

# ANNUAL GROUNDWATER MONITORING REPORT - YEAR 4

Olympica View & Sewer, Inc.

781 Walker Way

Port Ludlow, Washington 98365

VCP Identification No. SW1311

Prepared for: Raydient

Project No. 130046 • November 1, 2023 FINAL



e a r t h + w a t e r



# ANNUAL GROUNDWATER MONITORING REPORT - YEAR 4

Olympica View & Sewer, Inc.  
781 Walker Way  
Port Ludlow, Washington 98365  
VCP Identification No. SW1311

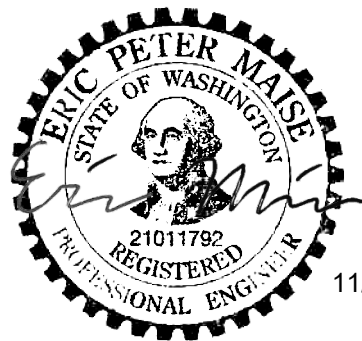
Prepared for: Raydient

Project No. 130046 • November 1, 2023 FINAL

Aspect Consulting, LLC

**Carmen Tappero, GIT**  
Staff Geologist  
carmen.tappero@aspectconsulting.com

**Eric Marhofer, PE**  
Principal Engineer  
eric.marhofer@aspectconsulting.com



11/1/2023

**Eric Maise, PE**  
Project Engineer  
eric.maise@aspectconsulting.com

V:\130046 OPG Port Ludlow Property\Deliverables\Year 4\_GW Monitoring Report\Final\OWSI\_Annual GW Mon Rpt\_Year 4\_11.01.2023.docx



# Contents

<b>Abbreviations .....</b>	<b>iii</b>
<b>1 Introduction .....</b>	<b>1</b>
1.1 Regulatory Framework .....	1
1.2 Report Organization .....	2
<b>2 Site Background .....</b>	<b>1</b>
2.1 Site Location and Description .....	1
2.2 Hydrogeology .....	1
<b>3 Groundwater Monitoring Procedures .....</b>	<b>3</b>
3.1 Groundwater Monitoring Well Network .....	3
3.2 Contaminants of Concern and Cleanup Levels.....	3
3.3 Groundwater Monitoring Procedures .....	3
<b>4 Groundwater Monitoring Results.....</b>	<b>5</b>
4.1 Groundwater Elevations, Gradient, and Flow Direction .....	5
4.2 Groundwater and Surface Water Analytical Results .....	5
4.3 Plume Stability Assessment.....	6
4.4 Data Validation and Management.....	6
<b>5 Summary .....</b>	<b>7</b>
<b>6 References .....</b>	<b>8</b>
<b>7 Limitations.....</b>	<b>9</b>

## List of Tables

---

- 1 Summary of Groundwater Elevation Data
- 2 Year 4 Groundwater Analytical Results
- 3 Summary of Historical Groundwater Analytical Results

## List of Figures

---

- 1 Site Location Map
- 2 Site Plan
- 3 Year 1 Groundwater Elevation and Contours
- 4 Year 2 Groundwater Elevation and Contours
- 5 Year 3 Groundwater Elevation and Contours
- 6 Year 4 Groundwater Elevation and Contours
- 7 Year 4 Groundwater and Surface Water Analytical Results

## List of Appendices

---

- A Laboratory Analytical Reports
- B Plume Stability Analyses
- C Report Guidelines and Limitations for Use

## Abbreviations

AGI	Applied Geotechnology, Inc.
Aspect	Aspect Consulting, LLC
bgs	below ground surface
BETX	benzene, ethylbenzene, toluene and xylenes
COCs	Contaminates of concern
Ecology	Washington Department of Ecology
EIM	Environmental Information Management
FFS	Focused Feasibility Study
GRO	gasoline-range organics
GMP	Groundwater Monitoring Plan
GWMR	Groundwater Monitoring Report
µg/L	micrograms per liter
MTCA	Model Toxics Control Act
MNA	Monitored Natural Attenuation
NFA	No Further Action
OWSI	Olympic Water & Sewer, Inc.
RL	Reporting Limit
USTs	Underground Storage Tanks
VCP	Voluntary Cleanup Program
VOC	volatile organic compound
WAC	Washington Administrative Code

# 1 Introduction

Aspect Consulting, LLC (Aspect), has prepared this Annual Groundwater Monitoring Report (GWMR) on behalf of Raydient for the Olympic Water & Sewer, Inc. (OWSI), Site, which is located at 781 Walker Way in Port Ludlow, Washington.

## 1.1 Regulatory Framework

---

In September 1990, Applied Geotechnology, Inc. (AGI) removed three underground storage tanks (USTs) from the property – one 1,000-gallon UST and two 2,000-gallon USTs. During the UST removals, a release of gasoline from the 1,000-gallon UST was discovered, and gasoline-impacted soil was removed to the extents practicable. During the installation of a water supply well in April 2009, gasoline impacts to shallow, perched groundwater were discovered. The Jefferson County Health Department was notified, who further notified the Washington State Department of Ecology (Ecology). In September 2009, Ecology listed the Site on its Confirmed or Suspected Contaminated Sites list; the Site is identified as the Olympic Water & Sewer Inc Site, cleanup Site ID 1196, and facility ID 62223345.

The Model Toxics Control Act (MTCA) defines the Site as anywhere where a hazardous substance has come to be located (Washington Administrative Code [WAC] 173-340-200). Further investigation through 2013 confirmed that the Site can be defined as the release(s) of total petroleum hydrocarbons measured as gasoline-range organics (GRO) and benzene, toluene, ethylbenzene, and xylenes (BTEX) to soil and groundwater. As part of Site investigation and cleanup activities, a Focused Feasibility Study (FFS; Aspect, 2013) was performed, which identified a preferred remedial alternative in accordance with MTCA. The preferred remedial alternative for the Site consisted of three primary components:

- **Source Removal:** In 1990, three USTs were removed. During removal, a release of gasoline was discovered, and overexcavation of GRO-contaminated soil was performed. The cleanup action consisted of excavation of the impacted soil to the extents practicable; however, residual impacted soil was left in place at the base of one of the UST excavations to prevent structural damage to a nearby building. At that time, residual impacted soil was expected to occur from approximately 10 feet below ground surface (bgs) to the perched groundwater table between approximately 20 to 41 feet bgs (SLR, 2011).
- **Institutional Controls:** An environmental covenant was filed with Jefferson County on September 24, 2015, with the deed on the property that restricts certain activities that could cause exposure to impacted soils or groundwater, or could result in mobilization of contaminants at the Site. Specifically, the environmental covenant included the following deed restrictions:
  - The property zoning and use will remain commercial, as the cleanup levels established for compliance are based on a commercial land use.

- The contaminated soil, which exceeds cleanup levels and remains on the property, is under existing structures and an existing layer of clean soil from the ground surface to a depth of 15 feet bgs. The covenant restricts the alteration of the current property configuration, including earthwork activities that may disturb the clean soil cap.
- Groundwater use in the shallow, perched groundwater at the Site will not be used for water supply.
- Groundwater monitoring will be maintained until groundwater at the Site meets applicable cleanup levels. The groundwater monitoring program was further defined in the second portion of the selected cleanup action as described below.
- **Monitored Natural Attenuation (MNA):** Cleanup levels at the Site will be achieved by the natural attenuation of GRO and BTEX in soil and groundwater. To monitor the natural attenuation of contaminants at the Site, a Groundwater Monitoring Plan (GMP) was developed that describes the frequency, location, and analyses of groundwater sampling activities to ensure the protectiveness of the selected cleanup action (Aspect, 2015). The GMP prescribed quarterly groundwater sampling during the first year of MNA, and annual groundwater sampling thereafter. The results of these groundwater sampling events will be evaluated during Ecology's 5-Year Site review.

The Site was entered in the Ecology Voluntary Cleanup Program (VCP) in 2013 and was assigned identification number SW1311. Ecology provided an opinion that upon completion of the preferred remedial alternative, no further remedial action would be necessary to clean up contamination at the Site (Ecology, 2014). The recorded environmental covenant was sent to Ecology on June 2, 2016. Ecology issued the no further action (NFA) determination letter on January 19, 2021.

## 1.2 Report Organization

---

This GWMR documents the results of the fourth year of MNA groundwater monitoring, in accordance with the Ecology-approved GMP. This report is organized to include the following Sections:

- **Section 2 – Site Background** describes the property location and zoning, operational history, topography, land use, and hydrogeology.
- **Section 3 – Groundwater Monitoring Procedures** describes the monitoring well network, contaminants of concern (COCs), and cleanup levels established for the Site, and the procedures for obtaining groundwater samples.
- **Section 4 – Groundwater Monitoring Results** describes the groundwater elevations, gradient, and flow directions, and laboratory analytical results for COCs during Year 4 of groundwater monitoring.
- **Section 5 – Summary** presents a summary of Year 4 groundwater monitoring activities and presents recommendations for continued monitoring under the GMP.

## 2 Site Background

### 2.1 Site Location and Description

---

The Site is located in Section 8, Township 28 North, Range 1 East in Port Ludlow, Washington (Figure 1). Identified as Jefferson County Parcel No. 821084004, the Site consists of an approximately 2.2-acre parcel of land located approximately 0.5 miles northwest of the Port Ludlow Bay. The Site is located at the southwest corner of the intersection of Walker Way and Rainer Lane at 781 Walker Way (Figure 2).

The Site is densely forested, with an approximate 0.5-acre area developed with an OWSI operations and maintenance facility, consisting of an office/shop/garage building (garage building), a public water supply well (Well #2), pump house building for Well #2, and a storage trailer (Figure 2). The ground surface within the developed portion of the Site is primarily unpaved, except for a narrow asphalt driveway that runs down the center of the OWSI facility from Walker Way to approximately the storage trailer. A densely vegetated gully, containing an intermittent seasonal stream, bisects the western half of the parcel, west of the OWSI facility, and flows off-property (Figure 2).

In 2020, OWSI, assisted by Robinson Noble, began the process of siting and installing a new public water supply well (Well #18) at the Site. A location in the northeast corner of the Site was selected based on the known location of petroleum impacts on the Site. Prior to Well #18 installation, a monitoring well (MW-18T; Figure 2) was installed to evaluate groundwater quality in the shallow, perched water-bearing zone in the vicinity of the well (Robinson Noble, 2020; Robinson Noble, 2021). In consultation with Ecology in December 2020, MW-18T and Well #18 were added to the annual groundwater monitoring program and the GMP has now been formally amended to include these wells (Aspect, 2022).

The ground surface elevation proximate to the northern property boundary of the Site is approximately 290 feet above mean sea level. The ground surface of the OWSI facility slopes gently to the southwest toward the intermittent stream (Figure 2).

### 2.2 Hydrogeology

---

Shallow groundwater at the Site occurs as a shallow, perched water-bearing zone within the glacial advance outwash and lacustrine deposits at depths above approximately 60 feet bgs. Seasonally, groundwater in the shallow, perched water-bearing zone at the Site ranges between 22 and 44 feet bgs, with individual wells showing seasonal fluctuations of groundwater levels of approximately 4.6 to 8.0 feet (Table 1). A deeper, regional water-bearing unit used for drinking water occurs at depths of between 215 and 245 feet bgs at Well #2 and Well #18. The regional aquifer depth to water has been documented to be between 85 and 97 feet bgs (Table 1), which indicates this is a confined aquifer with a potentiometric surface that is higher than the top of the water-bearing unit.



The shallow, perched water-bearing zone and the regional aquifer are separated by a thick aquitard comprised of clay and cemented silty sand. This aquitard was encountered in all borings at thicknesses ranging from 15 to more than 23 feet thick (Aspect, 2013). The regional aquifer is greater than 150 feet below the top of the aquitard and the base of the shallow, perched water-bearing zone.

The shallow, perched water-bearing zone occurs within a sand to gravel unit, which is perched on top of the underlying clayey to gravelly, cemented silt to sand unit that comprises the aquitard (SLR, 2011). During periods of seasonal recharge, groundwater appears to collect above the silt and overlying silty sand units. In areas where the silty sands and silts are present at higher elevations, the groundwater elevations are higher. Groundwater within the shallow, perched water-bearing unit (wells MW-3 through MW-5) is hydraulically continuous with the deeper perched water intercepted by wells MW-1 and MW-2. The horizontal hydraulic conductivity of the sand to gravel unit is expected to be significantly (i.e., orders of magnitude) greater than the vertical hydraulic conductivity of the underlying silt and silty sand (Aspect, 2013). Therefore, groundwater accumulating in the shallow, perched water-bearing zone is expected to primarily flow laterally toward the intermittent stream in the gulley to the west.

The points of compliance for the shallow, perched groundwater at the Site were set for the protection of drinking water and the protection of surface water. Therefore, the points of compliance are within the perched aquifer extending vertically to the lowest depth potentially affected (the regional aquifer) and the discharge of groundwater to the intermittent stream.

## 3 Groundwater Monitoring Procedures

Year 4 of annual groundwater monitoring occurred on May 9, 10, and 12, 2023. Detailed sampling and quality assurance/quality control procedures are presented in the GMP (Aspect, 2015). In addition to the work outlined in the GMP, Year 4 monitoring included the addition of monitoring groundwater at Well #18, in accordance with the addendum to the GMP dated July 11, 2022 (Aspect, 2022).

The following presents a summary of procedures performed during Year 4 of groundwater monitoring.

### 3.1 Groundwater Monitoring Well Network

---

The long-term groundwater monitoring network at the Site consists of the existing monitoring wells on the Site (MW-1, MW-2, MW-3, MW-4, MW-5, and MW-18T), the water supply wells (Well #2 and Well #18), and the intermittent stream. Monitoring wells MW-1, MW-2, and MW-4 represent the source area wells because of their locations relative to the release of gasoline from the 1,000-gallon UST (Figure 2). Monitoring wells MW-5 and MW-18T represent the upgradient wells, as they are outside of the plume boundary. Water supply Well #2 and Well #18, and the intermittent stream serve as monitoring points to ensure that human and ecological receptors are protected.

### 3.2 Contaminants of Concern and Cleanup Levels

---

As described in the FFS, the groundwater cleanup levels for the Site are the MTCA Method A cleanup levels for unrestricted land use. MTCA Method A cleanup levels are appropriate because the Site meets the criteria of WAC 173-340-704(1): there are few hazardous substances at the Site, the implemented remedy qualifies as a routine cleanup action, and numerical standards are established for the hazardous substances at the Site. The groundwater COCs and applicable MTCA Method A cleanup levels are:

- GRO – 800 micrograms per liter ( $\mu\text{g/L}$ )
- Benzene – 5  $\mu\text{g/L}$
- Toluene – 1,000  $\mu\text{g/L}$
- Ethylbenzene – 700  $\mu\text{g/L}$
- Total xylenes – 1,000  $\mu\text{g/L}$

### 3.3 Groundwater Monitoring Procedures

---

The following procedures were implemented during the collection of groundwater samples for each quarter:

- Prior to sampling, all monitoring wells were inspected to ensure that the well monuments, well caps, and well casings were in good working order and remained undamaged between sampling events.

## ASPECT CONSULTING

- Depth-to-groundwater measurements were recorded for each monitoring well with the exception of Well #2, which was not gauged since it is an active water supply well. The water level indicator was decontaminated between wells.
- With the exception of Well #2, each monitoring well was sampled using standard low-flow procedures. Wells were sampled using a portable bladder pump, which was decontaminated between wells, and a new bladder and tubing used at each monitoring well.
- During purging, field parameters (temperature, pH, specific electrical conductance, dissolved oxygen, and oxidation-reduction potential) were monitored using a YSI meter and flow-through cell. Turbidity was also monitored using a separate turbidimeter.
- To sample Well #2, the sample port closest to the wellhead was opened, and the pump was allowed to run for a minimum of 10 minutes to purge the well and flush the lines prior to collecting the sample.
- Groundwater samples were collected directly into laboratory-supplied sample containers.
- Quality control groundwater samples (field duplicates and trip blanks) were collected during each monitoring event.
- The intermittent stream was sampled using a peristaltic pump and standard low-flow procedures.
- Samples were maintained at the proper temperature for sample preservation and under chain of custody until delivered to the laboratory.
- Samples were submitted for analysis of site COCs (Section 2.2). In addition, groundwater samples were analyzed for geochemical parameters, which will be used during the 5-Year Site review to assess MNA.

There were no deviations from the GMP and the agreed- upon sampling protocol with Ecology during the Year 4 monitoring event.

## 4 Groundwater Monitoring Results

This section presents the results of the Year 4 groundwater monitoring at the Site.

### 4.1 Groundwater Elevations, Gradient, and Flow Direction

---

Groundwater elevations are summarized in Table 1 and depicted on Figure 6. During the fourth year of groundwater monitoring, groundwater elevations at the Site showed seasonal variation consistent with historical data. Compared with Years 1, 2, and 3, the groundwater elevation in the shallow, perched water-bearing zone at individual wells fluctuated between 0.05 and 7.1 feet. Similarly, groundwater elevations in the deeper, regional aquifer (measured at Well #2 in Year 2 and Well #18 in Year 3 and 4) used for water supply showed a seasonal fluctuation of 5 feet. Groundwater elevations in the shallow, perched aquifer at the most upgradient (MW-18T) and downgradient (MW-2) monitoring wells differed by approximately 14 feet.

In the shallow, perched water-bearing zone, the flow direction is primarily to the west, with slight southerly flow in the northern portion of the Site and slight northerly flow in the southern portion of the Site. This gradient and direction are consistent with the results collected in Year 1, Year 2, and Year 3 of groundwater monitoring (Figure 3, Figure 4, and Figure 5, respectively). Groundwater elevations and contours from Year 4 of groundwater monitoring are presented on Figure 6.

