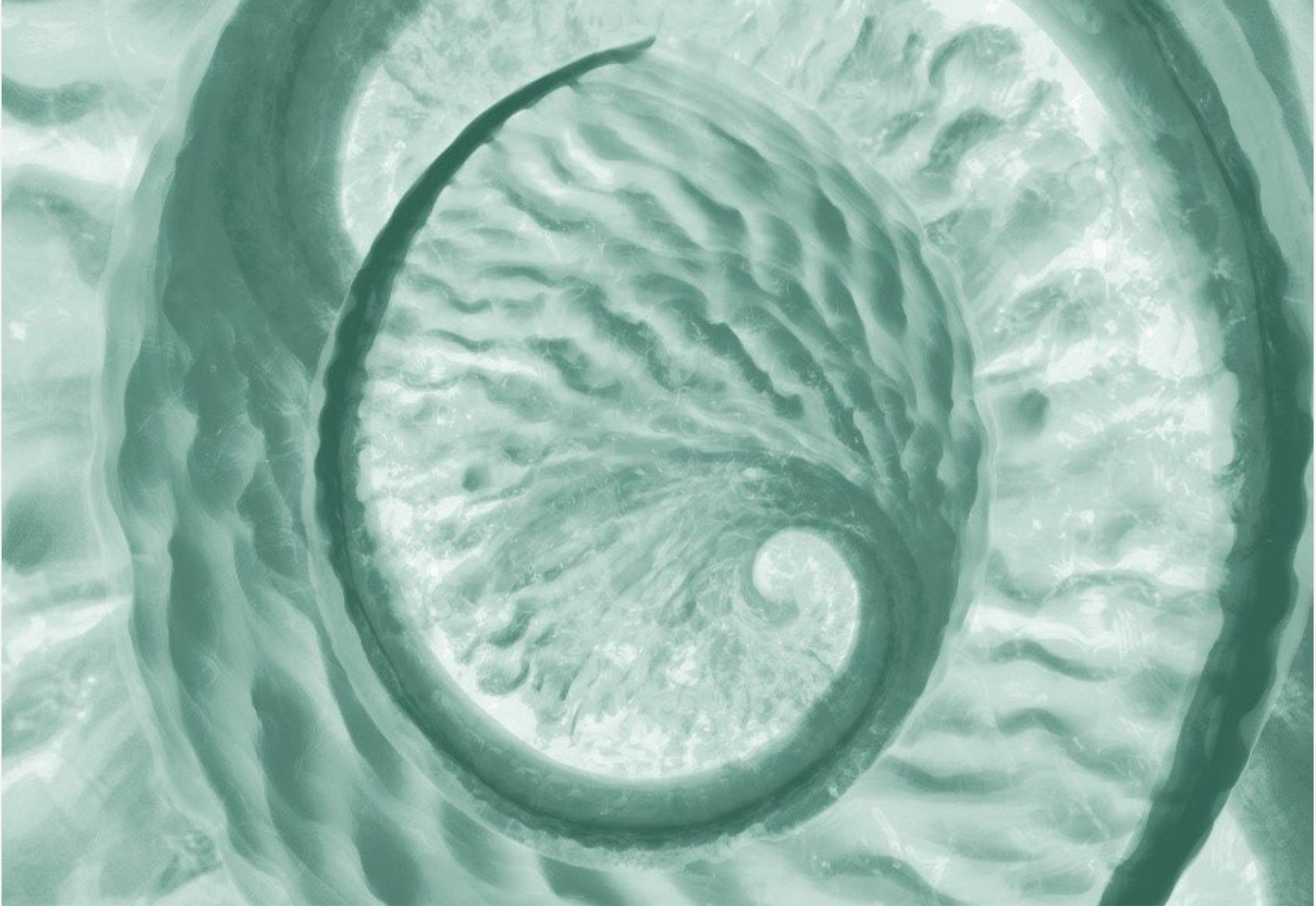

Burgard, a Series of MMGL LLC

Transition Zone Water Sampling Plan

Premier Edible Oils Site
10400 North Burgard Way
Portland, Oregon

04 May 2023

Project No.: 0680180

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04 May 2023

Transition Zone Water Sampling Plan

Premier Edible Oils Site
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Acronyms and Abbreviations

