology Method NWTPH-Dx.
- Volatile organic compounds (VOCs) by US Environmental Protection Agency (EPA) Method 8260C.
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs) by EPA Method 8270D/SIM.
- Dissolved and total MTCA metals by EPA Methods 200.8/7470A.
- Contingent analysis for polychlorinated biphenyls (PCBs) was not performed based on no detections of petroleum hydrocarbons in the samples.

All wells were purged and sampled with a submersible pump using low-flow techniques. Water quality indicator parameters were recorded until drawdown, flow rate, and parameters had stabilized, at which time samples were collected. Detailed field procedures used for sample collection are provided in Appendix A. Groundwater sampling field notes are provided in Appendix B.

RESULTS

GROUNDWATER CONDITIONS

The Site rests on a broad glacial recessional outwash plain, formed by melt water streams as the continental glaciers ablated, approximately 13,000 years ago. The Site slopes gently from west to east with surveyed ground elevations ranging from 380 feet above mean sea level at the northwest corner to 386 feet at the southwest corner to 373 feet along the east property line (Sitts & Hill 2019). The Site is relatively level with surface water either infiltrating where precipitation falls or collecting in drainage ditches to infiltrate at the foot of the north and west berms.

Groundwater in the site vicinity is reported as generally 30 feet below ground surface (bgs) or deeper in the shallow aquifer, flowing to the north-northwest (Brown and Caldwell et al. 1985; Ecology 2020). The depth of water varied by season and monitoring well from 24.98 to 42.91 bgs (Table 1). The groundwater gradient measured on February 4, 2020, along the predominant northerly flow between wells MW-3 to MW-1 was relatively flat, at 0.0065 feet/foot.

Table 1. Summary of the Water Level Elevation Data from Monitoring Wells, 13.4-Acre Undeveloped Parcel, Pierce County, Washington.

Monitoring Well Identification	Measurement Date	Reference Point Elevation[a] (feet)	Depth to Water[b] (feet)	Water Level Elevation[c] (feet)
MW-1	8/5/2019	379.50	37.68	341.82
	11/1/2019		38.64	340.86
	2/4/2020		24.98	354.52
MW-2	8/5/2019	382.33	40.66	341.67
	11/1/2019		41.58	340.75
	2/4/2020		28.03	354.30
MW-3	8/5/2019	384.97	41.98	342.99
	11/1/2019		42.91	342.06
	2/4/2020		28.83	356.14

[a] Reference point elevations (top of well casings) surveyed August 2019 by Sitts & Hill Engineers, Inc., Tacoma, Washington.

[b] Depth to water measurements were taken from reference points marks at the top of the PVC casing.

[c] Relative to reference point elevation.

GROUNDWATER ANALYTICAL RESULTS

Analytical results are presented in Table 2. The laboratory reports and chain-of-custody records are provided in Appendix C, and the Data Quality Assurance Review is provided in Appendix D. Analytical results for each sampling event are presented in Table 2.

Water quality has not changed significantly since the first monitoring event on August 5, 2019, when total chromium, lead, and zinc were detected above the laboratory reporting limits in MW-1, but below MTCA Method A cleanup levels. Total lead and chromium were detected during the February 2020 event, but were below MTCA Method A cleanup levels. It is assumed that the detection of metals above the reporting limits is attributed to slight turbidity in the samples. No VOCs, dissolved MTCA metals, gasoline- or diesel-range petroleum hydrocarbons, or PAHs were detected in any of the wells during the three events.

Table 2. Summary of Groundwater Sampling Analytical Results, August and November 2019, and February 2020, 13.4-Acre Undeveloped Parcel, Pierce County, Washington.

Parameter	MW-1			MW-2			MW-3			MTCA Method A Cleanup Level
Date	8/5/19	11/1/19	2/4/20	8/5/19	11/1/19	2/4/20	8/5/19	11/1/19	2/4/20	
NWTPH-G (µg/L)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	1,000
NWTPH-Dx (mg/L)										
Diesel Range Organics	ND (0.29)	ND (0.21)	ND (0.21)	ND (0.26)	ND (0.21)	ND (0.20)	ND (0.25)	ND (0.20)	ND (0.20)	0.5
Lube Oil	ND (0.46)	ND (0.21)	ND (0.21)	ND (0.41)	ND (0.21	ND (0.20)	ND (0.40)	ND (0.20	ND (0.20)	0.5
VOCs (µg/L)	ND (PQLs vary)			ND (PQLs vary)			ND (PQLs vary)			Varies
Metals (µg/L)										
Total Cadmium	ND (4.4)	ND (4.4)	ND (4.4)	ND (4.4)	ND (4.4)	ND (4.4)	ND (4.4)	ND (4.4)	ND (4.4)	5.0
Dissolved Cadmium	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	5.0
Total Chromium	**22**	ND (11)	**12**	ND (11)	ND (11)	ND (11)	ND (11)	ND (11)	**18**	50
Dissolved Chromium	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	50
Total Lead	**4.6**	ND (1.1)	**1.2**	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	15
Dissolved Lead	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	15
Total Nickel	ND (22)	ND (22)	ND (22)	ND (22)	ND (22)	ND (22)	ND (22)	ND (22)	ND (22)	320[a]
Dissolved Nickel	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	320[a]
Total Zinc	**40**	ND (28)	ND (28)	ND (28)	ND (28)	ND (28)	ND (28)	ND (28)	ND (28)	4,800[a]
Dissolved Zinc	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)	4,800[a]
Ethylene dibromide (µg/L)	ND (0.0096)	–	–	ND (0.0096)	–	–	ND (0.0097)	–	–	0.01
Tert-Amyl Methyl Ether (TAME) (µg/L)	ND (1.0)	–	–	ND (1.0)	–	–	ND (1.0)	–	–	
Total cPAHs (µg/L)	ND (0.011)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.011)	ND (0.010)	ND (0.010)	0.1
Total PCBs	ND (0.054)	–	–	ND (0.051)	–	–	ND (0.050)	–	–	0.1