The groundwater flow direction was consistent with previous monitoring events. The horizontal hydraulic gradient varied slightly from previous monitoring events. In the central portion of the Site, horizontal gradient was approximately 0.13 foot/foot as measured on May 9, 2023. Horizontal hydraulic gradients measured during previous events ranged from approximately 0.06 (February 2020) and 0.22 (May 2022) foot/foot in previous monitoring events.

### 4.2 Groundwater and Surface Water Analytical Results

---

Groundwater analytical results from Year 4 are summarized in Table 2 and displayed on Figure 7. The laboratory analytical reports for Year 4 are included as Appendix A.

Groundwater analytical results were consistent with previous annual groundwater monitoring events and historical results (Table 3). GRO and benzene were detected at concentrations exceeding the MTCA Method A cleanup levels at monitoring wells MW-1 and MW-2:

- Concentrations of GRO at MW-1 and MW-2 were 4,100 and 1,800 µg/L, respectively; the MTCA Method A Cleanup Level for GRO is 800 µg/L.
- Concentrations of benzene at MW-1 and MW-2 were 140 and 61 µg/L, respectively; the MTCA Method A Cleanup Level for benzene is 5 µg/L.

- Toluene, ethylbenzene, and total xylenes were also detected at MW-1, and toluene and ethylbenzene were also detected at MW-2, but at concentrations below the respective MTCA Method A cleanup levels.

Toluene was detected at Well #18, but at concentrations below the MTCA Method A cleanup level. At the remaining monitoring wells (MW-3, MW-4, MW-5, and MW-18T) and the water supply well (Well #2), COCs were not detected during the Year 4 monitoring event above the laboratory reporting limit. Similarly, COCs were not detected in the sample collected from the intermittent stream (Table 2).

MNA parameters were collected from each monitoring well during the Year 4 sampling event. The MNA parameters included total alkalinity, nitrate and nitrite as nitrogen, sulfate, dissolved methane, and soluble manganese (Table 2). The geochemical data will be evaluated during the 5-Year Site Review to assess the progress of MNA.

### 4.3 Plume Stability Assessment

---

A linear regression analysis and nonparametric analysis for plume stability was performed using the groundwater results collected from monitoring wells MW-1 and MW-2 and Ecology's data analysis tools (Ecology, 2007). The analysis included groundwater results collected since implementation of MNA and the GMP in 2019. The Mann-Kendall Trend Test results indicate that the groundwater plume is stable at MW-1 and shrinking at MW-2. The results of the test are provided in Appendix B.

### 4.4 Data Validation and Management

---

The groundwater data was managed in a project database operated by Aspect, and has been uploaded to Ecology's Environmental Information Management (EIM) database. The Aspect database manager verified the completeness and correctness of all laboratory deliverables (i.e., laboratory report and EDDs) before loading the data into EIM. Field and laboratory quality control were validated in accordance with the U.S. Environmental Protection Agency (EPA) *National Functional Guidelines for organic and inorganic analyses* (EPA, 2008 and 2010, respectively), and laboratory-defined QC limits, with regard to the following (as appropriate to the particular analysis): sample documentation/custody, holding times, reporting limits, blank/rinsate sample, surrogate percent recoveries, laboratory duplicates, field duplicate, comparability, and completeness.

For each sampling event, blind field duplicates were submitted to the laboratory. EPA data validation guidance provides no specific evaluation criteria for field duplicate samples. Advisory evaluation criteria are set forth at 35 percent for relative percent difference (if both results are greater than 5 times the reporting limit [RL]) and two times the RLs for concentration difference (if either of the result is less than 5 times the RL) between the original and field duplicate results. Results between the field duplicate and sample varied between 6.5 percent and 9.1 percent, indicating the results were valid and reproducible.

A trip blank was submitted to monitor possible cross-contamination occurring during sample transport. No detections of GRO or BTEX were noted in the trip blank.

## 5 Summary

Groundwater elevations, flow directions, and horizontal hydraulic gradients were consistent with historical results. The flow direction (to the west) and the steep hydraulic gradient are driven by local geology: the clayey and gravelly silt bed, which creates the perched groundwater condition, dips steeply to the west towards the gully and intermittent stream. However, the interconnectedness of the shallow, perched groundwater to surface water is not apparent, as the stream only flows intermittently, and COCs have never been detected in surface water at the Site.

Analytical results from Year 4 groundwater sampling were consistent with historical results. GRO and benzene concentrations exceeded the Site cleanup levels at MW-1 and MW-2. Only toluene was detected at Well #18 at a concentration below the cleanup level. COCs were not detected at any of the remaining monitoring wells, in water supply Well #2, nor the intermittent stream.

Based on the results of groundwater monitoring at the OWSI Site, the groundwater plume is stable or shrinking, and there are no complete exposure pathways of contaminated groundwater to either surface water or drinking water. Continued MNA of the groundwater plume is recommended as prescribed in the GMP and a reduction in the monitoring frequency may be warranted pending year 5 monitoring results and Ecology's 5-Year Site Review.

Laboratory reports from the annual sampling event at water supply wells Well #2 and Well #18 were submitted to the Washington State Office of Drinking Water within 5 days of receipt, as prescribed by the GMP. Analytical results were evaluated for quality control in accordance with the GMP, and all analytical results were validated and loaded into Ecology's EIM database.

For Year 5 of MNA, groundwater sampling will be performed on an annual basis, and a GWMR will be generated following receipt of laboratory analytical data. The next annual monitoring event should be performed in Spring 2024.

## 6 References

- Aspect Consulting, LLC (Aspect), 2013, Focused Feasibility Study, Olympic Water & Sewer, Inc. Site, dated September 24, 2013.
- Aspect Consulting, LLC (Aspect), 2015, Groundwater Monitoring Plan, Olympic Water & Sewer, Inc. Site, dated July 20, 2015.
- Aspect Consulting, LLC (Aspect), 2022, Groundwater Monitoring Plan Addendum, Olympic Water & Sewer, Inc. Site, dated July 11, 2022.
- Robinson Noble, Inc. (Robinson Noble), 2020, Notification of Proposed Drilling Operation, dated December 11, 2020.
- Robinson Noble, Inc. (Robinson Noble), 2021, Drilling and testing results for monitoring Well MW-18T; radius of control-variance for Olympic Water and Sewer, Inc. Production Well 2R (Well 18), dated January 25, 2021.
- SLR, 2011, Additional Investigation Report, Olympic Water & Sewer, Inc. Property, 781 Walker Way, Port Ludlow, Washington, August 2, 2011.
- U.S. Environmental Protection Agency (EPA), 2008, Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, Office of Superfund Remediation and Technical Innovation, U.S. Environmental Protection Agency, June 2008, USEPA-540-R-08-01.
- U.S. Environmental Protection Agency (EPA), 2010, Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, Office of Superfund Remediation and Technical Innovation, U.S. Environmental Protection Agency, January 2010, USEPA 540/R-10/011.
- Washington State Department of Ecology (Ecology), 2007, Natural Attenuation Analysis Tool Package for Petroleum-Contaminated Groundwater, July 2005, updated for Excel version 2007.
- Washington State Department of Ecology (Ecology), 2014, Letter Re: Opinion on Proposed Cleanup of the following Site: Olympic Water & Sewer Inc. 781 Walker Way, Port Ludlow, WA 98365, Cleanup Site ID 1196, Facility/Site No. 62223345, VCP Project No. SW1311, Prepared for Tom Ringo OPG/Pope Resources, LP, February 11, 2014.

## 7 Limitations

Work for this project was performed for Raydient (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

**Please refer to Appendix C titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.**



# **TABLES**

**Table 1. Summary of Groundwater Elevation Data**

Project No. 130046, Port Ludlow, Washington

Well Number	Top of Casing Elevation <sup>a</sup> (feet)	Date Measured	Depth to Groundwater <sup>b</sup> (feet)	Groundwater Elevation (feet)
MW-1	294.02	06/14/2010	41.33	252.69
		10/20/2010	40.3	253.72
		04/08/2011	36.98	257.04
		07/11/2019	37.89	256.13
		11/08/2019	40.14	253.88
		02/11/2020	39.42	254.6
		05/28/2020	36.75	257.27
		05/03/2022	35.57	258.45
		05/10/2023	36.16	257.86
MW-2	293.79	06/14/2010	39.63	254.16
		10/20/2010	40.71	253.08
		04/08/2011	36.9	256.89
		07/11/2019	43.58	250.21
		11/08/2019	41.95	251.84
		02/11/2020	43.2	250.59
		05/28/2020	39.78	254.01
		05/04/2022	36.41	257.38
		05/10/2023	36.46	257.33
MW-3	289.37	06/14/2010	25.19	264.18
		10/20/2010	28.7	260.67
		04/08/2011	23.02	266.35
		07/11/2019	27.68	261.69
		11/08/2019	31.06	258.31
		02/11/2020	29.96	259.41
		05/28/2020	26.35	263.02
		05/03/2022	23.73	265.64
		05/09/2023	24.46	264.91
MW-4	295.33	06/14/2010	23.92	271.41
		10/20/2010	26.67	268.66
		04/08/2011	21.95	273.38
		07/11/2019	27.75	267.58
		11/08/2019	29.06	266.27
		02/11/2020	28.03	267.3
		05/28/2020	25.43	269.9
		05/03/2022	22.61	272.72
		05/09/2023	22.42	272.91
MW-5	299.4	04/08/2011	23.55	275.85
		07/11/2019	29.04	270.36
		11/08/2019	30.36	269.04
		02/11/2020	27.59	271.81
		05/28/2020	25.73	273.67
		05/03/2022	23.82	275.58
		05/09/2023	24.96	274.44
MW-18T	300.74	05/03/2022	24.55	276.19
		05/09/2023	24.87	275.87
Well #2	Not Surveyed	07/11/2019	87.1	--
		11/08/2019	85.78	--
		02/11/2020	86.29	--
		05/28/2020	84.82	--
Well #18	Not Surveyed	05/04/2022	92.11	--
		05/12/2023	97.1	--

**Notes:**

<sup>a</sup> Top of casing elevations were surveyed relative to NAVD88 datum.

<sup>b</sup> Depth to groundwater measured in feet below top of PVC casing.

**Table 2. Year 4 Groundwater Analytical Results**

Project No. 130046, Port Ludlow, Washington

					Location Date Sample	MW-1 05/10/2023 MW-1-230510	MW-2 05/10/2023 MW-2-230510	MW-3 05/09/2023 MW-3-230509	MW-4 05/09/2023 MW-4-230509	MW-5 05/09/2023 MW-5-230509	MW-18T 05/09/2023 MW-18T-230509	Well #2 05/10/2023 WELL 2-230510	Well #18 05/12/2023 WELL 18-230512	SW-1 05/09/2023 SW-1-230509
Analyte	CAS_RN	Fraction	Unit	MTCA Method A Cleanup Level										
<b>Total Petroleum Hydrocarbons (TPHs)</b>														
Gasoline Range Organics	TPH-GRO	T	ug/L	800   1000	<b>4100</b>	<b>1800</b>	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U
<b>BTEX</b>														
Benzene	71-43-2	T	ug/L	5	<b>140</b>	<b>61</b>	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	108-88-3	T	ug/L	1000	<b>46</b>	<b>23</b>	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	<b>32</b>	< 1 U
Ethylbenzene	100-41-4	T	ug/L	700	<b>270</b>	<b>120</b>	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Total Xylenes	1330-20-7	T	ug/L	1000	<b>44</b>	< 30 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U
<b>Conventionals</b>														
Alkalinity, Total	ALKT	T	mg/L	--	<b>303</b>	<b>352</b>	<b>218</b>	<b>130</b>	<b>127</b>	<b>175</b>	--	--	--	--
Nitrate-Nitrite	NO3NO2N	T	mg/L	--	< 0.240 UJ	< 0.120 U	<b>1.19</b>	<b>0.402</b>	<b>0.424</b>	<b>0.340</b>	--	--	--	--
Sulfate	14808-79-8	T	mg/L	--	< 1.20 UJ	<b>11.3</b>	<b>17.8</b>	<b>7.07</b>	<b>4.41</b>	<b>7.33</b>	--	--	--	--
<b>Dissolved Gases</b>														
Methane	74-82-8	T	mg/L	--	<b>0.0264</b>	< 0.00675 U	< 0.00675 U	< 0.00675 U	< 0.00675 U	< 0.00675 U	< 0.00675 U	--	--	--
<b>Field Parameters</b>														
Temperature	Temp	T	deg C	--	<b>12</b>	<b>11</b>	<b>10.1</b>	<b>11.9</b>	<b>10.5</b>	<b>11.6</b>	<b>10</b>	<b>13.2</b>	<b>10.7</b>	<b>10.7</b>
Specific Conductance	Cond	T	uS/cm	--	<b>348.4</b>	<b>414.8</b>	<b>321.4</b>	<b>203.1</b>	<b>245.2</b>	<b>323.1</b>	<b>185.5</b>	<b>137</b>	<b>194.4</b>	<b>194.4</b>
Dissolved Oxygen	DO	T	mg/L	--	<b>0.26</b>	<b>0.71</b>	<b>4.64</b>	<b>6.76</b>	<b>4.07</b>	<b>2.1</b>	<b>0.85</b>	<b>0.29</b>	<b>8.45</b>	<b>8.45</b>
pH	pH	T	pH units	--	<b>7.32</b>	<b>7.63</b>	<b>7.37</b>	<b>7.74</b>	<b>6.94</b>	<b>6.95</b>	<b>6.83</b>	<b>9.52</b>	<b>6.92</b>	<b>6.92</b>
Oxidation Reduction Potential	ORP	T	mV	--	<b>-13.1</b>	<b>-40</b>	<b>47.4</b>	<b>48.3</b>	<b>30.9</b>	<b>65.8</b>	<b>-25</b>	<b>37.1</b>	<b>109.8</b>	<b>109.8</b>
Turbidity	Turb	T	NTU	--	<b>9.22</b>	<b>1.86</b>	<b>10</b>	<b>35</b>	<b>13.7</b>	<b>33.1</b>	<b>0</b>	<b>6.1</b>	<b>0.04</b>	<b>0.04</b>
Iron, Ferrous, Fe+2	15438-31-0	T	ppm	--	<b>0.5</b>	< 0 U	<b>6</b>	<b>6</b>	< 0 U	< 0 U	--	--	--	--
<b>Metals</b>														
Manganese	7439-96-5	D	ug/L	--	<b>651</b>	<b>284</b>	<b>1.27</b>	< 1 U	<b>1.04</b>	<b>3.73</b>	--	--	--	--

**Notes:**

- Bold** - detected
- Blue Shaded** - Detected result exceeded screening level
- U - Analyte not detected at or above Reporting Limit (RL) shown
- UJ - Analyte not detected and the Reporting Limit (RL) is an estimate
- D - Dissolved Fraction (filtered) sample result
- T - Total Fraction (unfiltered) sample result
- deg C - degrees Celsius
- mg/L - milligrams per liter
- mV - millivolts
- ug/L - micrograms per liter
- NTU - nephelometric turbidity units
- ppm - parts per million
- Gasoline Range Hydrocarbons are screened against a tighter value when benzene is present in the sample.
- "--" - indicates results not available

**Table 3. Summary of Historical Groundwater Analytical Results**

Project No. 130046, Port Ludlow, Washington

Location					MW-1									
Date					06/11/2010	10/20/2010	04/07/2011	07/11/2019	11/08/2019	02/11/2020	05/28/2020	11/04/2021	05/03/2022	05/10/2023
Sample					MW1-0610	MW1-1010	MW1-411	MW-1-071119	MW-1-110819	MW-1-021120	MW-1-052820	MW-1-110421	MW-1-220503	MW-1-230510
Analyte	CAS_RN	Fraction	Unit	MTCA Method A Cleanup Level										
<b>Total Petroleum Hydrocarbons (TPHs)</b>														
Gasoline Range Organics	TPH-GRO	T	ug/L	800   1000	990	1900	3000	4000	3600	3900	4300	3700	3900	4100
<b>BTEX</b>														
Benzene	71-43-2	T	ug/L	5	110	520	530	180	180	200	190	130	120	140
Toluene	108-88-3	T	ug/L	1000	45	140	82	61	58	72	100	60	87	46
Ethylbenzene	100-41-4	T	ug/L	700	1.1	110	160	360	340	420	410	320	350	270
Total Xylenes	1330-20-7	T	ug/L	1000	--	--	120	68	< 30 U	< 30 U	120	50	100	44
<b>Conventionals</b>														
Alkalinity as Carbonate	ALKCO3	T	mg/L	--	--	--	--	--	--	--	--	--	272	--
Alkalinity, Total	ALKT	T	mg/L	--	--	--	--	312	--	292	--	282	--	303
Nitrate as Nitrogen	14797-55-8	T	mg/L	--	--	--	--	< 0.5 U	--	< 0.100 U	--	< 0.500 UJ	< 0.100 UJ	--
Nitrate-Nitrite	NO3NO2N	T	mg/L	--	--	--	--	--	--	--	--	--	--	< 0.240 UJ
Nitrite as Nitrogen	14797-65-0	T	mg/L	--	--	--	--	< 0.5 U	--	< 0.100 U	--	< 0.500 UJ	--	--
Sulfate	14808-79-8	T	mg/L	--	--	--	--	0.868	--	0.963	--	< 0.600 U	< 0.600 U	< 1.20 UJ
<b>Dissolved Gases</b>														
Methane	74-82-8	T	mg/L	--	--	--	--	0.057	--	0.0367	--	0.0739	30.6	0.0264
<b>Field Parameters</b>														
Temperature	Temp	T	deg C	--	--	--	--	--	--	--	--	12	10.2	12
Specific Conductance	Cond	T	uS/cm	--	--	--	--	--	--	--	--	284.3	286.8	348.4
Dissolved Oxygen	DO	T	mg/L	--	--	--	--	--	--	--	--	0.39	0.64	0.26
pH	pH	T	pH units	--	--	--	--	--	--	--	--	6.88	7.47	7.32
Oxidation Reduction Potential	ORP	T	mV	--	--	--	--	--	--	--	--	62.7	-93.1	-13.1
Turbidity	Turb	T	NTU	--	--	--	--	--	--	--	--	23.1	3.43	9.22
Iron, Ferrous, Fe+2	15438-31-0	T	ppm	--	--	--	--	0.488	--	--	--	< 0	--	0.5
<b>Metals</b>														
Iron	7439-89-6	D	ug/L	--	--	--	--	590	--	--	--	--	--	--
Lead	7439-92-1	T	ug/L	15	< 1 U	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	D	ug/L	--	--	--	--	805	--	--	--	--	614	651
<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b>														
Naphthalene	91-20-3	T	ug/L	160	< 1 U	15	--	--	--	--	--	--	--	--
<b>Volatile Organic Compounds (VOCs)</b>														
1,2-Dibromoethane (EDB)	106-93-4	T	ug/L	0.01	< 0.01 U	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	107-06-2	T	ug/L	5	< 1 U	--	--	--	--	--	--	--	--	--
m,p-Xylenes	179601-23-1	T	ug/L	--	56	71	--	--	--	--	--	--	--	--
Methyl tert-butyl ether (MTBE)	1634-04-4	T	ug/L	20	< 1 U	--	--	--	--	--	--	--	--	--
o-Xylene	95-47-6	T	ug/L	--	130	150	--	--	--	--	--	--	--	--