Name	Description
°C	degrees Celsius
bgs	Below Ground Surface
COCs	Contaminants of Concern
EQuIS	Environmental Quality Information System
ERM	Environmental Resources Management, Inc.
Gravity	Gravity Marine Consulting
GPS	Global positioning system
GW SCM	groundwater source control measure
GW SCM PMP	*Revised Final Performance Monitoring Plan—Groundwater Source Control Measure*
LNAPL	light non-aqueous phase liquid
MMGL	MMGL LLC
mV	Millivolt
Site	the former Premier Edible Oils site located at 10400 N. Burgard Way, Portland, Oregon
TZW	transition zone water

1 INTRODUCTION

On behalf of Burgard, A Series of MMGL LLC (MMGL), Environmental Resources Management, Inc. (ERM), has prepared this Transition Zone Water (TZW) Sampling Plan for the former Premier Edible Oils site (herein referred to as the site) located at 10400 N. Burgard Way, Portland, Oregon (Figure 1). This sampling plan describes the sampling procedures and methods for collecting TZW samples during the Willamette River low river stage period (approximately September–October) in 2023 as described in Section 2. This sampling plan has been prepared pursuant to the Voluntary Agreement for Upland Remedial Investigation/Feasibility Study and Source Control Measures issued by the Oregon Department of Environmental Quality (ODEQ ECDVC-NWR-01-06).

2 BACKGROUND AND PURPOSE

A groundwater source control measure (GW SCM) has been implemented at the site and comprises a groundwater barrier wall installed to a depth of 35 feet and an oxygenation/biobarrier air sparge system consisting of deep zone (43.5 ft below ground surface [bgs]) and shallow zone (27.5 – 33.5 ft bgs) air sparge wells. The groundwater barrier wall was installed in 2015, and the air sparge system began operating in 2019. The purpose of the GW SCM is to protect ecological and human health receptors from impacts by residual site contamination potentially passing from groundwater through the TZW (i.e., porewater) and into the surface water column in the Willamette River. Key long-term objectives of the GW SCM are to control the potential migration of light non-aqueous phase liquid (LNAPL) into the TZW and to mitigate potential dissolved phase impacts to the Willamette River. Further details of the GW SCM are provided in the *Revised Final Performance Monitoring Plan—Groundwater Source Control Measure* (GW SCM PMP; ERM 2017a).

Previous TZW sampling at the site included low river stage TZW sampling conducted by Treadwell & Rollo in September 2014 and high river stage TZW sampling conducted by ERM in May 2015. The purpose of the 2014/2015 TZW sampling program was to evaluate potential impacts to shallow TZW and to assist in the remedial design of the GW SCM. The results of the 2014/2015 TZW sampling indicated that LNAPL did not reach the TZW and dissolved phase impacts to the TZW were limited (ERM 2017b).

The purposes of this 2023 TZW sampling program are to evaluate the water quality of TZW post-implementation of the GW SCM and to evaluate the performance of the GW SCM in controlling potential migration of LNAPL to TZW. Because the previous TZW sampling was performed prior to the implementation of the GW SCM, another round of TZW sampling is necessary to assess the water quality of TZW after the GW SCM has been operating for four years.

This 2023 TZW sampling will be performed under low river stage conditions when the hydraulic gradient toward the river is the highest each year. The 2014/2015 TZW sampling results showed that dissolved phase concentrations were generally greater in the low river stage samples than in the high river stage samples. Therefore, TZW sampling results during low river stage will provide an upper bound for dissolved phase concentrations in the TZW. Results from the 2023 TZW sampling will be compared with previous TZW sampling results as one line of evidence for the performance of the GW SCM in protecting potential receptors in the river, along with other lines of evidence such as shallow groundwater monitoring results. Figure 2 presents the 2023 TZW sample locations, along with TZW sampling locations performed in 2014 and 2015. Figure 2 also presents nearby in-water sediment samples collected as part of the *Portland Harbor RI/FS* (USEPA 2016) that were evaluated as part of source control screening reported in the *Upland and Transition Zone Water Investigation Report and Source Control Evaluation* (ERM 2017b). These sediment samples will be utilized as an additional line of evidence to evaluate TZW impacts during the review of TZW sample data collected in 2023.