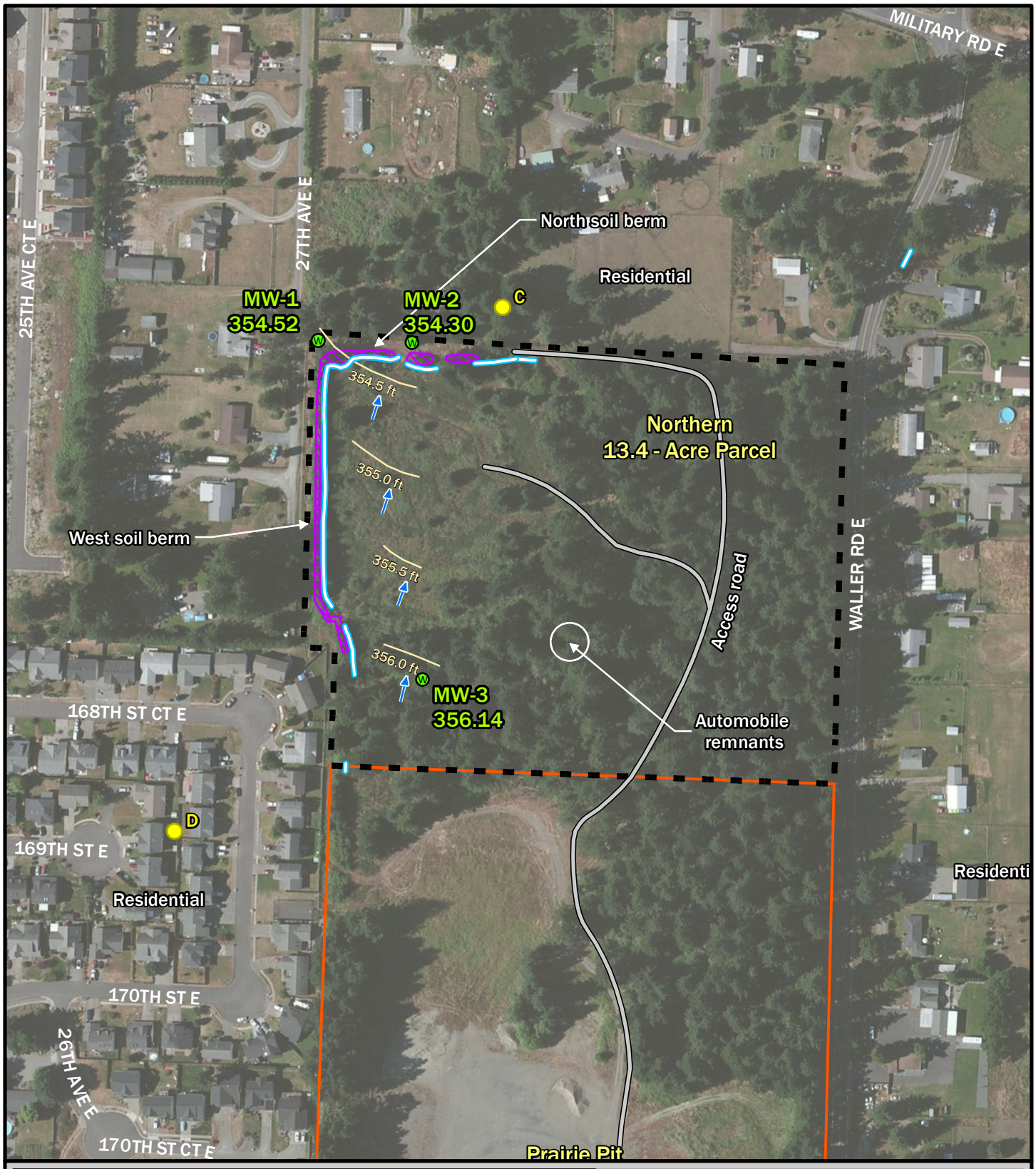
[a] MTCA Method B Cleanup Level.

BOLD values detected above the reporting limit.

NWTPH = Northwest total petroleum hydrocarbons
NWTPH-G = Gasoline range
NWTPH-Dx = Diesel range extended Ito include heavy oil)

VOCs = Volatile organic compounds
cPAHs = Carcinogenic polycyclic aromatic hydrocarbons
mg/L = milligrams per liter

µg/L = micrograms per liter
MTCA = Model Toxics Control Act
ND = Not detected above laboratory reporting limits shown in parentheses



Legend

- Private water supply well
- Monitoring well
- Parcel 0319262074 being sold
- Parcel 0319263091
- Soil berm
- Groundwater contour
- Ditch
- Access road
- Groundwater flow direction

Notes: The plotted locations of private water supply wells are not consistent with the listed addresses (see the Hydrology section of the Site Closure Report for more information).

Figure 3.
Groundwater Contour Map, February 4, 2020, 13.4-Acre Undeveloped Parcel, Pierce County, Washington.

N

0 125 250 500 Feet

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Digital Globe, Aerial

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CONCLUSIONS

Groundwater monitoring has been completed at the Site during three quarterly monitoring events: in August and November 2019, and in February 2020. Low levels of total lead and/or total chromium were detected in two wells during two of the three sampling events at concentrations below MTCA Method A cleanup levels. No VOCs, dissolved MTCA metals, gasoline- or diesel-range petroleum hydrocarbons, or PAHs were detected in any of the wells during the three events.

The findings from the most recent February 2020 groundwater monitoring fulfill the data gap identified in the Site Closure Report (Herrera 2019) and complete the characterization of groundwater conditions and flow direction at the Site.

REFERENCES

Brown and Caldwell. 1985. Final Report Clover/Chambers Creek Geohydrologic Study for Tacoma-Pierce County Health Department, July.

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Sitts & Hill. 2019. Monitoring Wells Location Exhibit over topographic survey. Prepared for Pierce County Planning and Public Works by Sitts & Hill Engineers, Inc., Tacoma, Washington. August 7, 2019.

S&W. 2019. Limited Phase II Environmental Site Assessment, Approximate 13.4 acres—Waller Road, Frederickson, Washington. Prepared for Bethel School District, Spanaway, Washington, by Shannon & Wilson, Seattle, Washington. May 2.

LIMITATIONS

This report has been prepared for the exclusive use of Pierce County Planning & Public Works. The analyses and conclusions included in this report are based on conditions encountered at the time of our field investigation, as well as professional experience and judgement. Herrera cannot be responsible for interpretation by others of the data contained in this report.

Herrera's services were performed with due diligence in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the area. No other warranty, express or implied, is made.