**Notes:**

- Bold** - detected
- Blue Shaded** - Detected result exceeded screening level.
- U - Analyte not detected at or above Reporting Limit (RL) shown.
- J - Result value estimated
- UJ - Analyte not detected and the Reporting Limit (RL) is an estimate.
- D - Dissolved Fraction (filtered) sample result
- T - Total Fraction (unfiltered) sample result
- deg C - degrees Celsius
- mg/L - milligrams per liter
- mV - millivolts
- ug/L - micrograms per liter
- NTU - nephelometric turbidity units
- ppm - parts per million
- Gasoline Range Hydrocarbons are screened against a tighter value when benzene is present in the sample.
- "--" - indicates results not available

**Table 3. Summary of Historical Groundwater Analytical Results**

Project No. 130046, Port Ludlow, Washington

Location					MW-2									
Date					06/11/2010	10/20/2010	04/07/2011	07/11/2019	11/08/2019	02/11/2020	05/28/2020	11/04/2021	05/04/2022	05/10/2023
Sample					MW2-0610	MW2-1010	MW2-411	MW-2-071119	MW-2-110819	MW-2-021120	MW-2-052820	MW-2-110421	MW-2-220504	MW-2-230510
Analyte	CAS_RN	Fraction	Unit	MTCA Method A Cleanup Level										
<b>Total Petroleum Hydrocarbons (TPHs)</b>														
Gasoline Range Organics	TPH-GRO	T	ug/L	800   1000	<b>8400</b>	<b>3900</b>	<b>5600</b>	<b>6400</b>	<b>5400</b>	<b>5000</b>	<b>2800</b>	<b>2700</b>	<b>2200</b>	<b>1800</b>
<b>BTEX</b>														
Benzene	71-43-2	T	ug/L	5	<b>2100</b>	<b>1300</b>	<b>500</b>	<b>780</b>	<b>820</b>	<b>840</b>	<b>150</b>	<b>220</b>	<b>79</b>	<b>61</b>
Toluene	108-88-3	T	ug/L	1000	<b>620</b>	<b>290</b>	<b>730</b>	<b>120</b>	<b>83</b>	<b>79</b>	<b>58</b>	<b>46</b>	<b>43</b>	<b>23</b>
Ethylbenzene	100-41-4	T	ug/L	700	<b>960</b>	<b>430</b>	<b>160</b>	<b>380</b>	<b>260</b>	<b>240</b>	<b>240</b>	<b>180</b>	<b>180</b>	<b>120</b>
Total Xylenes	1330-20-7	T	ug/L	1000	--	--	<b>410</b>	<b>91</b>	<b>69</b>	<b>64</b>	< 60 U	<b>37</b>	<b>41</b>	< 30 U
<b>Conventionals</b>														
Alkalinity as Carbonate	ALKCO3	T	mg/L	--	--	--	--	--	--	--	--	--	<b>336</b>	--
Alkalinity, Total	ALKT	T	mg/L	--	--	--	--	<b>422</b>	--	<b>380</b>	--	<b>339</b>	--	<b>352</b>
Nitrate as Nitrogen	14797-55-8	T	mg/L	--	--	--	--	< 0.5 U	--	< 0.100 U	--	< 0.500 UJ	< 0.200 UJ	--
Nitrate-Nitrite	NO3NO2N	T	mg/L	--	--	--	--	--	--	--	--	--	--	< 0.120 U
Nitrite as Nitrogen	14797-65-0	T	mg/L	--	--	--	--	< 0.5 U	--	< 0.100 U	--	< 0.500 UJ	--	--
Sulfate	14808-79-8	T	mg/L	--	--	--	--	<b>13.1</b>	--	<b>14.6</b>	--	<b>13.2</b>	<b>12.0</b>	<b>11.3</b>
<b>Dissolved Gases</b>														
Methane	74-82-8	T	mg/L	--	--	--	--	<b>0.0284</b>	--	<b>0.0158</b>	--	<b>0.0153</b>	<b>0.684</b>	< 0.00675 U
<b>Field Parameters</b>														
Temperature	Temp	T	deg C	--	--	--	--	--	--	--	--	<b>11.2</b>	<b>10.3</b>	<b>11</b>
Specific Conductance	Cond	T	uS/cm	--	--	--	--	--	--	--	--	<b>342.5</b>	<b>283.2</b>	<b>414.8</b>
Dissolved Oxygen	DO	T	mg/L	--	--	--	--	--	--	--	--	<b>1.29</b>	<b>0.45</b>	<b>0.71</b>
pH	pH	T	pH units	--	--	--	--	--	--	--	--	<b>7.24</b>	<b>7.72</b>	<b>7.63</b>
Oxidation Reduction Potential	ORP	T	mV	--	--	--	--	--	--	--	--	<b>49</b>	<b>14.4</b>	<b>-40</b>
Turbidity	Turb	T	NTU	--	--	--	--	--	--	--	--	<b>48.1</b>	<b>1.16</b>	<b>1.86</b>
Iron, Ferrous, Fe+2	15438-31-0	T	ppm	--	--	--	--	<b>0.197</b>	--	--	--	< 0	--	< 0 U
<b>Metals</b>														
Iron	7439-89-6	D	ug/L	--	--	--	--	<b>453</b>	--	--	--	--	--	--
Lead	7439-92-1	T	ug/L	15	< 1 U	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	D	ug/L	--	--	--	--	<b>491</b>	--	--	--	--	<b>325</b>	<b>284</b>
<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b>														
Naphthalene	91-20-3	T	ug/L	160	<b>100</b>	<b>35</b>	--	--	--	--	--	--	--	--
<b>Volatile Organic Compounds (VOCs)</b>														
1,2-Dibromoethane (EDB)	106-93-4	T	ug/L	0.01	< 0.01 U	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	107-06-2	T	ug/L	5	< 1 U	--	--	--	--	--	--	--	--	--
m,p-Xylenes	179601-23-1	T	ug/L	--	<b>400</b>	<b>240</b>	--	--	--	--	--	--	--	--
Methyl tert-butyl ether (MTBE)	1634-04-4	T	ug/L	20	< 1 U	--	--	--	--	--	--	--	--	--
o-Xylene	95-47-6	T	ug/L	--	<b>250</b>	<b>290</b>	--	--	--	--	--	--	--	--

**Notes:**

- Bold** - detected
- Blue Shaded** - Detected result exceeded screening level.
- U - Analyte not detected at or above Reporting Limit (RL) shown.
- J - Result value estimated
- UJ - Analyte not detected and the Reporting Limit (RL) is an estimate.
- D - Dissolved Fraction (filtered) sample result
- T - Total Fraction (unfiltered) sample result
- deg C - degrees Celsius
- mg/L - milligrams per liter
- mV - millivolts
- ug/L - micrograms per liter
- NTU - nephelometric turbidity units
- ppm - parts per million
- Gasoline Range Hydrocarbons are screened against a tighter value when benzene is present in the sample.
- "--" - indicates results not available

**Table 3. Summary of Historical Groundwater Analytical Results**

Project No. 130046, Port Ludlow, Washington

Location					MW-3									
Date					06/11/2010	10/20/2010	04/07/2011	07/11/2019	11/08/2019	02/11/2020	05/28/2020	11/04/2021	05/03/2022	05/09/2023
Sample					MW3-0610	MW3-1010	MW3-411	MW-3-071119	MW-3-110819	MW-3-021120	MW-3-052820	MW-3-110421	MW-3-220503	MW-3-230509
Analyte	CAS_RN	Fraction	Unit	MTCA Method A Cleanup Level										
<b>Total Petroleum Hydrocarbons (TPHs)</b>														
Gasoline Range Organics	TPH-GRO	T	ug/L	800   1000	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U
<b>BTEX</b>														
Benzene	71-43-2	T	ug/L	5	<b>0.36</b>	< 0.35 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	108-88-3	T	ug/L	1000	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	100-41-4	T	ug/L	700	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Total Xylenes	1330-20-7	T	ug/L	1000	--	--	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U
<b>Conventionals</b>														
Alkalinity as Carbonate	ALKCO3	T	mg/L	--	--	--	--	--	--	--	--	--	201	--
Alkalinity, Total	ALKT	T	mg/L	--	--	--	202	--	205	--	--	211	--	218
Nitrate as Nitrogen	14797-55-8	T	mg/L	--	--	--	2.14	--	2.22	--	--	1.68	1.78 J	--
Nitrate-Nitrite	NO3NO2N	T	mg/L	--	--	--	--	--	--	--	--	--	--	1.19
Nitrite as Nitrogen	14797-65-0	T	mg/L	--	--	--	< 0.2 U	--	< 0.200 U	--	--	< 0.500 UJ	--	--
Sulfate	14808-79-8	T	mg/L	--	--	--	17.4	--	15.3	--	--	16.1	17.3	17.8
<b>Dissolved Gases</b>														
Methane	74-82-8	T	mg/L	--	--	--	< 0.00863 U	--	< 0.00863 U	--	--	< 0.00675 U	0.198	< 0.00675 U
<b>Field Parameters</b>														
Temperature	Temp	T	deg C	--	--	--	--	--	--	--	--	12.3	10	10.1
Specific Conductance	Cond	T	uS/cm	--	--	--	--	--	--	--	--	234.1	216.5	321.4
Dissolved Oxygen	DO	T	mg/L	--	--	--	--	--	--	--	--	4.07	3.58	4.64
pH	pH	T	pH units	--	--	--	--	--	--	--	--	7.04	7.51	7.37
Oxidation Reduction Potential	ORP	T	mV	--	--	--	--	--	--	--	--	61.3	100.7	47.4
Turbidity	Turb	T	NTU	--	--	--	--	--	--	--	--	25	5.1	10
Iron, Ferrous, Fe+2	15438-31-0	T	ppm	--	--	--	0.0959 J	--	--	--	--	< 0	--	6
<b>Metals</b>														
Iron	7439-89-6	D	ug/L	--	--	--	128	--	--	--	--	--	--	--
Lead	7439-92-1	T	ug/L	15	< 1 U	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	D	ug/L	--	--	--	< 1 U	--	--	--	--	--	< 1 U	1.27
<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b>														
Naphthalene	91-20-3	T	ug/L	160	< 1 U	< 1 U	--	--	--	--	--	--	--	--
<b>Volatile Organic Compounds (VOCs)</b>														
1,2-Dibromoethane (EDB)	106-93-4	T	ug/L	0.01	< 0.01 U	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	107-06-2	T	ug/L	5	< 1 U	--	--	--	--	--	--	--	--	--
m,p-Xylenes	179601-23-1	T	ug/L	--	< 2 U	< 2 U	--	--	--	--	--	--	--	--
Methyl tert-butyl ether (MTBE)	1634-04-4	T	ug/L	20	< 1 U	--	--	--	--	--	--	--	--	--
o-Xylene	95-47-6	T	ug/L	--	< 1 U	< 1 U	--	--	--	--	--	--	--	--

**Notes:**

- Bold** - detected
- Blue Shaded** - Detected result exceeded screening level.
- U - Analyte not detected at or above Reporting Limit (RL) shown.
- J - Result value estimated
- UJ - Analyte not detected and the Reporting Limit (RL) is an estimate.
- D - Dissolved Fraction (filtered) sample result
- T - Total Fraction (unfiltered) sample result
- deg C - degrees Celsius
- mg/L - milligrams per liter
- mV - millivolts
- ug/L - micrograms per liter
- NTU - nephelometric turbidity units
- ppm - parts per million
- Gasoline Range Hydrocarbons are screened against a tighter value when benzene is present in the sample.
- "--" - indicates results not available

**Table 3. Summary of Historical Groundwater Analytical Results**

Project No. 130046, Port Ludlow, Washington

Location					MW-4									
Date					06/11/2010	10/20/2010	04/08/2011	07/11/2019	11/08/2019	02/11/2020	05/28/2020	11/04/2021	05/03/2022	05/09/2023
Sample					MW4-0610	MW4-1010	MW4-411	MW-4-071119	MW-4-110819	MW-4-021120	MW-4-052820	MW-4-110421	MW-4-220503	MW-4-230509
Analyte	CAS_RN	Fraction	Unit	MTCA Method A Cleanup Level										
<b>Total Petroleum Hydrocarbons (TPHs)</b>														
Gasoline Range Organics	TPH-GRO	T	ug/L	800   1000	< 100 U	< 100 U	<b>380</b>	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U
<b>BTEX</b>														
Benzene	71-43-2	T	ug/L	5	< 0.35 U	< 0.35 U	<b>5.3</b>	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	108-88-3	T	ug/L	1000	< 1 U	< 1 U	<b>75</b>	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	100-41-4	T	ug/L	700	< 1 U	< 1 U	<b>13</b>	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Total Xylenes	1330-20-7	T	ug/L	1000	--	--	<b>47</b>	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U
<b>Conventionals</b>														
Alkalinity as Carbonate	ALKCO3	T	mg/L	--	--	--	--	--	--	--	--	--	<b>111</b>	--
Alkalinity, Total	ALKT	T	mg/L	--	--	--	--	<b>140</b>	--	<b>239</b>	--	<b>127</b>	--	<b>130</b>
Nitrate as Nitrogen	14797-55-8	T	mg/L	--	--	--	--	<b>0.551</b>	--	<b>0.604</b>	--	<b>0.580</b>	<b>0.335 J</b>	--
Nitrate-Nitrite	NO3NO2N	T	mg/L	--	--	--	--	--	--	--	--	--	--	<b>0.402</b>
Nitrite as Nitrogen	14797-65-0	T	mg/L	--	--	--	--	< 0.1 U	--	< 0.100 U	--	< 0.500 UJ	--	--
Sulfate	14808-79-8	T	mg/L	--	--	--	--	<b>8.76</b>	--	<b>8.17</b>	--	<b>7.59</b>	<b>7.68</b>	<b>7.07</b>
<b>Dissolved Gases</b>														
Methane	74-82-8	T	mg/L	--	--	--	--	< 0.00863 U	--	< 0.00863 U	--	< 0.00675 U	< 0.00675 U	< 0.00675 U
<b>Field Parameters</b>														
Temperature	Temp	T	deg C	--	--	--	--	--	--	--	--	<b>12.5</b>	<b>10.8</b>	<b>11.9</b>
Specific Conductance	Cond	T	uS/cm	--	--	--	--	--	--	--	--	<b>149.6</b>	<b>147.1</b>	<b>203.1</b>
Dissolved Oxygen	DO	T	mg/L	--	--	--	--	--	--	--	--	<b>5.18</b>	<b>5.73</b>	<b>6.76</b>
pH	pH	T	pH units	--	--	--	--	--	--	--	--	<b>7.68</b>	<b>7.77</b>	<b>7.74</b>
Oxidation Reduction Potential	ORP	T	mV	--	--	--	--	--	--	--	--	<b>97.6</b>	<b>107.5</b>	<b>48.3</b>
Turbidity	Turb	T	NTU	--	--	--	--	--	--	--	--	<b>38.6</b>	<b>11</b>	<b>35</b>
Iron, Ferrous, Fe+2	15438-31-0	T	ppm	--	--	--	--	<b>0.199</b>	--	--	--	< 0	--	<b>6</b>
<b>Metals</b>														
Iron	7439-89-6	D	ug/L	--	--	--	--	<b>65.5</b>	--	--	--	--	--	--
Lead	7439-92-1	T	ug/L	15	< 1 U	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	D	ug/L	--	--	--	--	< 1 U	--	--	--	--	< 1 U	< 1 U
<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b>														
Naphthalene	91-20-3	T	ug/L	160	< 1 U	< 1 U	--	--	--	--	--	--	--	--
<b>Volatile Organic Compounds (VOCs)</b>														
1,2-Dibromoethane (EDB)	106-93-4	T	ug/L	0.01	< 0.01 U	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	107-06-2	T	ug/L	5	< 1 U	--	--	--	--	--	--	--	--	--
m,p-Xylenes	179601-23-1	T	ug/L	--	< 2 U	< 2 U	--	--	--	--	--	--	--	--
Methyl tert-butyl ether (MTBE)	1634-04-4	T	ug/L	20	< 1 U	--	--	--	--	--	--	--	--	--
o-Xylene	95-47-6	T	ug/L	--	< 1 U	< 1 U	--	--	--	--	--	--	--	--

**Notes:**

- Bold** - detected
- Blue Shaded** - Detected result exceeded screening level.
- U - Analyte not detected at or above Reporting Limit (RL) shown.
- J - Result value estimated
- UJ - Analyte not detected and the Reporting Limit (RL) is an estimate.
- D - Dissolved Fraction (filtered) sample result
- T - Total Fraction (unfiltered) sample result
- deg C - degrees Celsius
- mg/L - milligrams per liter
- mV - millivolts
- ug/L - micrograms per liter
- NTU - nephelometric turbidity units
- ppm - parts per million
- Gasoline Range Hydrocarbons are screened against a tighter value when benzene is present in the sample.
- "--" - indicates results not available



**Table 3. Summary of Historical Groundwater Analytical Results**

Project No. 130046, Port Ludlow, Washington

Location					MW-5							
Date					04/08/2011	07/11/2019	11/08/2019	02/11/2020	05/28/2020	11/04/2021	05/03/2022	05/09/2023
Sample					MW5-411	MW-5-071119	MW-5-110819	MW-5-021120	MW-5-052820	MW-5-110421	MW-5-220503	MW-5-230509
Analyte	CAS_RN	Fraction	Unit	MTCA Method A Cleanup Level								
<b>Total Petroleum Hydrocarbons (TPHs)</b>												
Gasoline Range Organics	TPH-GRO	T	ug/L	800   1000	220	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U
<b>BTEX</b>												
Benzene	71-43-2	T	ug/L	5	3.4	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	108-88-3	T	ug/L	1000	43	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	100-41-4	T	ug/L	700	7.8	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Total Xylenes	1330-20-7	T	ug/L	1000	25	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U
<b>Conventionals</b>												
Alkalinity as Carbonate	ALKCO3	T	mg/L	--	--	--	--	--	--	--	116	--
Alkalinity, Total	ALKT	T	mg/L	--	--	136	--	146	--	126	--	127
Nitrate as Nitrogen	14797-55-8	T	mg/L	--	--	0.561	--	0.628	--	0.630	0.419 J	--
Nitrate-Nitrite	NO3NO2N	T	mg/L	--	--	--	--	--	--	--	--	0.424
Nitrite as Nitrogen	14797-65-0	T	mg/L	--	--	< 0.1 U	--	< 0.200 U	--	< 0.500 UJ	--	--
Sulfate	14808-79-8	T	mg/L	--	--	6.66	--	4.61	--	6.71	5.15	4.41
<b>Dissolved Gases</b>												
Methane	74-82-8	T	mg/L	--	--	< 0.00863 U	--	< 0.00863 U	--	< 0.00675 U	< 0.00675 U	< 0.00675 U
<b>Field Parameters</b>												
Temperature	Temp	T	deg C	--	--	--	--	--	--	11.1	10.2	10.5
Specific Conductance	Cond	T	uS/cm	--	--	--	--	--	--	179.2	157.5	245.2
Dissolved Oxygen	DO	T	mg/L	--	--	--	--	--	--	4.56	4.48	4.07
pH	pH	T	pH units	--	--	--	--	--	--	6.52	7.14	6.94
Oxidation Reduction Potential	ORP	T	mV	--	--	--	--	--	--	100	81.9	30.9
Turbidity	Turb	T	NTU	--	--	--	--	--	--	93.7	67.5	13.7
Iron, Ferrous, Fe+2	15438-31-0	T	ppm	--	--	0.591 J	--	--	--	0.5	--	< 0 U
<b>Metals</b>												
Iron	7439-89-6	D	ug/L	--	--	81.3	--	--	--	--	--	--
Lead	7439-92-1	T	ug/L	15	--	--	--	--	--	--	--	--
Manganese	7439-96-5	D	ug/L	--	--	< 1 U	--	--	--	--	2.46	1.04
<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b>												
Naphthalene	91-20-3	T	ug/L	160	--	--	--	--	--	--	--	--
<b>Volatile Organic Compounds (VOCs)</b>												
1,2-Dibromoethane (EDB)	106-93-4	T	ug/L	0.01	--	--	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	107-06-2	T	ug/L	5	--	--	--	--	--	--	--	--
m,p-Xylenes	179601-23-1	T	ug/L	--	--	--	--	--	--	--	--	--
Methyl tert-butyl ether (MTBE)	1634-04-4	T	ug/L	20	--	--	--	--	--	--	--	--
o-Xylene	95-47-6	T	ug/L	--	--	--	--	--	--	--	--	--

**Notes:**

- Bold** - detected
- Blue Shaded** - Detected result exceeded screening level.
- U - Analyte not detected at or above Reporting Limit (RL) shown.
- J - Result value estimated
- UJ - Analyte not detected and the Reporting Limit (RL) is an estimate.
- D - Dissolved Fraction (filtered) sample result
- T - Total Fraction (unfiltered) sample result
- deg C - degrees Celsius
- mg/L - milligrams per liter
- mV - millivolts
- ug/L - micrograms per liter
- NTU - nephelometric turbidity units
- ppm - parts per million
- Gasoline Range Hydrocarbons are screened against a tighter value when benzene is present in the sample.
- "--" - indicates results not available



**Table 3. Summary of Historical Groundwater Analytical Results**

Project No. 130046, Port Ludlow, Washington

Location					MW-18T			SW-1			
Date					11/04/2021	05/03/2022	05/09/2023	04/04/2011	02/11/2020	05/03/2022	05/09/2023
Sample					MW-18T-110421	MW-18T-220503	MW-18T-230509	STREAM-4411	SW-1-021120	SW-1-220503	SW-1-230509
Analyte	CAS_RN	Fraction	Unit	MTCA Method A Cleanup Level							
<b>Total Petroleum Hydrocarbons (TPHs)</b>											
Gasoline Range Organics	TPH-GRO	T	ug/L	800   1000	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U
<b>BTEX</b>											
Benzene	71-43-2	T	ug/L	5	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	108-88-3	T	ug/L	1000	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	100-41-4	T	ug/L	700	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Total Xylenes	1330-20-7	T	ug/L	1000	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U
<b>Conventionals</b>											
Alkalinity as Carbonate	ALKCO3	T	mg/L	--	--	156	--	--	--	--	--
Alkalinity, Total	ALKT	T	mg/L	--	--	175	--	26.8	--	--	--
Nitrate as Nitrogen	14797-55-8	T	mg/L	--	--	0.282 J	--	1.41	--	--	--
Nitrate-Nitrite	NO3NO2N	T	mg/L	--	--	0.340	--	--	--	--	--
Nitrite as Nitrogen	14797-65-0	T	mg/L	--	--	--	--	< 0.100 U	--	--	--
Sulfate	14808-79-8	T	mg/L	--	--	7.37	7.33	5.06	--	--	--
<b>Dissolved Gases</b>											
Methane	74-82-8	T	mg/L	--	--	< 0.00675 U	< 0.00675 U	--	< 0.00863 U	--	--
<b>Field Parameters</b>											
Temperature	Temp	T	deg C	--	11.3	10.2	11.6	--	--	--	10.7
Specific Conductance	Cond	T	uS/cm	--	232.2	224.4	323.1	--	--	--	194.4
Dissolved Oxygen	DO	T	mg/L	--	4.09	2.95	2.1	--	--	--	8.45
pH	pH	T	pH units	--	6.81	6.97	6.95	--	--	--	6.92
Oxidation Reduction Potential	ORP	T	mV	--	69.7	130.6	65.8	--	--	--	109.8
Turbidity	Turb	T	NTU	--	56.6	77.4	33.1	--	--	--	0.04
Iron, Ferrous, Fe+2	15438-31-0	T	ppm	--	< 0	--	< 0 U	--	--	--	--
<b>Metals</b>											
Iron	7439-89-6	D	ug/L	--	--	--	--	--	--	--	--
Lead	7439-92-1	T	ug/L	15	--	--	--	--	--	--	--
Manganese	7439-96-5	D	ug/L	--	--	28.3	3.73	--	--	--	--
<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b>											
Naphthalene	91-20-3	T	ug/L	160	--	--	--	--	--	--	--
<b>Volatile Organic Compounds (VOCs)</b>											
1,2-Dibromoethane (EDB)	106-93-4	T	ug/L	0.01	--	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	107-06-2	T	ug/L	5	--	--	--	--	--	--	--
m,p-Xylenes	179601-23-1	T	ug/L	--	--	--	--	--	--	--	--
Methyl tert-butyl ether (MTBE)	1634-04-4	T	ug/L	20	--	--	--	--	--	--	--
o-Xylene	95-47-6	T	ug/L	--	--	--	--	--	--	--	--

**Notes:**

- Bold** - detected
- Blue Shaded** - Detected result exceeded screening level.
- U - Analyte not detected at or above Reporting Limit (RL) shown.
- J - Result value estimated
- UJ - Analyte not detected and the Reporting Limit (RL) is an estimate.
- D - Dissolved Fraction (filtered) sample result
- T - Total Fraction (unfiltered) sample result
- deg C - degrees Celsius
- mg/L - milligrams per liter
- mV - millivolts
- ug/L - micrograms per liter
- NTU - nephelometric turbidity units
- ppm - parts per million
- Gasoline Range Hydrocarbons are screened against a tighter value when benzene is present in the sample.
- "--" - indicates results not available

**Table 3. Summary of Historical Groundwater Analytical Results**

Project No. 130046, Port Ludlow, Washington

Location					Well #2						Well #18		
Date					07/11/2019	11/08/2019	02/11/2020	05/28/2020	11/04/2021	05/09/2022	05/10/2023	05/09/2022	05/12/2023
Sample					W-2-071119-P	W-2-110819	W-2-021120	W-2-052820	W-2-110421	WELL 2-220509	WELL 2-230510	WELL 18-220509	WELL 18-230512
Analyte	CAS_RN	Fraction	Unit	MTCA Method A Cleanup Level									
<b>Total Petroleum Hydrocarbons (TPHs)</b>													
Gasoline Range Organics	TPH-GRO	T	ug/L	800   1000	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	< 100 U	120	< 100 U
<b>BTEX</b>													
Benzene	71-43-2	T	ug/L	5	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	108-88-3	T	ug/L	1000	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	38	32
Ethylbenzene	100-41-4	T	ug/L	700	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Total Xylenes	1330-20-7	T	ug/L	1000	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U	< 3 U
<b>Conventionals</b>													
Alkalinity as Carbonate	ALKCO3	T	mg/L	--	--	--	--	--	--	--	--	--	--
Alkalinity, Total	ALKT	T	mg/L	--	68.2	--	102	--	53.2	--	--	--	--
Nitrate as Nitrogen	14797-55-8	T	mg/L	--	< 0.1 U	--	< 0.100 U	--	< 0.500 UJ	--	--	--	--
Nitrate-Nitrite	NO3NO2N	T	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrite as Nitrogen	14797-65-0	T	mg/L	--	< 0.1 U	--	< 0.100 U	--	< 0.500 UJ	--	--	--	--
Sulfate	14808-79-8	T	mg/L	--	43.2	--	47.4	--	16.0	--	--	--	--
<b>Dissolved Gases</b>													
Methane	74-82-8	T	mg/L	--	0.0178	--	0.0574	--	0.00836	--	--	--	--
<b>Field Parameters</b>													
Temperature	Temp	T	deg C	--	--	--	--	--	11.9	10.9	10	11.2	13.2
Specific Conductance	Cond	T	uS/cm	--	--	--	--	--	106.6	1908	185.5	138.2	137
Dissolved Oxygen	DO	T	mg/L	--	--	--	--	--	2.26	1.87	0.85	10.69	0.29
pH	pH	T	pH units	--	--	--	--	--	7.15	7.19	6.83	8.95	9.52
Oxidation Reduction Potential	ORP	T	mV	--	--	--	--	--	85.4	-7.4	-25	70.8	37.1
Turbidity	Turb	T	NTU	--	--	--	--	--	9.03	0.93	0	18.9	6.1
Iron, Ferrous, Fe+2	15438-31-0	T	ppm	--	< 0.05 UJ	--	--	--	< 0	--	--	--	--
<b>Metals</b>													
Iron	7439-89-6	D	ug/L	--	1150	--	--	--	--	--	--	--	--
Lead	7439-92-1	T	ug/L	15	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	D	ug/L	--	275	--	--	--	--	--	--	--	--
<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b>													
Naphthalene	91-20-3	T	ug/L	160	--	--	--	--	--	--	--	--	--
<b>Volatile Organic Compounds (VOCs)</b>													
1,2-Dibromoethane (EDB)	106-93-4	T	ug/L	0.01	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane (EDC)	107-06-2	T	ug/L	5	--	--	--	--	--	--	--	--	--
m,p-Xylenes	179601-23-1	T	ug/L	--	--	--	--	--	--	--	--	--	--
Methyl tert-butyl ether (MTBE)	1634-04-4	T	ug/L	20	--	--	--	--	--	--	--	--	--
o-Xylene	95-47-6	T	ug/L	--	--	--	--	--	--	--	--	--	--

**Notes:**

- Bold** - detected
- Blue Shaded** - Detected result exceeded screening level.
- U - Analyte not detected at or above Reporting Limit (RL) shown.
- J - Result value estimated
- UJ - Analyte not detected and the Reporting Limit (RL) is an estimate.
- D - Dissolved Fraction (filtered) sample result
- T - Total Fraction (unfiltered) sample result
- deg C - degrees Celsius
- mg/L - milligrams per liter
- mV - millivolts
- ug/L - micrograms per liter
- NTU - nephelometric turbidity units
- ppm - parts per million
- Gasoline Range Hydrocarbons are screened against a tighter value when benzene is present in the sample.
- "--" - indicates results not available

# FIGURES

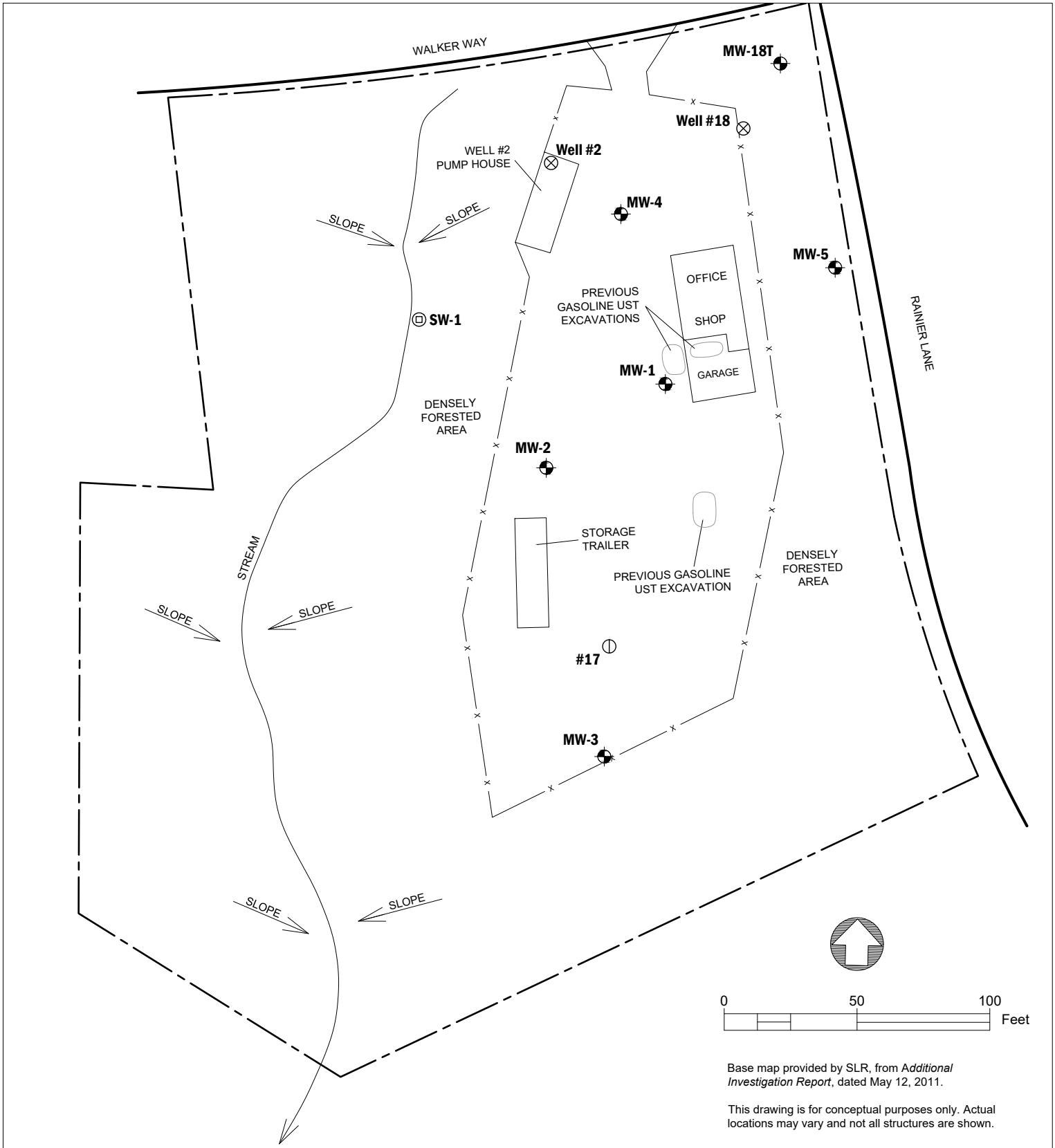


**Site Location Map**  
 Year 4 Annual Groundwater Monitoring Report  
 Olympic Water & Sewer, Inc.  
 Port Ludlow, Washington

	JUN-2023	BY: EPM / SCC	FIGURE NO.  <b>1</b>
	PROJECT NO. 130046	REVISED BY: CT / SCC	

Basemap Layer Credits || Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community  
 Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

GIS Path: Q:\Olympic Property Group\130046 Port Ludlow\2023-06 Year 4 Annual GW Monitoring Report\GIS\01 Site Location Map.mxd | Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet | Date Saved: 6/23/2023 | User: scudd | Print Date: 6/23/2023



Base map provided by SLR, from *Additional Investigation Report*, dated May 12, 2011.