APPENDIX A

Field Procedures

FIELD PROCEDURES

Field procedures used to perform the groundwater monitoring at the 13.4-acre undeveloped parcel of land located at 16720 Waller Road East in unincorporated Pierce County addressed the following:

- Groundwater sampling procedures at monitoring wells
- Sample containers, sample handling, and chain-of-custody procedures
- Investigation-derived waste disposal

These procedures are presented in the following sections.

SAMPLING PROCEDURES

Groundwater Sampling from Monitoring Wells

The water was sampled using a low-flow purge method with clean, dedicated polyethylene tubing and a submersible pump. General procedures for collecting groundwater samples from temporary wells following development were as follows:

- Remove the well monument cover and inspect the condition of the well and surrounding area. Note observations in the field notebook and well sampling log. Unlock and remove the well casing plug.
- Using an electronic water level indicator, the depth to groundwater was measured to the nearest 0.01 foot. Measurements were taken relative to the surveyed reference mark at the top of the PVC well casing. Date, time, and measurements were recorded on the well sampling log.
- Flexible polyethylene tubing was lowered into the well with the tube intake located in the middle of the screened zone. The well was purged using the submersible pump at a rate less than 1 liter per minute.
- During purging, pH, water temperature, dissolved oxygen, specific conductivity, and turbidity were measured at 5-minute intervals. The amount of water purged, water parameter measurements, and time of collection were recorded on the well sampling log.

- When drawdown, flow rate, and the parameters had stabilized after three successive readings, the sample was collected. Sample stabilization criteria are as follows: ±0.1 for pH, ±3 percent for specific conductance, and ±0.3 milligrams per liter for dissolved oxygen.

- Purged water removed during development was placed into 55-gallon drums stored on site.

- Samples were collected directly from the tubing into sample containers provided by the analytical laboratory. Immediately upon filling, each container was securely capped, labeled, and placed into a chilled cooler for storage prior to delivery to the analytical laboratory. The date and time of each sample collected was recorded on the well sampling log. Samples were handled in accordance with the sample handling procedure described later in this section.

- Dedicated tubing used for purging and sampling groundwater from each well was pulled out and discarded into a plastic garbage bag and disposed of at a solid waste disposal facility.

- The well casing plug was replaced and locked, and the well monument cover was secured.

SAMPLE HANDLING

All samples collected during this investigation were handled according to the procedures described in this section.

Sample Containers and Labeling

Samples were placed in containers supplied by the analytical laboratory appropriate for the analyses to be performed. Sample container labels were completed at the time of collection using a permanent waterproof pen or marker. Sample labels included the following information:

- Project name

- Sample identification

- Date and time of collection

- Analysis to be performed

Sample Storage

Immediately following sample collection, sample containers were placed into a chilled cooler for storage prior to delivery to the analytical laboratory. Care was taken to ensure that sample holding times were not exceeded.

Chain of Custody

Following collection, sample information was recorded on a chain-of-custody form. The purpose of this record is to account for the possession (or custody) of each sample from the time it is collected until laboratory testing and reporting is complete. The signature of each person in possession of the samples was recorded on the chain-of-custody form. Information recorded on the chain-of-custody record included the following:

- Project name and location
- Project number
- Names of project manager and sampling personnel
- Sample identification
- Sample matrix (soil or water)
- Date and time of collection (for each sample)
- Analysis requested (for each sample)
- Number of sample containers (for each sample)
- Signature, date, and time (for each person releasing or accepting sample custody)

Sample Shipment and Delivery

Samples collected during this field investigation were hand delivered by Herrera Environmental Consultants, Inc. (Herrera) to the analytical laboratory.

Sample Documentation

All sampling activities during this investigation were documented in a dedicated field notebook. The notebook was labeled with the project name, project identification number, dates of field activities, and name of the field coordinator. All relevant activities were recorded in the field notebook during the period of the field investigation. Entries into the field notebook were made in permanent ink. Corrections were made by placing a single line through the original entry accompanied by the initials of the person entering the correction. At a minimum, information in the field notebook included:

- Date and atmospheric conditions
- Name of sampling personnel present
- General condition of well
- Depth to water
- Summary of field parameters measured during purging at sample collection (e.g., temperature, specific conductance, pH, dissolved oxygen)
- Amount of water purged from the well
- Time of purging and sample collection
- Any unusual events or occurrences

Disposal of Investigation-Derived Waste

Disposal of Incidental Trash

Incidental trash generated during this investigation (including discarded gloves, disposable bailers, paper towels, and food packaging) was placed in a plastic trash bag and disposed of as solid waste into a dumpster at the Herrera office building in Seattle, Washington.

Decontamination Fluids and Purge Water Disposal

Decontamination fluids generated during well sampling were placed into 55-gallon drums pending analytical results. The drums containing contaminated water will be stored on site pending analytical results. Contaminated water will be disposed of at an approved offsite facility. Clean water will be disposed of on the ground surface.

APPENDIX B

Groundwater Sampling Field Notes

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GROUNDWATER SAMPLING LOG

Project 16-06310-011 **Site:** 13.4-acre Undev. Parcel **Well No.:** MW-1 **Date:** 02/04/2020

Well Depth: 50' **Screen Length:** 10' **Well Diameter:** 2" **Casing Type:** PVC

Sampling Device Submersible pump **Tubing Type:** Polyethylene **Water Level:** 24.98

Measuring Point: Top of PVC Casing **Notes**: purged at low flow rate of approx. 0.4 L/min

Sampling Personnel: B. Blaud

Time	pH (Std. Units)	Temp. (°C)	Cond. (µs/cm)	Dis.O_2 (mg/L)	Turb. (NTU)	Water Level	Notes
1531	Start Purge						
1536	7.23	11.3	171.0	10.58	696	24.98	very turbid
1541	6.99	11.4	169.9	10.72	363	24.98	turbid
1546	6.75	11.3	169.2	10.73	136	24.98	slightly turbid
1550	6.64	11.3	169.2	10.70	96	24.98	clearing
1554	6.60	11.4	169.2	10.70	86	24.98	moved pump up
1601	6.60	11.4	169.4	10.78	215	24.98	turbid
16006	6.60	11.4	169.2	10.75	159	24.98	clearing
1610	6.58	11.4	168.0	10.76	131	24.98	still slightly turbid
1615	6.58	11.4	168.9	10.71	144	24.98	
1623	6.61	11.3	168.9	10.71	151	24.98	move pump up 5'
1629	6.54	11.4	170.2	10.59	948	24.98	very turbid
1635	6.56	11.3	168.7	10.79	780	24.98	turbid
1640	6.54	11.3	168.7	10.74	359	24.98	clearing
1645	6.52	11.3	168.6	10.81	254	24.98	clearing
1651	6.58	11.3	168.6	10.85	180	24.98	still slightly turbid
16056	6.55	11.4	168.6	10.75	167	24.98	

Type of Samples Collected for Laboratory Analysis:

more on back of page 2.

NWPTH-Gx/BTEX/EDC (VOAs), NWTPH-Dx (2 x 500 ml amber glass), PAHs and PCBs (4 x 1L amber glass), Total and dissolved (field filtered) MTCA metals (500 ml HDPE)

Well Casing Volumes:

Gal/Ft 1¼" = 0.077 1½" = 0.10 2" = 0.16 2½" = 0.24 3" = 0.37 3½" = 0.50 4" = 0.65 6" = 1.46

Time	pH	Temp	cond	DO	turb	WL	Notes
1701	6.56	11.4	168.5	10.88	127	24.98	still clearing
1706	6.52	11.4	168.5	10.77	129	24.98	turb. stabilizing
1712	6.52	11.4	168.5	10.74	128	24.98	
1715	start sampling						

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GROUNDWATER SAMPLING LOG

Project 16-06310-011 **Site:** 13.4-acre Undev. Parcel **Well No.:** MW-2 **Date:** 02/04/2020

Well Depth: 50' **Screen Length:** 10' **Well Diameter:** 2" **Casing Type:** PVC

Sampling Device Submersible pump **Tubing Type:** Polyethylene **Water Level:** 28.03

Measuring Point: Top of PVC Casing **Notes:** purged at low flow rate of approx. 0.4 L/min

Sampling Personnel: B. Blaud

Time	pH (Std. Units)	Temp. (°C)	Cond. (µs/cm)	Dis.O_2 (mg/L)	Turb. (NTU)	Water Level	Notes
1740	Start Purge						
1745	6.85	10.1	161.2	10.59	4.41	27.02	clear
1750	6.79	10.9	159.9	10.44	4.32	27.02	
1754	6.77	11.1	159.7	10.39	3.94	27.02	
1759	6.76	11.2	159.7	10.51	1.82	27.02	
1804	6.72	11.2	159.7	10.48	0.96	27.02	
1810	6.70	11.3	159.7	10.46	0.84	2702	
1815	6.69	11.3	159.7	10.46	0.82	27.02	
1815	start sampling						

Type of Samples Collected for Laboratory Analysis:

NWPTH-Gx/BTEX/EDC (VOAs), NWTPH-Dx (2 x 500 ml amber glass), PAHs and PCBs (4 x 1L amber glass), Total and dissolved (field filtered) MTCA metals (500 ml HDPE)

Well Casing Volumes:

Gal/Ft 1¼" = 0.077 1½" = 0.10 2" = 0.16 2½" = 0.24 3" = 0.37 3½" = 0.50 4" = 0.65 6" = 1.46

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GROUNDWATER SAMPLING LOG

Project 16-06310-011 **Site:** 13.4-acre Undev. Parcel **Well No.:** MW-3 **Date:** 02/04/2020

Well Depth: 50' **Screen Length:** 10' **Well Diameter:** 2" **Casing Type:** PVC

Sampling Device Submersible pump **Tubing Type:** Polyethylene **Water Level:** 28.83

Measuring Point: Top of PVC Casing **Notes**: purged at low flow rate of approx. 0.4 L/min

Sampling Personnel: B. Blaud

Time	pH (Std. Units)	Temp. (°C)	Cond. (µs/cm)	Dis.O_2 (mg/L)	Turb. (NTU)	Water Level	Notes
1840	Start Purge					28.75	
1844	6.80	9.6	168.9	10.50	4.53	28.75	
1848	6.86	11.0	169.9	10.10	46.94	28.75	increasing turb?
1852	6.94	11.1	169.4	10.32	18.05	28.75	
1856	6.82	11.1	169.1	10.24	11.96	28.75	
1900	6.76	11.2	168.9	10.23	6.31	28.75	
1905	6.73	11.1	168.9	10.22	5.48	28.75	
1910	6.71	11.1	168.9	10.22	5.46	28.75	
1910	Start Sampling						

Type of Samples Collected for Laboratory Analysis:

NWPTH-Gx/BTEX/EDC (VOAs), NWTPH-Dx (2 x 500 ml amber glass), PAHs and PCBs (4 x 1L amber glass), Total and dissolved (field filtered) MTCA metals (500 ml HDPE)

Well Casing Volumes:

Gal/Ft 1¼" = 0.077 1½" = 0.10 2" = 0.16 2½" = 0.24 3" = 0.37 3½" = 0.50 4" = 0.65 6" = 1.46

2.4.20 Prairie Pit

1444 - Arrive on site
1450 - Calibrate multimeter
1502 - MW-3 @ 28.83
1507 - MW-2 @ 28.03
1510 - MW-1 @ 24.98
1531 - Start purging MW-1
1558 - very turbid still $ I bumped the submersible pump
1623 - moved pump up ~5' to see if it would clear more
715 - start sampling MW-1
1740 - start purge MW-2
1815 - start sampling MW-2
1840 - start purge MW-3
1910 - sample MW-3
1932 - Leave site

APPENDIX C

Laboratory Analytical Report and Chain-of-Custody Record

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

February 7, 2020

George Iftner
Herrera Environmental Consultants, Inc.
2200 6th Avenue, Suite 1100
Seattle, WA 98121

Re: Analytical Data for Project 16-06310-011
Laboratory Reference No. 2002-042

Dear George:

Enclosed are the analytical results and associated quality control data for samples submitted on February 5, 2020.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

Case Narrative

Samples were collected on February 4, 2020 and received by the laboratory on February 5, 2020. They were maintained at the laboratory at a temperature of 2°C to 6°C.