This drawing is for conceptual purposes only. Actual locations may vary and not all structures are shown.

**Legend**

- Monitoring Well Location
- Stream Sample Location
- Water Supply Well Location
- Existing Casing Location

**Site Plan**  
 Year 4 Annual Groundwater Monitoring Report  
 Olympic Water & Sewer, Inc.  
 Port Ludlow, Washington

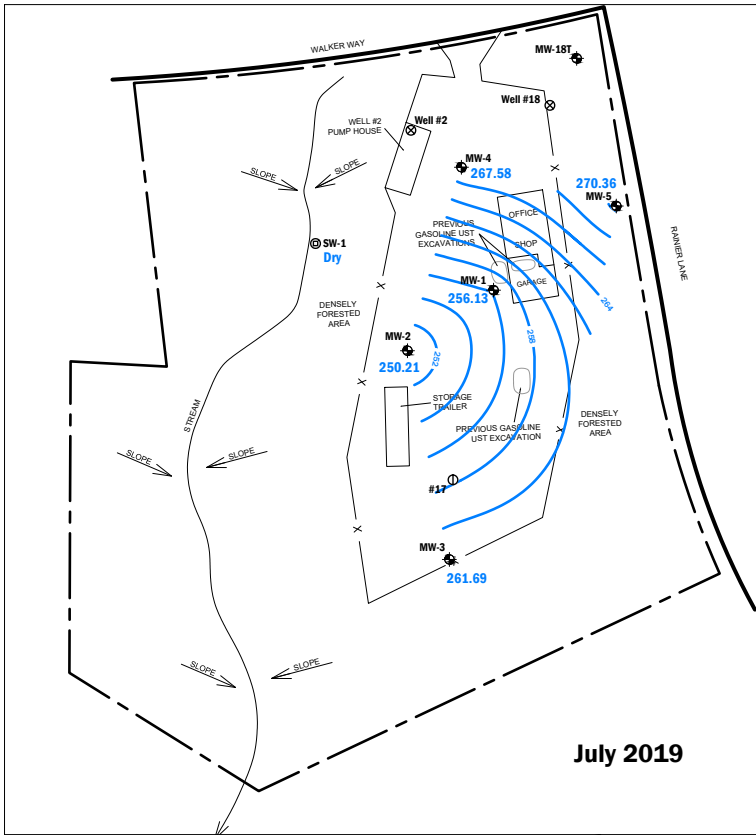


Jun-2023  
 PROJECT NO.  
 130046

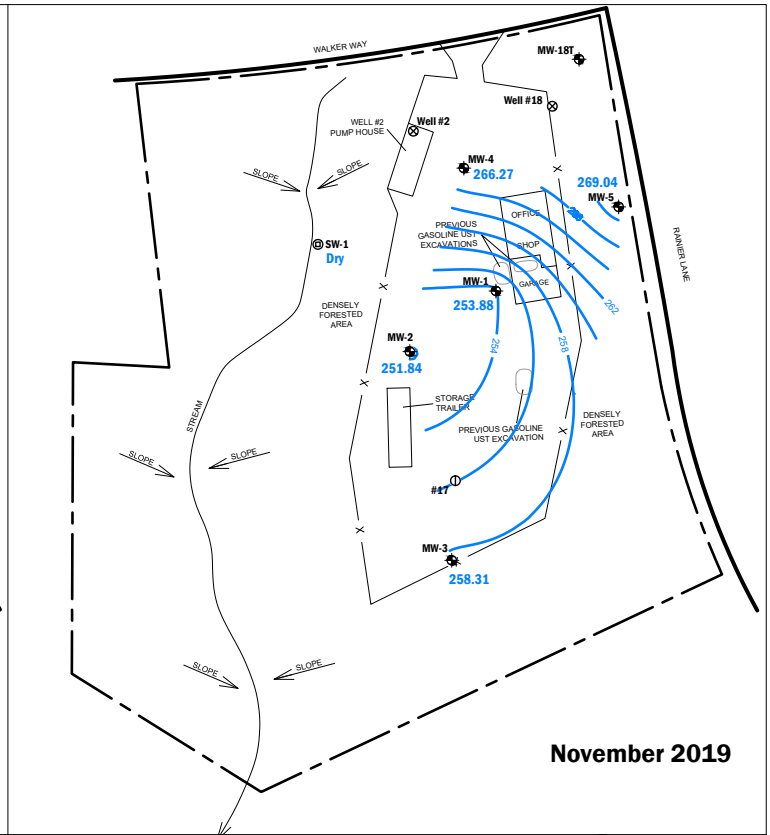
BY:  
 DWU/SCC  
 REVISED BY:  
 CT/SCC

FIGURE NO.  
**2**

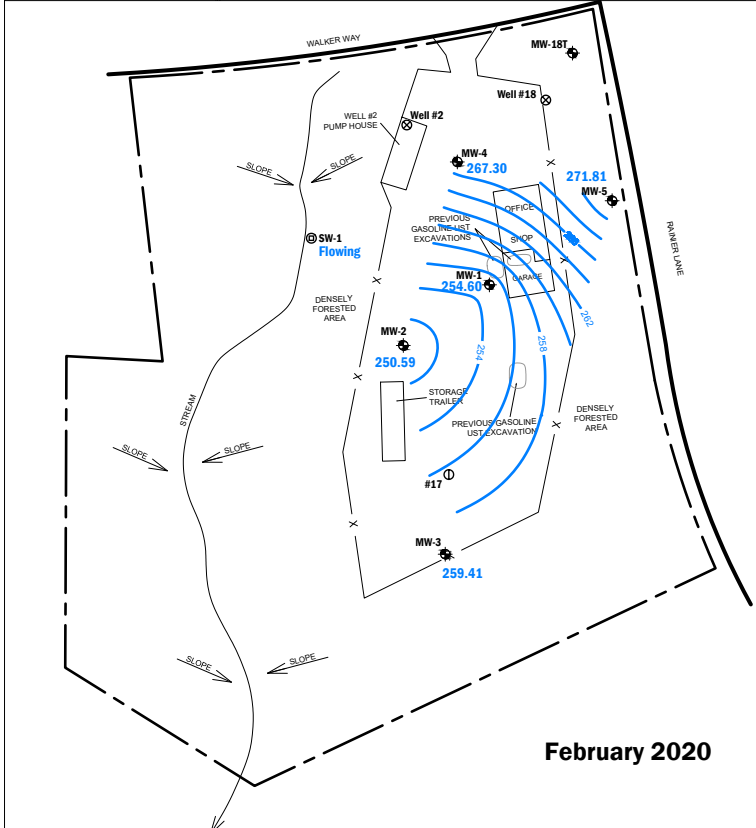




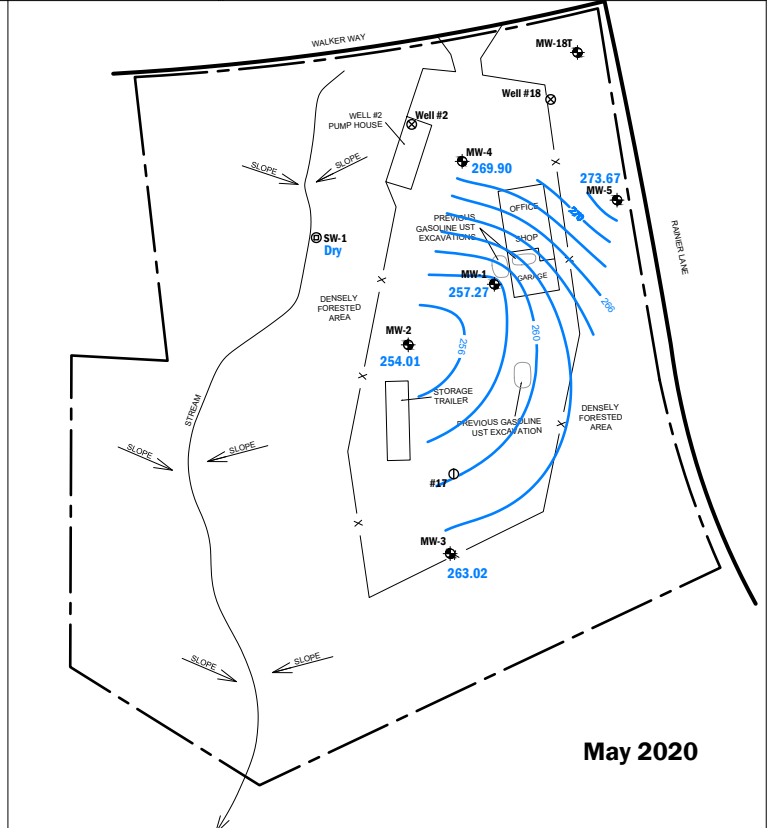
July 2019



November 2019



February 2020



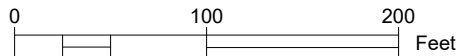
May 2020

**Legend**

- ⊕ Monitoring Well Location
- ⊙ Stream Sample Location
- ⊗ Existing Water Supply Well Location
- ⓪ Existing Casing Location
- Groundwater Elevation Contour Line (Feet)

Base map provided by SLR, from *Additional Investigation Report*, dated May 12, 2011.

This drawing is for conceptual purposes only. Actual locations may vary and not all structures are shown.



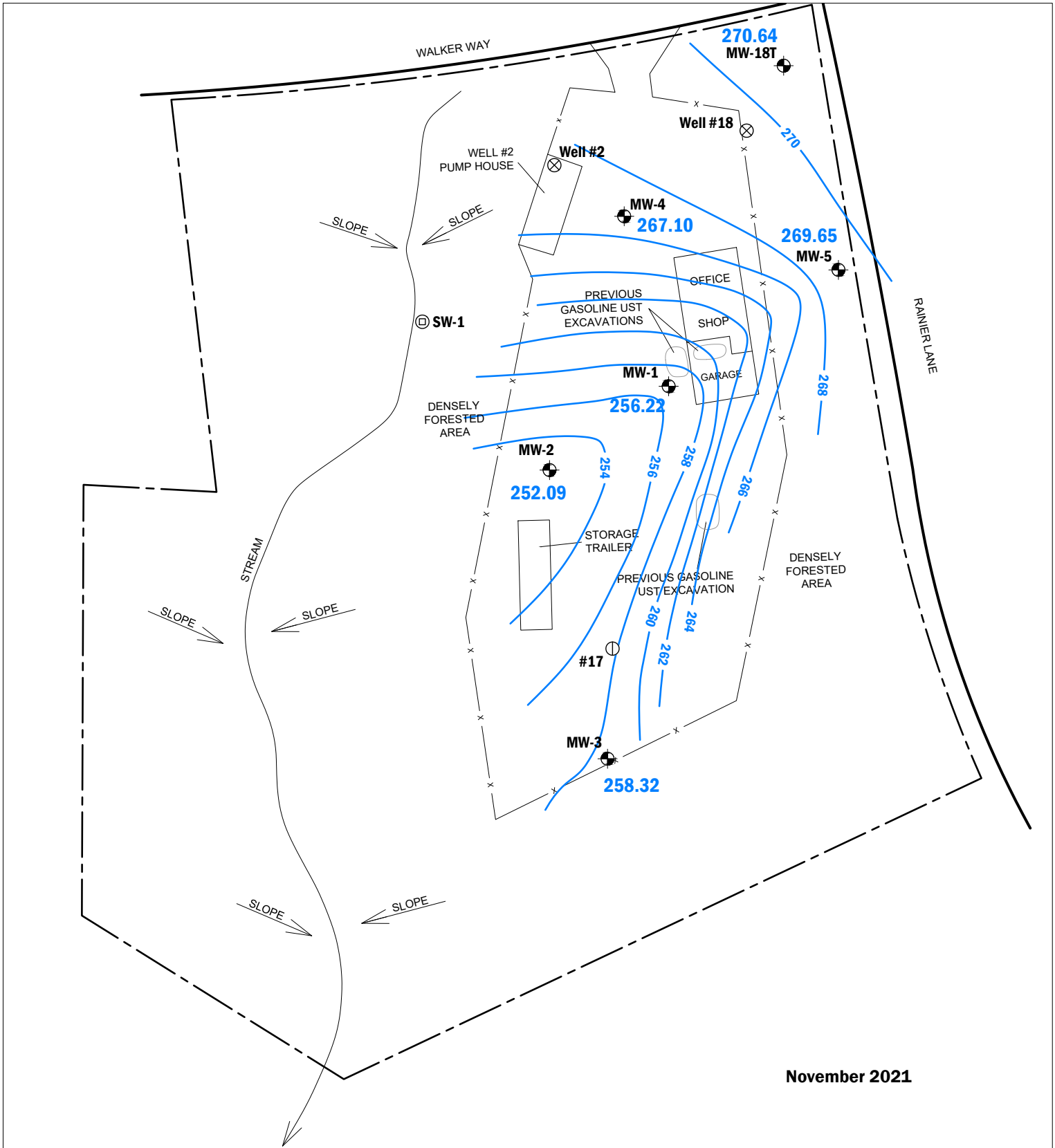
**Year 1 Groundwater Elevation and Contours**  
 Year 4 Annual Groundwater Monitoring Report  
 Olympic Water & Sewer, Inc.  
 Port Ludlow, Washington



Jun-2023  
 PROJECT NO.  
 130046

BY:  
 DWJ/SCC  
 REVISED BY:  
 CT / SCC

FIGURE NO.  
**3**



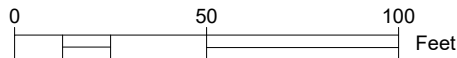
November 2021

**Legend**

- Monitoring Well Location
- Stream Sample Location
- Existing Water Supply Well Location
- Existing Casing Location
- Groundwater Elevation Contour Line (Feet)

Base map provided by SLR, from *Additional Investigation Report*, dated May 12, 2011.

This drawing is for conceptual purposes only. Actual locations may vary and not all structures are shown.



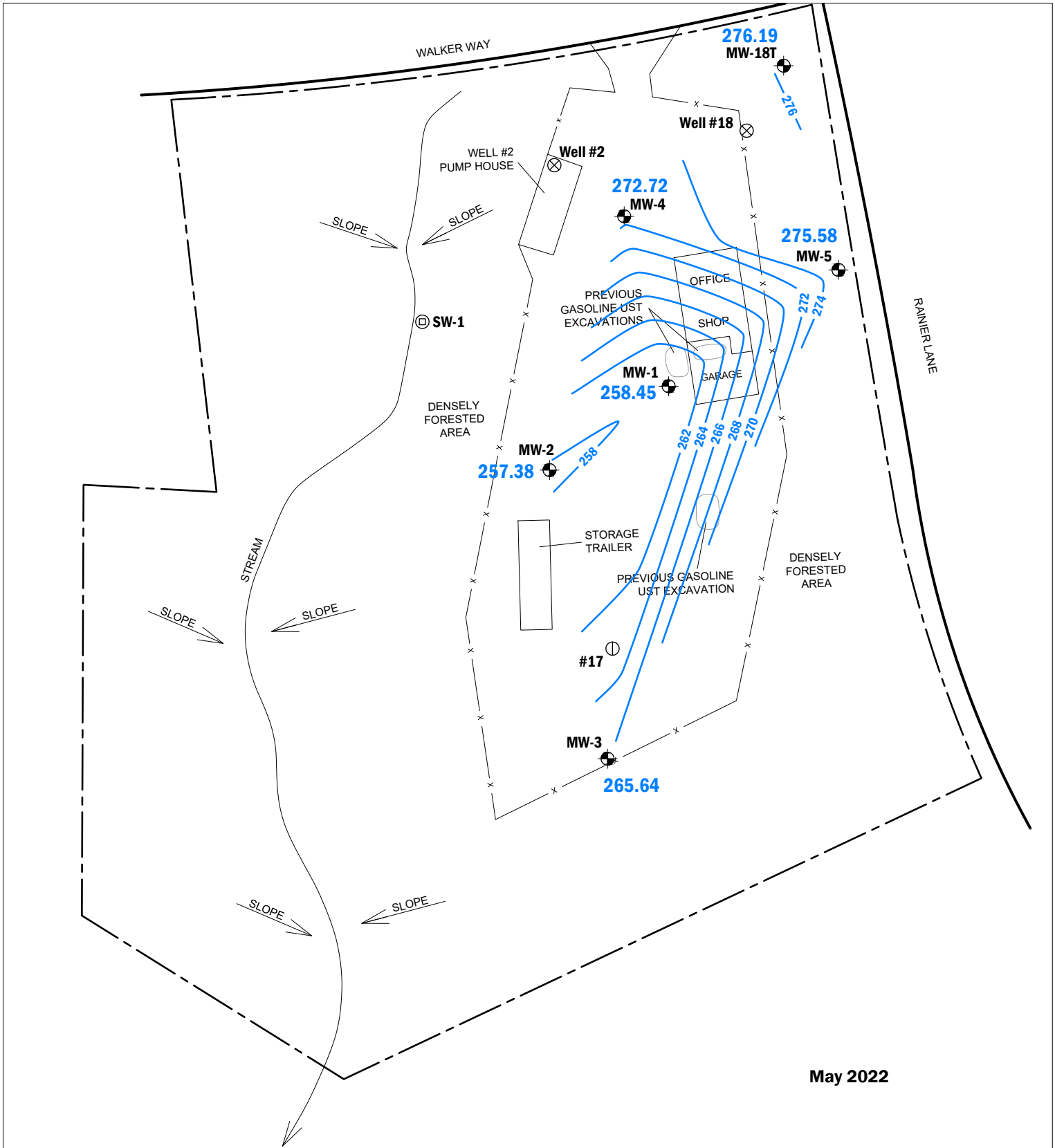
**Year 2 Groundwater Elevation and Contours**  
 Year 4 Annual Groundwater Monitoring Report  
 Olympic Water & Sewer, Inc.  
 Port Ludlow, Washington



Jun-2023  
 PROJECT NO.  
 130046

BY:  
 DWU/SCC  
 REVISED BY:  
 CT / SCC

FIGURE NO.  
**4**



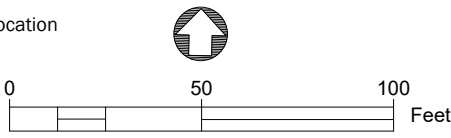
May 2022

**Legend**

- Monitoring Well Location
- Stream Sample Location
- Existing Water Supply Well Location
- Existing Casing Location
- Groundwater Elevation Contour Line (Feet)

Base map provided by SLR, from *Additional Investigation Report*, dated May 12, 2011.

This drawing is for conceptual purposes only. Actual locations may vary and not all structures are shown.



**Year 3 Groundwater Elevation and Contours**

Year 4 Annual Groundwater Monitoring Report  
Olympic Water & Sewer, Inc.  
Port Ludlow, Washington

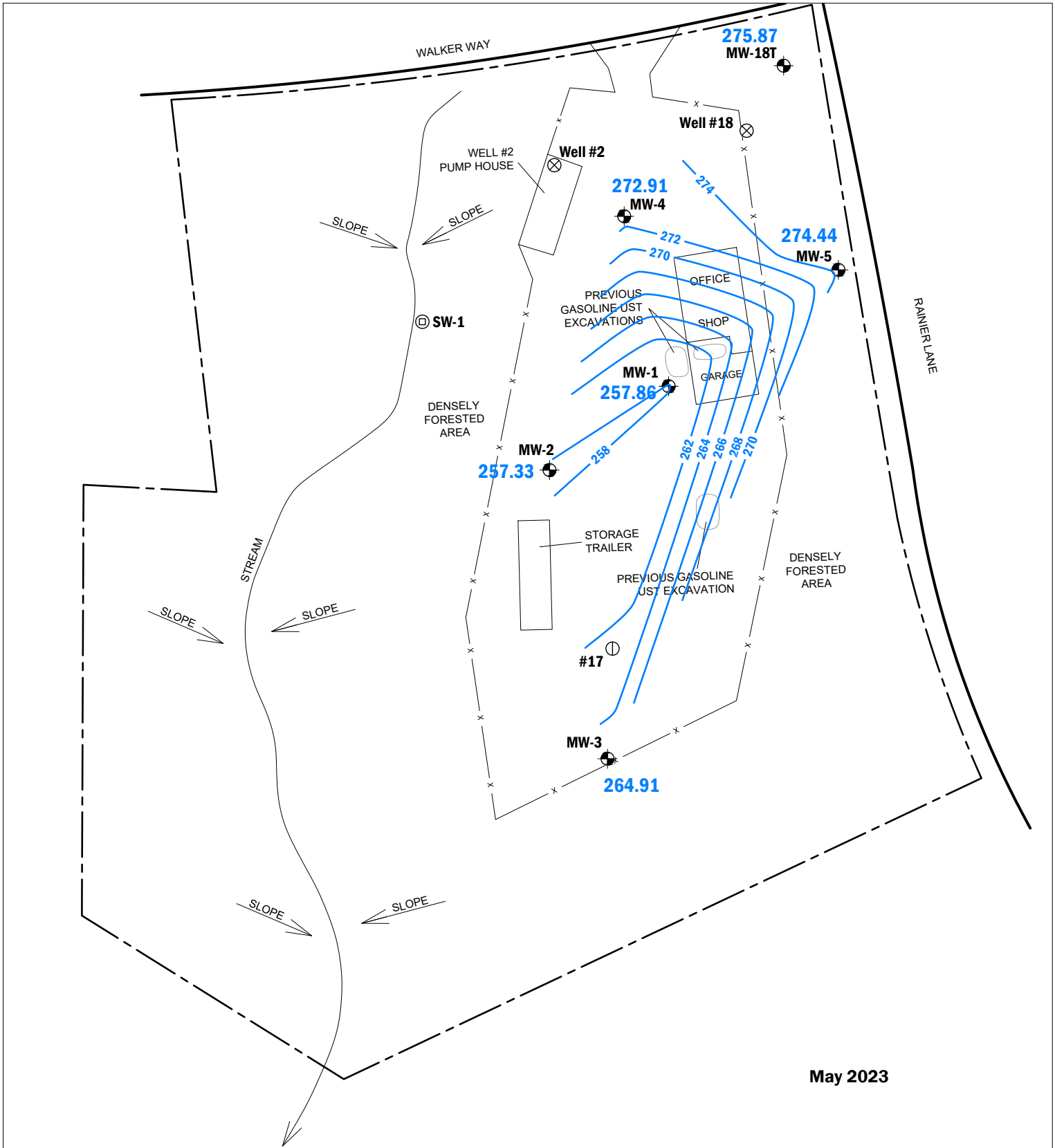


Jun-2023  
PROJECT NO.  
130046

BY:  
EPM/SCC  
REVISED BY:  
CT / SCC

FIGURE NO.  
**5**





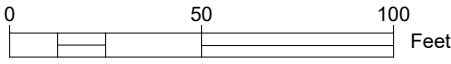
May 2023

**Legend**

- Monitoring Well Location
- Stream Sample Location
- Existing Water Supply Well Location
- Existing Casing Location
- Groundwater Elevation Contour Line (Feet)

Base map provided by SLR, from *Additional Investigation Report*, dated May 12, 2011.

This drawing is for conceptual purposes only. Actual locations may vary and not all structures are shown.



**Year 4 Groundwater Elevation and Contours**

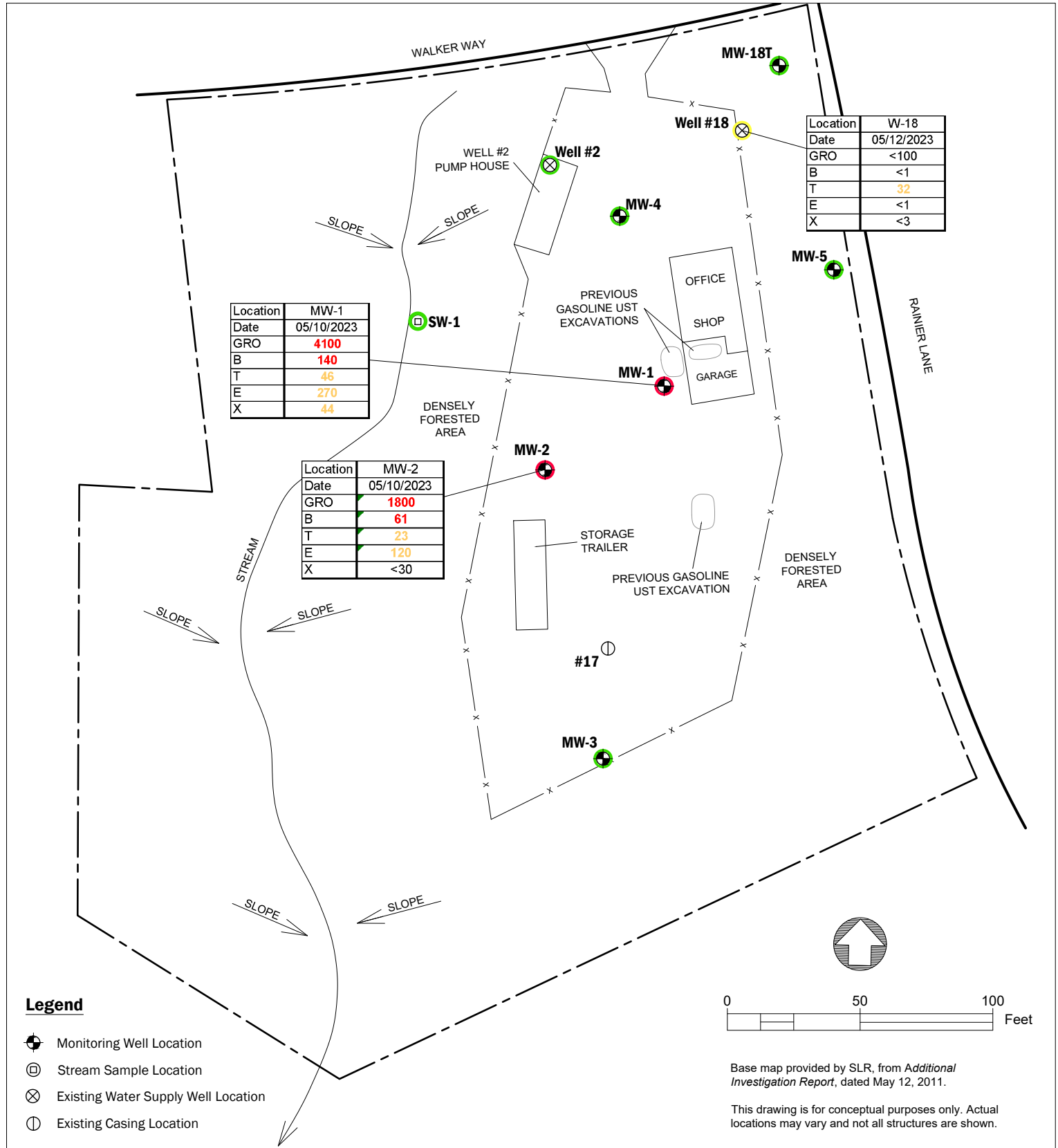
Year 4 Annual Groundwater Monitoring Report  
Olympic Water & Sewer, Inc.  
Port Ludlow, Washington



Jul-2023  
PROJECT NO.  
130046

BY:  
EPM/SCC  
REVISED BY:  
CT / SCC

FIGURE NO.  
**6**



**Legend**

- Monitoring Well Location
- Stream Sample Location
- Existing Water Supply Well Location
- Existing Casing Location

**Analytical Results**

- One or more petroleum hydrocarbon constituents was detected at a concentration exceeding its respective MTCA Method A Cleanup Level
- One or more petroleum hydrocarbons constituents was detected at a concentration less than its respective MTCA Method A Cleanup Level
- Petroleum hydrocarbon constituents not detected

GRO - Gasoline-range Total Petroleum Hydrocarbons  
 B - Benzene  
 T - Toluene  
 E - Ethylbenzene  
 X - Total Xylenes

Note: Concentrations are in µg/L

**Groundwater and Surface Water Analytical Results**

Year 4 Annual Groundwater Monitoring Report  
 Olympic Water & Sewer, Inc.  
 Port Ludlow, Washington



Jul-2023  
 PROJECT NO.  
 130046

BY:  
 EPM/SCC  
 REVISED BY:  
 SCC

FIGURE NO.  
**7**

## **APPENDIX A**

### **Laboratory Analytical Reports**

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.  
Yelena Aravkina, M.S.  
Michael Erdahl, B.S.  
Vineta Mills, M.S.  
Eric Young, B.S.

5500 4th Avenue South  
Seattle, WA 98108  
(206) 285-8282  
fbi@isomedia.com  
www.friedmanandbruya.com

May 19, 2023

Eric Maise, Project Manager  
Aspect Consulting, LLC  
710 2<sup>nd</sup> Ave S, Suite 550  
Seattle, WA 98104

Dear Mr Maise:

Included are the results from the testing of material submitted on May 11, 2023 from the OWSI 130046, F&BI 305184 project. There are 13 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl  
Project Manager

Enclosures  
c: Aspect Data  
ASP0519R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on May 11, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC OWSI 130046, F&BI 305184 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting, LLC</u>
305184 -01	MW-4-230509
305184 -02	MW-3-230509
305184 -03	MW-5-230509
305184 -04	SW-1-230509
305184 -05	MW-18T-230509
305184 -06	MW-1-230510
305184 -07	MW-2-230510
305184 -08	MW-X-230510
305184 -09	Well 2-230510
305184 -10	Trip Blank
305184 -11	Equipment-230510

Samples MW-4-230509, MW-3-230509, MW-5-230509, MW-18T-230509, MW-1-230510, and MW-2-230510 were sent to Fremont Analytical for alkalinity, nitrate+nitrite, sulfate and dissolved methane analyses. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/23  
 Date Received: 05/11/23  
 Project: OWSI 130046, F&BI 305184  
 Date Extracted: 05/11/23  
 Date Analyzed: 05/12/23

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES  
 FOR BENZENE, TOLUENE, ETHYLBENZENE,  
 XYLENES AND TPH AS GASOLINE  
 USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
MW-4-230509 305184-01	<1	<1	<1	<3	<100	112
MW-3-230509 305184-02	<1	<1	<1	<3	<100	110
MW-5-230509 305184-03	<1	<1	<1	<3	<100	112
SW-1-230509 305184-04	<1	<1	<1	<3	<100	108
MW-18T-230509 305184-05	<1	<1	<1	<3	<100	112
MW-1-230510 305184-06 1/10	140	46	270	44	4,100	117
MW-2-230510 305184-07 1/10	61	23	120	<30	1,800	112
MW-X-230510 305184-08 1/10	130	43	250	40	3,800	111
Well 2-230510 305184-09	<1	<1	<1	<3	<100	111
Trip Blank 305184-10	<1	<1	<1	<3	<100	106

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/23  
Date Received: 05/11/23  
Project: OWSI 130046, F&BI 305184  
Date Extracted: 05/11/23  
Date Analyzed: 05/12/23

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES  
FOR BENZENE, TOLUENE, ETHYLBENZENE,  
XYLENES AND TPH AS GASOLINE  
USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
Equipment-230510 305184-11	<1	<1	<1	<3	<100	111
Method Blank 03-953 MB	<1	<1	<1	<3	<100	114

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-4-230509	Client:	Aspect Consulting, LLC
Date Received:	05/11/23	Project:	OWSI 130046, F&BI 305184
Date Extracted:	05/11/23	Lab ID:	305184-01
Date Analyzed:	05/15/23	Data File:	305184-01.043
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
----------	-----------------------------

Manganese	<1
-----------	----



FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-3-230509	Client:	Aspect Consulting, LLC
Date Received:	05/11/23	Project:	OWSI 130046, F&BI 305184
Date Extracted:	05/11/23	Lab ID:	305184-02
Date Analyzed:	05/11/23	Data File:	305184-02.072
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
----------	-----------------------------

Manganese	1.27
-----------	------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-5-230509	Client:	Aspect Consulting, LLC
Date Received:	05/11/23	Project:	OWSI 130046, F&BI 305184
Date Extracted:	05/11/23	Lab ID:	305184-03
Date Analyzed:	05/11/23	Data File:	305184-03.073
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Manganese	1.04

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-18T-230509	Client:	Aspect Consulting, LLC
Date Received:	05/11/23	Project:	OWSI 130046, F&BI 305184
Date Extracted:	05/11/23	Lab ID:	305184-05
Date Analyzed:	05/11/23	Data File:	305184-05.074
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
----------	-----------------------------

Manganese	3.73
-----------	------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-1-230510	Client:	Aspect Consulting, LLC
Date Received:	05/11/23	Project:	OWSI 130046, F&BI 305184
Date Extracted:	05/11/23	Lab ID:	305184-06
Date Analyzed:	05/11/23	Data File:	305184-06.075
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
----------	-----------------------------

Manganese	651
-----------	-----

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-2-230510	Client:	Aspect Consulting, LLC
Date Received:	05/11/23	Project:	OWSI 130046, F&BI 305184
Date Extracted:	05/11/23	Lab ID:	305184-07
Date Analyzed:	05/11/23	Data File:	305184-07.076
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Manganese	284

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	OWSI 130046, F&BI 305184
Date Extracted:	05/11/23	Lab ID:	I3-376 mb
Date Analyzed:	05/11/23	Data File:	I3-376 mb.050
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
----------	-----------------------------

Manganese	<1 k
-----------	------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/23

Date Received: 05/11/23

Project: OWSI 130046, F&BI 305184

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER  
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,  
XYLENES, AND TPH AS GASOLINE  
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 305137-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	
			Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	98	70-130
Toluene	ug/L (ppb)	50	98	70-130
Ethylbenzene	ug/L (ppb)	50	110	70-130
Xylenes	ug/L (ppb)	150	100	70-130
Gasoline	ug/L (ppb)	1,000	100	70-130

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/23

Date Received: 05/11/23

Project: OWSI 130046, F&BI 305184

**QUALITY ASSURANCE RESULTS  
FOR THE ANALYSIS OF WATER SAMPLES  
FOR DISSOLVED METALS USING EPA METHOD 6020B**

Laboratory Code: 305182-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Manganese	ug/L (ppb)	20	2,580	0 b	0 b	75-125	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Manganese	ug/L (ppb)	20	102	80-120



# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### **Data Qualifiers & Definitions**

- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- fc - The analyte is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits due to sample matrix effects.
- j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- k - The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.
- lc - The presence of the analyte is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

305184

SAMPLE CHAIN OF CUSTODY

05/11/23

duw/K2

2

Report To Eric Maize

Company Aspect Consulting

Address \_\_\_\_\_

City, State, ZIP \_\_\_\_\_

Phone \_\_\_\_\_ Email emaize@aspectconsulting.com

SAMPLERS (signature) [Signature]