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

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

PAHs EPA 8270D/SIM Analysis

The method blank had one surrogate recovery out of control limits. This is within allowance of our standard operating procedure as long as the recovery is above 10%.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-1**					
Laboratory ID:	02-042-01					
Gasoline	**ND**	100	NWTPH-Gx	2-5-20	2-5-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*102*	*59-122*				
Client ID:	**MW-2**					
Laboratory ID:	02-042-02					
Gasoline	**ND**	100	NWTPH-Gx	2-5-20	2-5-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*102*	*59-122*				
Client ID:	**MW-3**					
Laboratory ID:	02-042-03					
Gasoline	**ND**	100	NWTPH-Gx	2-5-20	2-5-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*101*	*59-122*				

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

GASOLINE RANGE ORGANICS
NWTPH-Gx
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0205W1					
Gasoline	**ND**	100	NWTPH-Gx	2-5-20	2-5-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*102*	*59-122*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	02-017-01										
	ORIG	DUP									
Gasoline	**291**	**303**	NA	NA		NA		NA	4	30	
Surrogate:											
Fluorobenzene						*97*	*98*	*59-122*			

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

VOLATILE ORGANICS EPA 8260D

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-1**					
Laboratory ID:	02-042-01					
Benzene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
1,2-Dichloroethane	ND	0.20	EPA 8260D	2-6-20	2-6-20	
Toluene	ND	1.0	EPA 8260D	2-6-20	2-6-20	
Ethylbenzene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
m,p-Xylene	ND	0.40	EPA 8260D	2-6-20	2-6-20	
o-Xylene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*115*	*75-127*				
Toluene-d8	*112*	*80-127*				
4-Bromofluorobenzene	*91*	*78-125*				

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

VOLATILE ORGANICS EPA 8260D

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-2**					
Laboratory ID:	02-042-02					
Benzene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
1,2-Dichloroethane	ND	0.20	EPA 8260D	2-6-20	2-6-20	
Toluene	ND	1.0	EPA 8260D	2-6-20	2-6-20	
Ethylbenzene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
m,p-Xylene	ND	0.40	EPA 8260D	2-6-20	2-6-20	
o-Xylene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*111*	*75-127*				
Toluene-d8	*109*	*80-127*				
4-Bromofluorobenzene	*88*	*78-125*				

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

VOLATILE ORGANICS EPA 8260D

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-3**					
Laboratory ID:	02-042-03					
Benzene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
1,2-Dichloroethane	ND	0.20	EPA 8260D	2-6-20	2-6-20	
Toluene	ND	1.0	EPA 8260D	2-6-20	2-6-20	
Ethylbenzene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
m,p-Xylene	ND	0.40	EPA 8260D	2-6-20	2-6-20	
o-Xylene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*118*	*75-127*				
Toluene-d8	*114*	*80-127*				
4-Bromofluorobenzene	*90*	*78-125*				

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

VOLATILE ORGANICS EPA 8260D

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**Trip blank**					
Laboratory ID:	02-042-04					
Benzene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
1,2-Dichloroethane	ND	0.20	EPA 8260D	2-6-20	2-6-20	
Toluene	ND	1.0	EPA 8260D	2-6-20	2-6-20	
Ethylbenzene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
m,p-Xylene	ND	0.40	EPA 8260D	2-6-20	2-6-20	
o-Xylene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*112*	*75-127*				
Toluene-d8	*109*	*80-127*				
4-Bromofluorobenzene	*89*	*78-125*				

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

VOLATILE ORGANICS EPA 8260D
QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0206W2					
Benzene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
1,2-Dichloroethane	ND	0.20	EPA 8260D	2-6-20	2-6-20	
Toluene	ND	1.0	EPA 8260D	2-6-20	2-6-20	
Ethylbenzene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
m,p-Xylene	ND	0.40	EPA 8260D	2-6-20	2-6-20	
o-Xylene	ND	0.20	EPA 8260D	2-6-20	2-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*113*	*75-127*				
Toluene-d8	*111*	*80-127*				
4-Bromofluorobenzene	*95*	*78-125*				

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

VOLATILE ORGANICS EPA 8260D
QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0206W2									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**9.46**	**9.96**	10.0	10.0	95	100	63-130	5	17	
Benzene	**10.0**	**10.8**	10.0	10.0	100	108	76-125	8	19	
Trichloroethene	**9.81**	**10.3**	10.0	10.0	98	103	76-121	5	18	
Toluene	**10.3**	**10.7**	10.0	10.0	103	107	80-124	4	18	
Chlorobenzene	**10.2**	**11.0**	10.0	10.0	102	110	75-120	8	19	
Surrogate:										
Dibromofluoromethane					*116*	*111*	*75-127*			
Toluene-d8					*114*	*110*	*80-127*			
4-Bromofluorobenzene					*93*	*93*	*78-125*			

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-1**					
Laboratory ID:	02-042-01					
Diesel Range Organics	**ND**	0.21	NWTPH-Dx	2-5-20	2-6-20	
Lube Oil Range Organics	**ND**	0.21	NWTPH-Dx	2-5-20	2-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*88*	*50-150*				
Client ID:	**MW-2**					
Laboratory ID:	02-042-02					
Diesel Range Organics	**ND**	0.20	NWTPH-Dx	2-5-20	2-6-20	
Lube Oil Range Organics	**ND**	0.20	NWTPH-Dx	2-5-20	2-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*95*	*50-150*				
Client ID:	**MW-3**					
Laboratory ID:	02-042-03					
Diesel Range Organics	**ND**	0.20	NWTPH-Dx	2-5-20	2-6-20	
Lube Oil Range Organics	**ND**	0.20	NWTPH-Dx	2-5-20	2-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*83*	*50-150*				

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0205W1					
Diesel Range Organics	**ND**	0.20	NWTPH-Dx	2-5-20	2-5-20	
Lube Oil Range Organics	**ND**	0.20	NWTPH-Dx	2-5-20	2-5-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*95*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	SB0205W1										
	ORIG	DUP									
Diesel Fuel #2	**0.469**	**0.464**	NA	NA		NA		NA	1	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*90*	*85*	*50-150*			

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

PAHs EPA 8270E/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-1**					
Laboratory ID:	02-042-01					
Naphthalene	**ND**	0.099	EPA 8270E/SIM	2-6-20	2-7-20	
2-Methylnaphthalene	**ND**	0.099	EPA 8270E/SIM	2-6-20	2-7-20	
1-Methylnaphthalene	**ND**	0.099	EPA 8270E/SIM	2-6-20	2-7-20	
Benzo[a]anthracene	**ND**	0.0099	EPA 8270E/SIM	2-6-20	2-7-20	
Chrysene	**ND**	0.0099	EPA 8270E/SIM	2-6-20	2-7-20	
Benzo[b]fluoranthene	**ND**	0.0099	EPA 8270E/SIM	2-6-20	2-7-20	
Benzo(j,k)fluoranthene	**ND**	0.0099	EPA 8270E/SIM	2-6-20	2-7-20	
Benzo[a]pyrene	**ND**	0.0099	EPA 8270E/SIM	2-6-20	2-7-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0099	EPA 8270E/SIM	2-6-20	2-7-20	
Dibenz[a,h]anthracene	**ND**	0.0099	EPA 8270E/SIM	2-6-20	2-7-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*83*	*27 - 106*				
Pyrene-d10	*82*	*35 - 98*				
Terphenyl-d14	*125*	*41 - 129*				

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

PAHs EPA 8270E/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-2**					
Laboratory ID:	02-042-02					
Naphthalene	**ND**	0.093	EPA 8270E/SIM	2-6-20	2-7-20	
2-Methylnaphthalene	**ND**	0.093	EPA 8270E/SIM	2-6-20	2-7-20	
1-Methylnaphthalene	**ND**	0.093	EPA 8270E/SIM	2-6-20	2-7-20	
Benzo[a]anthracene	**ND**	0.0093	EPA 8270E/SIM	2-6-20	2-7-20	
Chrysene	**ND**	0.0093	EPA 8270E/SIM	2-6-20	2-7-20	
Benzo[b]fluoranthene	**ND**	0.0093	EPA 8270E/SIM	2-6-20	2-7-20	
Benzo(j,k)fluoranthene	**ND**	0.0093	EPA 8270E/SIM	2-6-20	2-7-20	
Benzo[a]pyrene	**ND**	0.0093	EPA 8270E/SIM	2-6-20	2-7-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0093	EPA 8270E/SIM	2-6-20	2-7-20	
Dibenz[a,h]anthracene	**ND**	0.0093	EPA 8270E/SIM	2-6-20	2-7-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*83*	*27 - 106*				
Pyrene-d10	*71*	*35 - 98*				
Terphenyl-d14	*101*	*41 - 129*				

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

PAHs EPA 8270E/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-3**					
Laboratory ID:	02-042-03					
Naphthalene	**ND**	0.095	EPA 8270E/SIM	2-6-20	2-6-20	
2-Methylnaphthalene	**ND**	0.095	EPA 8270E/SIM	2-6-20	2-6-20	
1-Methylnaphthalene	**ND**	0.095	EPA 8270E/SIM	2-6-20	2-6-20	
Benzo[a]anthracene	**ND**	0.0095	EPA 8270E/SIM	2-6-20	2-6-20	
Chrysene	**ND**	0.0095	EPA 8270E/SIM	2-6-20	2-6-20	
Benzo[b]fluoranthene	**ND**	0.0095	EPA 8270E/SIM	2-6-20	2-6-20	
Benzo(j,k)fluoranthene	**ND**	0.0095	EPA 8270E/SIM	2-6-20	2-6-20	
Benzo[a]pyrene	**ND**	0.0095	EPA 8270E/SIM	2-6-20	2-6-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0095	EPA 8270E/SIM	2-6-20	2-6-20	
Dibenz[a,h]anthracene	**ND**	0.0095	EPA 8270E/SIM	2-6-20	2-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*66*	*27 - 106*				
Pyrene-d10	*83*	*35 - 98*				
Terphenyl-d14	*94*	*41 - 129*				

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0206W1					
Naphthalene	**ND**	0.10	EPA 8270E/SIM	2-6-20	2-6-20	
2-Methylnaphthalene	**ND**	0.10	EPA 8270E/SIM	2-6-20	2-6-20	
1-Methylnaphthalene	**ND**	0.10	EPA 8270E/SIM	2-6-20	2-6-20	
Benzo[a]anthracene	**ND**	0.010	EPA 8270E/SIM	2-6-20	2-6-20	
Chrysene	**ND**	0.010	EPA 8270E/SIM	2-6-20	2-6-20	
Benzo[b]fluoranthene	**ND**	0.010	EPA 8270E/SIM	2-6-20	2-6-20	
Benzo(j,k)fluoranthene	**ND**	0.010	EPA 8270E/SIM	2-6-20	2-6-20	
Benzo[a]pyrene	**ND**	0.010	EPA 8270E/SIM	2-6-20	2-6-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.010	EPA 8270E/SIM	2-6-20	2-6-20	
Dibenz[a,h]anthracene	**ND**	0.010	EPA 8270E/SIM	2-6-20	2-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*90*	*27 - 106*				
Pyrene-d10	*89*	*35 - 98*				
Terphenyl-d14	*142*	*41 - 129*				Q

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0206W1									
	SB	SBD	SB	SBD	SB	SBD				
Naphthalene	**0.262**	**0.270**	0.500	0.500	52	54	36 - 99	3	40	
Acenaphthylene	**0.329**	**0.322**	0.500	0.500	66	64	45 - 113	2	32	
Acenaphthene	**0.364**	**0.316**	0.500	0.500	73	63	43 - 119	14	33	
Fluorene	**0.317**	**0.318**	0.500	0.500	63	64	48 - 114	0	30	
Phenanthrene	**0.351**	**0.354**	0.500	0.500	70	71	49 - 113	1	24	
Anthracene	**0.363**	**0.369**	0.500	0.500	73	74	50 - 113	2	25	
Fluoranthene	**0.376**	**0.401**	0.500	0.500	75	80	57 - 118	6	22	
Pyrene	**0.489**	**0.464**	0.500	0.500	98	93	56 - 128	5	32	
Benzo[a]anthracene	**0.448**	**0.469**	0.500	0.500	90	94	59 - 127	5	24	
Chrysene	**0.460**	**0.470**	0.500	0.500	92	94	57 - 122	2	24	
Benzo[b]fluoranthene	**0.486**	**0.495**	0.500	0.500	97	99	58 - 123	2	26	
Benzo(j,k)fluoranthene	**0.455**	**0.463**	0.500	0.500	91	93	60 - 123	2	22	
Benzo[a]pyrene	**0.446**	**0.453**	0.500	0.500	89	91	54 - 121	2	24	
Indeno(1,2,3-c,d)pyrene	**0.452**	**0.459**	0.500	0.500	90	92	55 - 125	2	26	
Dibenz[a,h]anthracene	**0.440**	**0.440**	0.500	0.500	88	88	57 - 127	0	25	
Benzo[g,h,i]perylene	**0.442**	**0.454**	0.500	0.500	88	91	54 - 122	3	25	
Surrogate:										
2-Fluorobiphenyl					*71*	*67*	*27 - 106*			
Pyrene-d10					*85*	*89*	*35 - 98*			
Terphenyl-d14					*122*	*113*	*41 - 129*			