PROJECT NAME OWS1

130046

REMARKS

PO #

INVOICE TO

Page # 1 of 2

TURNAROUND TIME

Standard turnaround

RUSH

Rush charges authorized by: \_\_\_\_\_

SAMPLE DISPOSAL

Archive samples

Other \_\_\_\_\_

Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes			
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Sulfates by EPA 300.0	Nitrate/Nitrite 355.2	dissolved methane per 15		Dissolved Mn	Alkalinity	
MW-4-230509	01 A-E	5/9/23	1406	W	9	<del>XXXXXX</del>	X	X					X	X	X				
MW-3-230509	02		155		9	<del>XXXXXX</del>	X	X					X	X	X				
MW-5-230509	03		1015		9	<del>XXXXXX</del>	X	X					X	X	X				
SU-1-230509	04 A-C		0830		3	<del>XXXXXX</del>													
MW-18T-230509	05 A-E		1530		9	<del>XXXXXX</del>							X	X	X				
MW-1-230510	06	5/10/23	1145		9	<del>XXXXXX</del>							X	X	X				
MW-2-230510	07		1325		9	<del>XXXXXX</del>							X	X	X				
MW-X-230510	08 A-C		1530		3	<del>XXXXXX</del>													
Well #2-230510	09 A-C		0810		3	<del>XXXXXX</del>													
Tap Blank	10 A-B				2	<del>XXXXXX</del>													

SIGNATURE

PRINT NAME

COMPANY

DATE

TIME

Friedman & Bruya, Inc.  
Ph. (206) 285-8282

Relinquished by: [Signature]

Received by: [Signature]

Relinquished by: [Signature]

Carmen Tappero  
Dwan Pfan

Aspect Consulting  
FEBI

5/10/23 1500  
5/11/23 0700

Received by:

Samples received at 200

305184

SAMPLE CHAIN OF CUSTODY

05/11/23

WUH/K2  
Page # 2 of 2

Report To Eric Maise

Company Aspect Consulting

Address \_\_\_\_\_

City, State, ZIP \_\_\_\_\_

Phone \_\_\_\_\_ Email emaise@aspectconsulting.com

SAMPLERS (signature) [Signature]

PROJECT NAME OWSI

130046

REMARKS

INVOICE TO

Project specific RIs? - Yes / No

PO #

TURNAROUND TIME  
 Standard turnaround  
 RUSH  
Rush charges authorized by: \_\_\_\_\_

SAMPLE DISPOSAL  
 Archive samples  
 Other \_\_\_\_\_

Default: Dispose after 30 days

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes						
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082							
Equipment - 230510	11 A-C	5/10/23	1600	W	3	X	X	X											

SIGNATURE

PRINT NAME

COMPANY

DATE

TIME

Friedman & Bruya, Inc.  
Ph. (206) 285-8282

Relinquished by: [Signature]  
Received by: [Signature]  
Relinquished by: \_\_\_\_\_

Carmen Tapero  
Man Phan

Aspect Consulting  
Fe B T

5/10/23  
5/11/23  
0700

Received by: \_\_\_\_\_  
Samples received at: 200



3600 Fremont Ave. N.  
Seattle, WA 98103  
T: (206) 352-3790  
F: (206) 352-7178  
info@fremontanalytical.com

**Friedman & Bruya**  
Michael Erdahl  
5500 4th Ave S  
Seattle, WA 98108

**RE: 305184**  
**Work Order Number: 2305260**

May 18, 2023

**Attention Michael Erdahl:**

Fremont Analytical, Inc. received 6 sample(s) on 5/11/2023 for the analyses presented in the following report.

***Dissolved Gases by RSK-175***  
***Ion Chromatography by EPA Method 300.0***  
***Total Alkalinity by SM 2320B***

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes  
Project Manager

*DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing*  
*ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing*  
*Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910*

---

Original

---

**CLIENT:** Friedman & Bruya  
**Project:** 305184  
**Work Order:** 2305260

---

**Work Order Sample Summary**

<b>Lab Sample ID</b>	<b>Client Sample ID</b>	<b>Date/Time Collected</b>	<b>Date/Time Received</b>
2305260-001	MW-4-230509	05/09/2023 2:00 PM	05/11/2023 5:45 PM
2305260-002	MW-3-230509	05/09/2023 11:55 AM	05/11/2023 5:45 PM
2305260-003	MW-5-230509	05/09/2023 10:15 AM	05/11/2023 5:45 PM
2305260-004	MW-18T-230509	05/09/2023 3:30 PM	05/11/2023 5:45 PM
2305260-005	MW-2-230509	05/10/2023 11:45 AM	05/11/2023 5:45 PM
2305260-006	MW-1-230509	05/10/2023 1:25 PM	05/11/2023 5:45 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

**CLIENT:** Friedman & Bruya

**Project:** 305184

---

**I. SAMPLE RECEIPT:**

Samples receipt information is recorded on the attached Sample Receipt Checklist.

**II. GENERAL REPORTING COMMENTS:**

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

**III. ANALYSES AND EXCEPTIONS:**

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

### Qualifiers:

- \* - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

### Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- DUP - Sample Duplicate
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MCL - Maximum Contaminant Level
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- REP - Sample Replicate
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



**CLIENT:** Friedman & Bruya

**Project:** 305184

**Lab ID:** 2305260-001

**Collection Date:** 5/9/2023 2:00:00 PM

**Client Sample ID:** MW-4-230509

**Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

**Dissolved Gases by RSK-175**

Batch ID: R84049 Analyst: NR

Methane	ND	0.00675		mg/L	1	5/17/2023 10:45:00 PM
---------	----	---------	--	------	---	-----------------------

**Ion Chromatography by EPA Method 300.0**

Batch ID: 40395 Analyst: AT

Nitrate (as N)+Nitrite (as N)	0.402	0.240	D	mg/L	2	5/17/2023 7:21:00 PM
Sulfate	7.07	1.20	D	mg/L	2	5/17/2023 7:21:00 PM

**Total Alkalinity by SM 2320B**

Batch ID: R84043 Analyst: ME

Alkalinity, Total (As CaCO3)	130	2.50		mg/L	1	5/17/2023 9:26:38 AM
------------------------------	-----	------	--	------	---	----------------------

**Lab ID:** 2305260-002

**Collection Date:** 5/9/2023 11:55:00 AM

**Client Sample ID:** MW-3-230509

**Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

**Dissolved Gases by RSK-175**

Batch ID: R84049 Analyst: NR

Methane	ND	0.00675		mg/L	1	5/17/2023 10:48:00 PM
---------	----	---------	--	------	---	-----------------------

**Ion Chromatography by EPA Method 300.0**

Batch ID: 40395 Analyst: AT

Nitrate (as N)+Nitrite (as N)	1.19	0.240	D	mg/L	2	5/17/2023 8:31:00 PM
Sulfate	17.8	1.20	D	mg/L	2	5/17/2023 8:31:00 PM

**Total Alkalinity by SM 2320B**

Batch ID: R84043 Analyst: ME

Alkalinity, Total (As CaCO3)	218	2.50		mg/L	1	5/17/2023 9:26:38 AM
------------------------------	-----	------	--	------	---	----------------------





**CLIENT:** Friedman & Bruya

**Project:** 305184

**Lab ID:** 2305260-003

**Collection Date:** 5/9/2023 10:15:00 AM

**Client Sample ID:** MW-5-230509

**Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

**Dissolved Gases by RSK-175**

Batch ID: R84049 Analyst: NR

Methane	ND	0.00675		mg/L	1	5/17/2023 10:51:00 PM
---------	----	---------	--	------	---	-----------------------

**Ion Chromatography by EPA Method 300.0**

Batch ID: 40395 Analyst: AT

Nitrate (as N)+Nitrite (as N)	0.424	0.240	D	mg/L	2	5/17/2023 8:54:00 PM
Sulfate	4.41	1.20	D	mg/L	2	5/17/2023 8:54:00 PM

**Total Alkalinity by SM 2320B**

Batch ID: R84043 Analyst: ME

Alkalinity, Total (As CaCO <sub>3</sub> )	127	2.50		mg/L	1	5/17/2023 9:26:38 AM
---	-----	------	--	------	---	----------------------

**Lab ID:** 2305260-004

**Collection Date:** 5/9/2023 3:30:00 PM

**Client Sample ID:** MW-18T-230509

**Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

**Dissolved Gases by RSK-175**

Batch ID: R84049 Analyst: NR

Methane	ND	0.00675		mg/L	1	5/17/2023 10:54:00 PM
---------	----	---------	--	------	---	-----------------------

**Ion Chromatography by EPA Method 300.0**

Batch ID: 40395 Analyst: AT

Nitrate (as N)+Nitrite (as N)	0.340	0.240	D	mg/L	2	5/17/2023 9:17:00 PM
Sulfate	7.33	1.20	D	mg/L	2	5/17/2023 9:17:00 PM

**Total Alkalinity by SM 2320B**

Batch ID: R84043 Analyst: ME

Alkalinity, Total (As CaCO <sub>3</sub> )	175	2.50		mg/L	1	5/17/2023 9:26:38 AM
---	-----	------	--	------	---	----------------------



**CLIENT:** Friedman & Bruya

**Project:** 305184

**Lab ID:** 2305260-005

**Collection Date:** 5/10/2023 11:45:00 AM

**Client Sample ID:** MW-2-230509

**Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

**Dissolved Gases by RSK-175**

Batch ID: R84049 Analyst: NR

Methane	ND	0.00675		mg/L	1	5/17/2023 10:57:00 PM
---------	----	---------	--	------	---	-----------------------

**Ion Chromatography by EPA Method 300.0**

Batch ID: 40395 Analyst: AT

Nitrate (as N)+Nitrite (as N)	ND	0.120		mg/L	1	5/18/2023 10:14:00 AM
Sulfate	11.3	0.600		mg/L	1	5/18/2023 10:14:00 AM

**Total Alkalinity by SM 2320B**

Batch ID: R84043 Analyst: ME

Alkalinity, Total (As CaCO3)	352	2.50		mg/L	1	5/17/2023 9:26:38 AM
------------------------------	-----	------	--	------	---	----------------------

**Lab ID:** 2305260-006

**Collection Date:** 5/10/2023 1:25:00 PM

**Client Sample ID:** MW-1-230509

**Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

**Dissolved Gases by RSK-175**

Batch ID: R84049 Analyst: NR

Methane	0.0264	0.00675		mg/L	1	5/17/2023 11:00:00 PM
---------	--------	---------	--	------	---	-----------------------

**Ion Chromatography by EPA Method 300.0**

Batch ID: 40395 Analyst: AT

Nitrate (as N)+Nitrite (as N)	ND	0.240	D	mg/L	2	5/17/2023 10:04:00 PM
Sulfate	ND	1.20	D	mg/L	2	5/17/2023 10:04:00 PM

**NOTES:**

Diluted due to matrix.

**Total Alkalinity by SM 2320B**

Batch ID: R84043 Analyst: ME

Alkalinity, Total (As CaCO3)	303	2.50		mg/L	1	5/17/2023 9:26:38 AM
------------------------------	-----	------	--	------	---	----------------------

**Work Order:** 2305260  
**CLIENT:** Friedman & Bruya  
**Project:** 305184

**QC SUMMARY REPORT**  
**Total Alkalinity by SM 2320B**

Sample ID: <b>MB-R84043</b>	SampType: <b>MBLK</b>	Units: <b>mg/L</b>	Prep Date: <b>5/17/2023</b>	RunNo: <b>84043</b>							
Client ID: <b>MBLKW</b>	Batch ID: <b>R84043</b>	Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1753056</b>								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	ND	2.50									

Sample ID: <b>LCS-R84043</b>	SampType: <b>LCS</b>	Units: <b>mg/L</b>	Prep Date: <b>5/17/2023</b>	RunNo: <b>84043</b>							
Client ID: <b>LCSW</b>	Batch ID: <b>R84043</b>	Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1753057</b>								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	117	2.50	100.0	0	117	83.8	121				

Sample ID: <b>2305274-001ADUP</b>	SampType: <b>DUP</b>	Units: <b>mg/L</b>	Prep Date: <b>5/17/2023</b>	RunNo: <b>84043</b>							
Client ID: <b>BATCH</b>	Batch ID: <b>R84043</b>	Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1753059</b>								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	60.4	2.50						58.20	3.73	20	

Work Order: 2305260  
 CLIENT: Friedman & Bruya  
 Project: 305184

**QC SUMMARY REPORT**  
**Ion Chromatography by EPA Method 300.0**

Sample ID: <b>LCS-40395</b>	SampType: <b>LCS</b>	Units: <b>mg/L</b>			Prep Date: <b>5/17/2023</b>	RunNo: <b>84094</b>					
Client ID: <b>LCSW</b>	Batch ID: <b>40395</b>				Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1754075</b>					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)+Nitrite (as N)	1.49	0.120	1.500	0	99.5	90	110				
Sulfate	3.72	0.600	3.750	0	99.1	90	110				

Sample ID: <b>MB-40395</b>	SampType: <b>MBLK</b>	Units: <b>mg/L</b>			Prep Date: <b>5/17/2023</b>	RunNo: <b>84094</b>					
Client ID: <b>MBLKW</b>	Batch ID: <b>40395</b>				Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1754077</b>					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)+Nitrite (as N)	ND	0.120									
Sulfate	ND	0.600									

Sample ID: <b>2305260-001ADUP</b>	SampType: <b>DUP</b>	Units: <b>mg/L</b>			Prep Date: <b>5/17/2023</b>	RunNo: <b>84094</b>					
Client ID: <b>MW-4-230509</b>	Batch ID: <b>40395</b>				Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1754079</b>					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)+Nitrite (as N)	0.398	0.240						0.4020	1.00	20	D
Sulfate	7.19	1.20						7.074	1.63	20	D

Sample ID: <b>2305260-001AMS</b>	SampType: <b>MS</b>	Units: <b>mg/L</b>			Prep Date: <b>5/17/2023</b>	RunNo: <b>84094</b>					
Client ID: <b>MW-4-230509</b>	Batch ID: <b>40395</b>				Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1754080</b>					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)+Nitrite (as N)	3.21	0.240	3.000	0.4020	93.7	80	120				D
Sulfate	14.6	1.20	7.500	7.074	99.8	80	120				D

Sample ID: <b>2305203-008BDUP</b>	SampType: <b>DUP</b>	Units: <b>mg/L</b>			Prep Date: <b>5/17/2023</b>	RunNo: <b>84094</b>					
Client ID: <b>BATCH</b>	Batch ID: <b>40395</b>				Analysis Date: <b>5/18/2023</b>	SeqNo: <b>1754110</b>					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)+Nitrite (as N)	ND	6.00						0		20	D
Sulfate	ND	30.0						0		20	D

Work Order: 2305260  
 CLIENT: Friedman & Bruya  
 Project: 305184

**QC SUMMARY REPORT**  
 Ion Chromatography by EPA Method 300.0

Sample ID: <b>2305203-008BDUP</b>	SampType: <b>DUP</b>	Units: <b>mg/L</b>			Prep Date: <b>5/17/2023</b>	RunNo: <b>84094</b>					
Client ID: <b>BATCH</b>	Batch ID: <b>40395</b>				Analysis Date: <b>5/18/2023</b>	SeqNo: <b>1754110</b>					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: <b>2305203-008BMS</b>	SampType: <b>MS</b>	Units: <b>mg/L</b>			Prep Date: <b>5/17/2023</b>	RunNo: <b>84094</b>					
Client ID: <b>BATCH</b>	Batch ID: <b>40395</b>				Analysis Date: <b>5/18/2023</b>	SeqNo: <b>1754111</b>					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)+Nitrite (as N)	67.1	6.00	75.00	0	89.4	80	120				D
Sulfate	170	30.0	187.5	14.75	83.0	80	120				D

Sample ID: <b>2305203-008BMSD</b>	SampType: <b>MSD</b>	Units: <b>mg/L</b>			Prep Date: <b>5/17/2023</b>	RunNo: <b>84094</b>					
Client ID: <b>BATCH</b>	Batch ID: <b>40395</b>				Analysis Date: <b>5/18/2023</b>	SeqNo: <b>1754112</b>					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate (as N)+Nitrite (as N)	67.1	6.00	75.00	0	89.4	80	120	67.05	0	20	D
Sulfate	172	30.0	187.5	14.75	83.9	80	120	170.4	0.993	20	D

**Work Order:** 2305260  
**CLIENT:** Friedman & Bruya  
**Project:** 305184

**QC SUMMARY REPORT**  
**Dissolved Gases by RSK-175**

Sample ID: <b>LCS-R84049</b>	SampType: <b>LCS</b>	Units: <b>ppmv</b>	Prep Date: <b>5/17/2023</b>	RunNo: <b>84049</b>							
Client ID: <b>LCSW</b>	Batch ID: <b>R84049</b>	Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1753146</b>								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	997	0.00675	1,000	0	99.7	73.6	124				

Sample ID: <b>MB-R84049</b>	SampType: <b>MBLK</b>	Units: <b>mg/L</b>	Prep Date: <b>5/17/2023</b>	RunNo: <b>84049</b>							
Client ID: <b>MBLKW</b>	Batch ID: <b>R84049</b>	Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1753144</b>								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675									

Sample ID: <b>2305241-001EREP</b>	SampType: <b>REP</b>	Units: <b>mg/L</b>	Prep Date: <b>5/17/2023</b>	RunNo: <b>84049</b>							
Client ID: <b>BATCH</b>	Batch ID: <b>R84049</b>	Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1753130</b>								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675						0		30	

Sample ID: <b>2305266-002EREP</b>	SampType: <b>REP</b>	Units: <b>mg/L</b>	Prep Date: <b>5/17/2023</b>	RunNo: <b>84049</b>							
Client ID: <b>BATCH</b>	Batch ID: <b>R84049</b>	Analysis Date: <b>5/17/2023</b>	SeqNo: <b>1753141</b>								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methane	ND	0.00675						0		30	

Client Name: <b>FB</b>	Work Order Number: <b>2305260</b>
Logged by: <b>Morgan Wilson</b>	Date Received: <b>5/11/2023 5:45:00 PM</b>