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

DISSOLVED METALS
EPA 200.8

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-1**					
Laboratory ID:	02-042-01					
Cadmium	**ND**	4.0	EPA 200.8		2-6-20	
Chromium	**ND**	10	EPA 200.8		2-6-20	
Lead	**ND**	1.0	EPA 200.8		2-6-20	
Nickel	**ND**	20	EPA 200.8		2-6-20	
Zinc	**ND**	25	EPA 200.8		2-6-20	
Client ID:	**MW-2**					
Laboratory ID:	02-042-02					
Cadmium	**ND**	4.0	EPA 200.8		2-6-20	
Chromium	**ND**	10	EPA 200.8		2-6-20	
Lead	**ND**	1.0	EPA 200.8		2-6-20	
Nickel	**ND**	20	EPA 200.8		2-6-20	
Zinc	**ND**	25	EPA 200.8		2-6-20	
Client ID:	**MW-3**					
Laboratory ID:	02-042-03					
Cadmium	**ND**	4.0	EPA 200.8		2-6-20	
Chromium	**ND**	10	EPA 200.8		2-6-20	
Lead	**ND**	1.0	EPA 200.8		2-6-20	
Nickel	**ND**	20	EPA 200.8		2-6-20	
Zinc	**ND**	25	EPA 200.8		2-6-20	

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

DISSOLVED METALS
EPA 200.8
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0206D1					
Cadmium	**ND**	4.0	EPA 200.8		2-6-20	
Chromium	**ND**	10	EPA 200.8		2-6-20	
Lead	**ND**	1.0	EPA 200.8		2-6-20	
Nickel	**ND**	20	EPA 200.8		2-6-20	
Zinc	**ND**	25	EPA 200.8		2-6-20	

Analyte	Result		Spike Level		Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE										
Laboratory ID:	02-042-03									
	ORIG	DUP								
Cadmium	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Chromium	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Nickel	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Zinc	**ND**	**ND**	NA	NA		NA	NA	NA	20	
MATRIX SPIKES										
Laboratory ID:	02-042-03									
	MS	MSD	MS	MSD		MS	MSD			
Cadmium	**79.4**	**80.0**	80.0	80.0	ND	**99**	**100**	75-125	1	20
Chromium	**66.8**	**68.8**	80.0	80.0	ND	**84**	**86**	75-125	3	20
Lead	**73.2**	**74.4**	80.0	80.0	ND	**92**	**93**	75-125	2	20
Nickel	**65.8**	**67.0**	80.0	80.0	ND	**82**	**84**	75-125	2	20
Zinc	**75.8**	**80.4**	80.0	80.0	ND	**95**	**101**	75-125	6	20

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

TOTAL METALS
EPA 200.8

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW-1**					
Laboratory ID:	02-042-01					
Cadmium	**ND**	4.4	EPA 200.8	2-6-20	2-6-20	
Chromium	**12**	11	EPA 200.8	2-6-20	2-6-20	
Lead	**1.2**	1.1	EPA 200.8	2-6-20	2-6-20	
Nickel	**ND**	22	EPA 200.8	2-6-20	2-6-20	
Zinc	**ND**	28	EPA 200.8	2-6-20	2-6-20	
Client ID:	**MW-2**					
Laboratory ID:	02-042-02					
Cadmium	**ND**	4.4	EPA 200.8	2-6-20	2-6-20	
Chromium	**ND**	11	EPA 200.8	2-6-20	2-6-20	
Lead	**ND**	1.1	EPA 200.8	2-6-20	2-6-20	
Nickel	**ND**	22	EPA 200.8	2-6-20	2-6-20	
Zinc	**ND**	28	EPA 200.8	2-6-20	2-6-20	
Client ID:	**MW-3**					
Laboratory ID:	02-042-03					
Cadmium	**ND**	4.4	EPA 200.8	2-6-20	2-6-20	
Chromium	**18**	11	EPA 200.8	2-6-20	2-6-20	
Lead	**ND**	1.1	EPA 200.8	2-6-20	2-6-20	
Nickel	**ND**	22	EPA 200.8	2-6-20	2-6-20	
Zinc	**ND**	28	EPA 200.8	2-6-20	2-6-20	

Date of Report: February 7, 2020
Samples Submitted: February 5, 2020
Laboratory Reference: 2002-042
Project: 16-06310-011

TOTAL METALS
EPA 200.8
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0206WM1					
Cadmium	**ND**	4.4	EPA 200.8	2-6-20	2-6-20	
Chromium	**ND**	11	EPA 200.8	2-6-20	2-6-20	
Lead	**ND**	1.1	EPA 200.8	2-6-20	2-6-20	
Nickel	**ND**	22	EPA 200.8	2-6-20	2-6-20	
Zinc	**ND**	28	EPA 200.8	2-6-20	2-6-20	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	01-329-01										
	ORIG	DUP									
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Nickel	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Zinc	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	01-329-01										
	MS	MSD	MS	MSD		MS	MSD				
Cadmium	**132**	**133**	111	111	ND	**119**	**120**	75-125	0	20	
Chromium	**123**	**120**	111	111	ND	**111**	**108**	75-125	3	20	
Lead	**113**	**112**	111	111	ND	**102**	**101**	75-125	1	20	
Nickel	**118**	**118**	111	111	ND	**106**	**106**	75-125	0	20	
Zinc	**131**	**128**	111	111	ND	**118**	**115**	75-125	3	20	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

Chain of Custody

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

Company: Herrera
Project Number: 16-01310-011
Project Name: Prairie Pit
Project Manager: George Lafner
Sampled by: Brianna Blaud

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

Laboratory Number: 02-042

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX (EPA 8260)	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	cPAHs + Naphthalenes	Diss. total metals (Cd, Cr, Ni, Pb, Zn)			% Moisture
1	MW-1	2.4.20	1715	water	13		X		X														X	X			
2	MW-2		1815		13		X		X														X	X			
3	MW-3		1910		13		X		X														X	X			
4	Trip blank		—		3		X ← VOCs only																				

	Signature	Company	Date	Time
Relinquished	Brianna Blaud	Herrera	2.5.20	1245
Received		CASE	2/5/20	1245
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
1. dissolved metals were field filtered (marked w/ FF on label)
2. hold for PCBs
3. MW-1 metals needs preservative (bottles spilled in field)

Data Package: Standard ☐ Level III ☐ Level IV ☐

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

George Iftner

From: George Iftner
Sent: Friday, January 31, 2020 9:52 AM
To: david baumeister (dbaumeister@onsite-env.com)
Cc: Brianna Blaud
Subject: Need sample containers by early next week February 4. Prairie Pit Project

Good morning David!
Happy Friday in this lovely rainy Evergreen State.

Please send three (3) sets of containers for groundwater for the following:

1. Trip Blank
2. NWTPH-Dx
3. NWTPH-Gx/BTEX/EDC low levels
4. cPAHs + naphthalene
5. Total metals (Cd, Cr, Ni, Pb, Zn)
6. Dissolved metals (Cd, Cr, Ni, Pb, Zn) - we will field filter them
7. PCBs

Need by early next week.
We'll be sampling in early February and these will likely be on 2-day turnaround time.
George

HERRERA

GEORGE IFTNER
Senior Scientist, CPESC
direct 206.787.8210 | cell 206.697.0312 | main 206.441.9080
2200 Sixth Avenue Suite 1100 Seattle, WA 98121

Find Herrera online at: www.herrerainc.com

Chain of Custody

Page 1 of 1

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

Laboratory Number: 02-042

Company: Herrera
Project Number: 16-06310-011
Project Name: Prairie Pit
Project Manager: George Ifaner
Sampled by: Brianna Blaud

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

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX /EDC 8260	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	cPAHs + Naphthalenes	Diss. total metals (Cd, Cr, Ni, Pb, Zn)		% Moisture
1	MW-1	2.4.20	1715	water	13		X		X														X	X		
2	MW-2	"	1815	"	13		X		X														X	X		
3	MW-3	"	1910	"	13		X		X														X	X		
4	Trip blank	"	—	"	3		X																			

	Signature	Company	Date	Time
Relinquished	Brianna Blaud	Herrera	2.5.20	1245
Received		CCSE	2/5/20	1245
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
1. dissolved metals were field filtered (marked w/ FF on label)
2. hold for PCBs
3. MW-1 metals needs preservative (bottles spilled in field)

Data Package: Standard ☐ Level III ☐ Level IV ☐

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

APPENDIX D

Data Quality Assurance Review

Herrera Environmental Consultants, Inc.

Internal Memorandum

Date: February 14, 2020

To: Project File 16-06310-011

Copy To:

From: Gina Catarra

Subject: Data Quality Assurance Review of the 13.4-Acre Undeveloped Parcel, 16720 Waller Road East, Pierce County, Washington, Data

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This memorandum presents a review of data quality for three groundwater samples collected for the 13.4-Acre Undeveloped Parcel, 16720 Waller Road East, Pierce County, Washington, Project on February 4, 2020. OnSite Environmental, Inc. (OnSite), of Redmond, Washington analyzed the samples for:

- Gasoline-range petroleum hydrocarbons by Ecology's NWPTH-Gx method
- Diesel- and lube oil-range petroleum hydrocarbons by Ecology's NWTPH-Dx method
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) and 1,2-dichloroethane (EDC) by EPA Method 8260D
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and naphthalenes by EPA Method 8270E/SIM
- Total and dissolved metals (cadmium, chromium, lead, nickel, and zinc) by EPA Method 200.8.

Results for the following samples were validated.

Sample ID	Lab SDG	Date Collected	Analyses
MW-1	2002-042	2/04/2020	Gx/BTEX, EDC, Dx, total and dissolved metals, cPAHs, naphthalenes
MW-2	2002-042	2/04/2020	Gx/BTEX, EDC, Dx, total and dissolved metals, cPAHs, naphthalenes
MW-3	2002-042	2/04/2020	Gx/BTEX, EDC, Dx, total and dissolved metals, cPAHs, naphthalenes

The laboratory's performance was reviewed in accordance with quality control (QC) criteria by the laboratory and in the specified methods.

Quality control data summaries submitted by the laboratories were reviewed; raw data were not submitted by the laboratories. Data qualifiers (flags) were added to the sample results in the laboratory reports. Data validation results are summarized below, followed by definitions of data qualifiers.

Custody, Preservation, Holding Times, and Completeness—Acceptable

The samples were properly preserved, and sample custody was maintained from sample collection to receipt at the laboratories. Samples were analyzed within the required method holding times. The laboratory reports were complete and contained results for all samples and tests requested on the chain-of-custody (COC) forms.

Laboratory Reporting Limits—Acceptable

The laboratory reporting limits were reasonable for the methods. No data were qualified based on laboratory reporting limits.

Method Blank Analysis—Acceptable

Method blanks were analyzed at the required frequency. Method blanks did not contain levels of target analytes above the laboratory reporting limits.

Trip Blank Analysis—Acceptable

A trip blank was submitted for analysis along with samples for BTEX and EDC. The trip blank did not contain levels of target analytes above the laboratory reporting limits.

Laboratory Control Sample Analysis—Acceptable

Laboratory control samples (LCS) or LCS/laboratory control sample duplicates (LCS/LCSD) were analyzed with samples for BTEX/EDC and cPAHs at the required frequency. The percent recovery values met the criteria established by the laboratory.

Surrogate Analysis—Acceptable with Discussion

Surrogate compounds were added to samples for Gx, BTEX/EDC, Dx, and cPAHs analyses, as required by the methods. With the exception noted below, all surrogate recovery values met the criteria established by the laboratory or specified method.

The percent recovery for surrogate terphenyl-d14 (142 percent) exceeded the criteria established by the laboratory (41 to 129 percent). No data were qualified because the bias was high, and no target analytes were detected in the method blank.

Matrix Spike Analysis—Acceptable

Matrix spike samples were analyzed with samples for total and dissolved metals at the required frequency. The percent recovery values met the criteria established by the specified method.

Laboratory Duplicate Analysis—Acceptable

Laboratory duplicate samples were analyzed for Gx, Dx, and total and dissolved metals at the required frequency. The relative percent difference (RPD) values met the control limits established by the laboratory or the specified method.

Field Duplicate Analysis—Not Analyzed

Field duplicates were not collected for this field effort.