**Chain of Custody**

1. Is Chain of Custody complete?      Yes       No       Not Present
2. How was the sample delivered?      Client

**Log In**

3. Coolers are present?      Yes       No       NA
4. Shipping container/cooler in good condition?      Yes       No
5. Custody Seals present on shipping container/cooler?  
(Refer to comments for Custody Seals not intact)      Yes       No       Not Present
6. Was an attempt made to cool the samples?      Yes       No       NA
7. Were all items received at a temperature of >2°C to 6°C \*      Yes       No       NA
8. Sample(s) in proper container(s)?      Yes       No
9. Sufficient sample volume for indicated test(s)?      Yes       No
10. Are samples properly preserved?      Yes       No
11. Was preservative added to bottles?      Yes       No       NA
12. Is there headspace in the VOA vials?      Yes       No       NA
13. Did all samples containers arrive in good condition(unbroken)?      Yes       No
14. Does paperwork match bottle labels?      Yes       No
15. Are matrices correctly identified on Chain of Custody?      Yes       No
16. Is it clear what analyses were requested?      Yes       No
17. Were all holding times able to be met?      Yes       No

**Special Handling (if applicable)**

18. Was client notified of all discrepancies with this order?      Yes       No       NA

Person Notified:	<input type="text" value="Michael Erdahl"/>	Date:	<input type="text" value="5/12/2023"/>
By Whom:	<input type="text" value="Morgan Wilson"/>	Via:	<input checked="" type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text" value="Anions Method 353.2 for N+N. can we switch to 300.0"/>		
Client Instructions:	<input type="text" value="Okav to proceed with EPA 300.0 for N+N"/>		

19. Additional remarks:

**Item Information**

Item #	Temp °C
Sample	1.2

\* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C





**SUBCONTRACT SAMPLE CHAIN OF CUSTODY**

2305266  
 Page # 1 of 1

Send Report To Michael Erdahl  
 Company Friedman and Bruya, Inc.  
 Address 3012 16th Ave W  
 City, State, ZIP Seattle, WA 98119  
 Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont		PO #
PROJECT NAME/NO. 305184	D-297	
REMARKS Aspect EDD		

<input checked="" type="checkbox"/> Standard TAT RUSH Rush charges authorized by:	TURNAROUND TIME SAMPLE DISPOSAL Dispose after 30 days Return samples Will call with instructions
---	--

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED				Notes
						Nitrate/Nitrite <del>1000</del>	Sulfate 300.0	Alkalinity	Dissolved Metha	
MW-4-230509		5/9/2023	1400	water	(NP) 45	x	x	x	x	
MW-3-230509		5/9/2023	1155	water	45	x	x	x	x	
MW-5-230509		5/9/2023	1015	water	45	x	x	x	x	
MW-18T-230509		5/9/2023	1530	water	45	x	x	x	x	
MW-2-230509		5/10/2023	1145	water	45	x	x	x	x	
MW-1-230509		5/10/2023	1325	water	45	x	x	x	x	

SIGNATURE 		PRINT NAME Michael Erdahl		COMPANY Friedman & Bruya		DATE 5/11/23		TIME 0745	
Received by: 		Relinquished by: MHE R		Received by: FAI					

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.  
Yelena Aravkina, M.S.  
Michael Erdahl, B.S.  
Vineta Mills, M.S.  
Eric Young, B.S.

5500 4th Avenue South  
Seattle, WA 98108  
(206) 285-8282  
fbi@isomedia.com  
www.friedmanandbruya.com

May 19, 2023

Eric Maise, Project Manager  
Aspect Consulting, LLC  
710 2<sup>nd</sup> Ave S, Suite 550  
Seattle, WA 98104

Dear Mr Maise:

Included are the results from the testing of material submitted on May 15, 2023 from the OWSI 130046, F&BI 305241 project. There are 4 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl  
Project Manager

Enclosures  
c: Aspect Data  
ASP0519R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on May 15, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC OWSI 130046, F&BI 305241 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting, LLC</u>
305241 -01	Well 18-230512
305241 -02	Trip Blank

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/23  
Date Received: 05/15/23  
Project: OWSI 130046, F&BI 305241  
Date Extracted: 05/16/23  
Date Analyzed: 05/17/23

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES  
FOR BENZENE, TOLUENE, ETHYLBENZENE,  
XYLENES AND TPH AS GASOLINE  
USING METHODS 8021B AND NWTPH-Gx**

Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
Well 18-230512 305241-01	<1	32	<1	<3	<100	110
Trip Blank 305241-02	<1	<1	<1	<3	<100	110
Method Blank 03-961 MB	<1	<1	<1	<3	<100	111

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/19/23

Date Received: 05/15/23

Project: OWSI 130046, F&BI 305241

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER  
SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,  
XYLENES, AND TPH AS GASOLINE  
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 305198-02 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	96	70-130
Toluene	ug/L (ppb)	50	94	70-130
Ethylbenzene	ug/L (ppb)	50	104	70-130
Xylenes	ug/L (ppb)	150	93	70-130
Gasoline	ug/L (ppb)	1,000	100	70-130

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### **Data Qualifiers & Definitions**

- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- fc - The analyte is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits due to sample matrix effects.
- j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- k - The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.
- lc - The presence of the analyte is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

305241

SAMPLE CHAIN OF CUSTODY

05/15/23

WA 2

Report To Eric Maisie

Company Aspect Consulting

Address Seattle, WA, 98104

Phone Email emaise@aspectconsulting.com

SAMPLES (signature)

PROJECT NAME OWS1

PO # 130096

REMARKS

INVOICE TO

Project specific RIs? - Yes / No

Page # 1 of 1

TURNAROUND TIME Standard turnaround RUSH Rush charges authorized by:

SAMPLE DISPOSAL Archival samples Other Default: Dispose after 30 days

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes			
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082				
Well #18 - 230512	O1A-F	5/12/23	1015	W	2	X	X	X								
Trip Blank	02A-B	-	-	W	2	X	X	X								Samples received at 1°C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <i>[Signature]</i>	Carmen Tappero	Aspect Consulting	5/15/23	0910
Received by: <i>[Signature]</i>	Favour Spina	Aspect Consulting	5/15/23	0911
Relinquished by: <i>[Signature]</i>	Mylinda Park	T&T	5/15/23	0911
Received by:				

Friedman & Bruya, Inc. Ph. (206) 285-8282

## **APPENDIX B**

### **Plume Stability Analyses**



**Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)**

Site Name: *Olympic Water & Sewer, Inc. Site*

Site Address: *781 Walker Way, Port Ludlow, WA*

Additional Description:

Well (Sampling) Location? **MW-1**

Level of Confidence (Decision Criteria)? **85%**

**1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.**

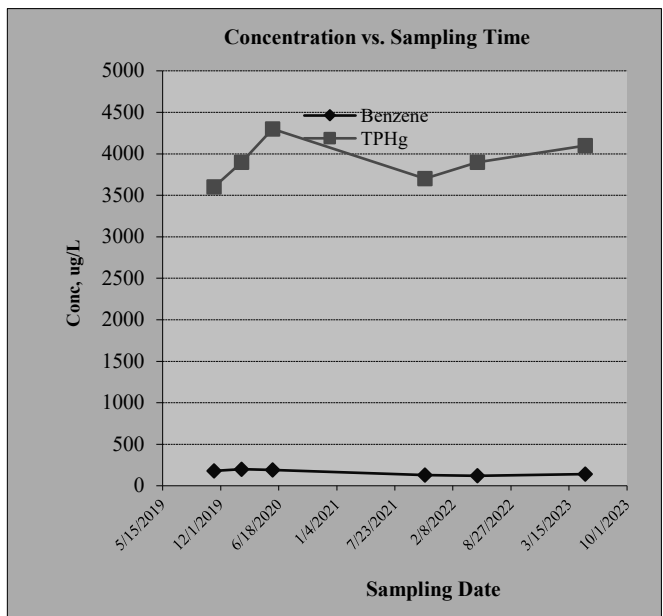
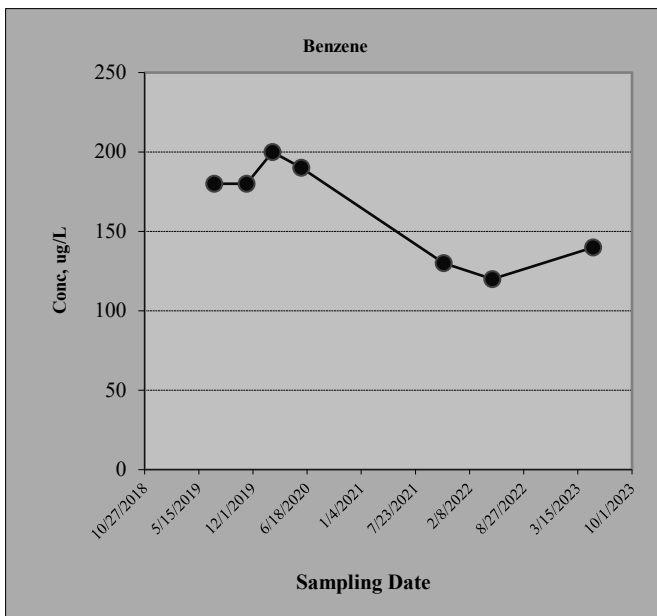
Sampling Event	Date Sampled	Hazardous Substances (unit is ug/L)			
		Benzene	TPHg		
#1	7/11/2019	180	4000		
#2	11/8/2019	180	3600		
#3	2/11/2020	200	3900		
#4	5/28/2020	190	4300		
#5	11/4/2021	130	3700		
#6	5/3/2022	120	3900		
#7	5/10/2023	140	4,100		
#8					
#9					
#10					
#11					
#12					
#13					
#14					
#15					
#16					

**2. Mann-Kendall Non-parametric Statistical Test Results**

Hazardous Substance?	Benzene	TPHg				
Confidence Level Calculated?	80.90%	61.40%	NA	NA	NA	NA
<b>Plume Stability?</b>	Stable	Stable	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1	CV <= 1	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-8	4	0	0	0	0
Number of Sampling Rounds?	7	7	0	0	0	0
Average Concentration?	162.86	3928.57	NA	NA	NA	NA
Standard Deviation?	32.00	236.04	NA	NA	NA	NA
Coefficient of Variation?	0.20	0.06	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

**3. Temporal Trend: Plot of Concentration vs. Sampling Time**

Hazardous substance? **Benzene**  
 Plume Stability? **Stable**



### Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)

Site Name: *Olympic Water & Sewer, Inc. Site*

Site Address: *781 Walker Way, Port Ludlow, WA*

Additional Description:

Well (Sampling) Location? **MW-2**

Level of Confidence (Decision Criteria)? **85%**

#### 1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

Sampling Event	Date Sampled	Hazardous Substances (unit is ug/L)			
		Benzene	TPHg		
#1	7/11/2019	780	6400		
#2	11/8/2019	820	5400		
#3	2/11/2020	840	5000		
#4	5/28/2020	150	2800		
#5	11/4/2021	220	2700		
#6	5/3/2022	79	2200		
#7	5/10/2023	61	1800		
#8					
#9					
#10					
#11					
#12					
#13					
#14					
#15					
#16					

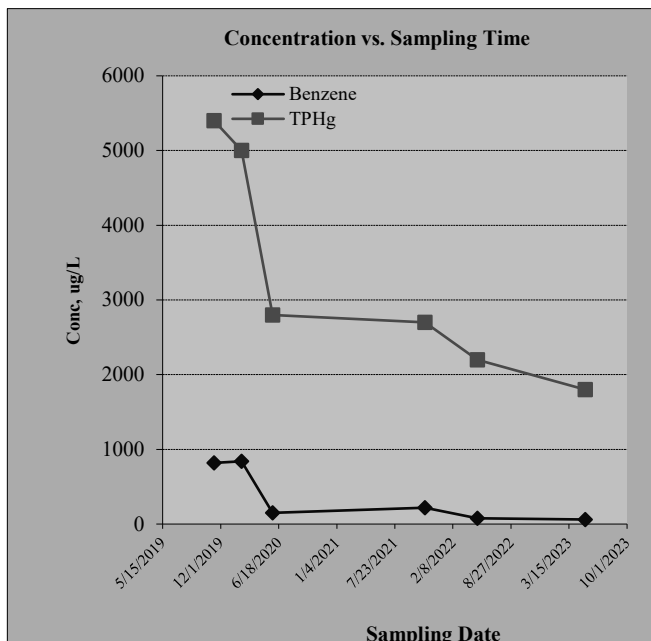
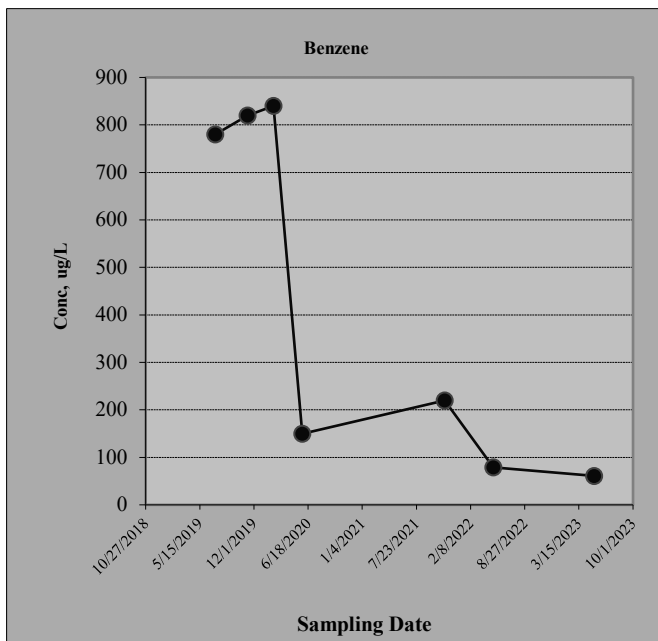
#### 2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Benzene	TPHg				
Confidence Level Calculated?	96.5%	100%	NA	NA	NA	NA
Plume Stability?	Shrinking	Shrinking	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1	CV <=1	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-13	-21	0	0	0	0
Number of Sampling Rounds?	7	7	0	0	0	0
Average Concentration?	421.43	3757.14	NA	NA	NA	NA
Standard Deviation?	370.60	1803.57	NA	NA	NA	NA
Coefficient of Variation?	0.88	0.48	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

#### 3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? **Benzene**

Plume Stability? **Shrinking**



## **APPENDIX C**

### **Report Guidelines and Limitations for Use**

# REPORT LIMITATIONS AND USE GUIDELINES

## Reliance Conditions for Third Parties

---

This report was prepared for the exclusive use of the Client. No other party may rely on this report or the product of our services without the express written consent of Aspect Consulting, LLC (Aspect). This limitation is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual conditions or limitations and guidelines governing their use of the report. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and recognized standards of professionals in the same locality and involving similar conditions.

## Services for Specific Purposes, Persons and Projects

---

Aspect has performed the services in general accordance with the scope and limitations of our Agreement. This report has been prepared for the exclusive use of the Client and their authorized third parties, approved in writing by Aspect. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

This report is not, and should not, be construed as a warranty or guarantee regarding the presence or absence of hazardous substances or petroleum products that may affect the subject property. The report is not intended to make any representation concerning title or ownership to the subject property. If real property records were reviewed, they were reviewed for the sole purpose of determining the subject property's historical uses. All findings, conclusions, and recommendations stated in this report are based on the data and information provided to Aspect, current use of the subject property, and observations and conditions that existed on the date and time of the report.

Aspect structures its services to meet the specific needs of our clients. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and subject property. This report should not be applied for any purpose or project except the purpose described in the Agreement.

## This Report Is Project-Specific

---

Aspect considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

## **Geoscience Interpretations**

---

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

## **Discipline-Specific Reports Are Not Interchangeable**

---

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

## **Environmental Regulations Are Not Static**

---

Some hazardous substances or petroleum products may be present near the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or petroleum products or do not otherwise present potential liability. Changes may occur in the standards for appropriate inquiry or regulatory definitions of hazardous substance and petroleum products; therefore, this report has a limited useful life.

## **Property Conditions Change Over Time**

---

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time (for example, Phase I ESA reports are applicable for 180 days), by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope failure or groundwater fluctuations. If more than six months have passed since issuance of our report, or if any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

## **Phase I ESAs – Uncertainty Remains After Completion**

---

Aspect has performed the services in general accordance with the scope and limitations of our Agreement and the current version of the “Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process”, ASTM E1527, and U.S. Environmental Protection Agency (EPA)'s Federal Standard 40 CFR Part 312 "Innocent Landowners, Standards for Conducting All Appropriate Inquiries".

No ESA can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with subject property. Performance of an ESA study is intended to reduce, but not eliminate, uncertainty regarding the potential for environmental conditions affecting the subject property. There is always a potential that areas with contamination that were not identified during this ESA exist at the subject property or in the study area. Further evaluation of such potential would require additional research, subsurface exploration, sampling and/or testing.

## **Historical Information Provided by Others**

---

Aspect has relied upon information provided by others in our description of historical conditions and in our review of regulatory databases and files. The available data does not provide definitive information with regard to all past uses, operations or incidents affecting the subject property or adjacent properties. Aspect makes no warranties or guarantees regarding the accuracy or completeness of information provided or compiled by others.

## **Exclusion of Mold, Fungus, Radon, Lead, and HBM**

---

Aspect's services do not include the investigation, detection, prevention or assessment of the presence of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detection, assessment, prevention or abatement of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Aspect's services also do not include the investigation or assessment of hazardous building materials (HBM) such as asbestos, polychlorinated biphenyls (PCBs) in light ballasts, lead based paint, asbestos-containing building materials, urea-formaldehyde insulation in on-site structures or debris or any other HBMs. Aspect's services do not include an evaluation of radon or lead in drinking water, unless specifically requested.