3 SCOPE OF WORK

The 2023 TZW sampling will be conducted concurrently with the August 2023 groundwater monitoring event. ERM will subcontract with Gravity Marine Consulting (Gravity) to collect TZW samples at five locations adjacent to the 2014 and 2015 TZW sampling locations (Table 1 and Figure 2). Gravity will use an in-water vessel guided by a differential global positioning system (GPS) to place the TZW sampling locations in the vicinity of corresponding 2014 and 2015 TZW sampling locations pending accessibility and identified subsurface utilities. The target mudline elevations of the TZW sampling locations will be based on the estimated elevations of the 2014 and 2015 TZW sampling locations using bathymetric data acquired between 14-18 January 2021 (Floyd-Snider 2023). TZW sampling will include advancing a vibracoring unit into the riverbed to install a stainless-steel piezometer within the riverbed for collection of the TZW samples. Pre-investigation activities, riverbed coring procedure, and TZW sampling procedure are described in the following subsections.

3.1 Utility Clearance

Prior to initiating ground disturbance, public utility locates will be coordinated through the Oregon Utility Notification Center (811) to identify municipal utilities for avoidance. Because the sampling locations are in the river, private utility locates using ground penetrating radar or other locating methods will not be possible. A minimum distance of 10 feet will be maintained between any subsurface utility or obstruction identified during the public utility locate process.

3.2 Field Instrument Calibration

Calibration of water quality meter and turbidity meter will be checked prior to sampling activities each day. If necessary, the instruments will be recalibrated according to the manufacturers' specifications. Results of calibration and recalibration, if applicable, will be recorded.

3.3 Riverbed Coring Procedure

At each sampling location, Gravity will use a vibracoring unit to advance a ¾-inch diameter stainless steel tube with attached custom stainless steel, 200-micron screen piezometer to a target depth of between 1 to 2 feet below the mudline based on field observations during piezometer advancement (Figure 3). The frequency of the vibrarcoring unit will be adjusted as necessary to minimize disturbance of the sediment substrates. The degree of sediment disturbance will be visually assessed by inspecting the turbidity of river water around the coring unit. An adjustable seal plate will then be placed over the top of the piezometer to minimize surface water intrusion into the piezometer.

3.4 TZW Sample Collection Procedure

Following installation of the piezometer, disposable polyethylene tubing will be placed into the piezometer through the seal plate to a depth of 1 foot below the mudline. TZW sample will be collected using a variable-speed peristaltic pump following the low-flow method as described in the United States Environmental Protection Agency's guidance (USEPA 2022). Field parameters (pH, specific conductance, temperature, oxidation reduction potential) of TZW and surface water will be collected simultaneously and compared to ensure that surface water is not being entrained along with TZW. A measurement of field paraments will be taken of the TZW and surface water prior to beginning purging. If the initial reading of TZW water quality parameters after purging one tubing volume of water is similar to those of the surface water (±10 % for specific conductance and dissolved oxygen, ±50 mV for ORP, or ±0.1 for pH), this will be taken as an indication that conditions within the TZW are influenced by surface water exchange. If the difference in field parameters is outside of these ranges during the initial reading, purging will continue

until parameters stabilize as described below. A final set of readings will be recorded at the end of sampling to evaluate if infiltration of surface water has occurred during sample collection.

Prior to sample collection, the piezometers will initially be purged at a flow rate of less than 100 ml/min and slowly increased to a maximum flow rate 200 mL/min until field parameters are stabilized within the following criteria:

- Temperature (±1 °C)
- pH (±0.10 standard units)
- Specific conductance (±3 percent)
- Oxidation reduction potential (±10 millivolts [mV] or ±10 percent if between -100 mV and +100 mV)

Although a turbidity meter will be used to measure turbidity of the water, turbidity measurements do not need to be stabilized prior to sampling collection.

If purge water field parameters do not stabilize or evaluation of the final parameters indicates surface water intrusion, a new TZW sampling location will be installed at an offset from the original location.

Following purging, TZW samples for the analyses below, with the exception of total metals, will be collected through a porous glass fiber media capsule filter to minimize the amount of sediment that enters the sample containers. TZW samples collected from each piezometer will be labeled with a unique identification and stored in an ice-chilled cooler before being shipped to the analytical laboratory for the following site COCs (Table 2 and Table 3):

- Benzene, Toluene, Ethylbenzene and Xylenes (USEPA 8260C LL)
- Polycyclic aromatic hydrocarbons (SM 8270D)
- Gasoline Range Organics by Method NWTPH-Gx
- Diesel Range Organics by Method NWTPH-Dx (with and without silica gel cleanup)
- C10-C12 Aliphatics by Method NWTPH-VPH
- Total and dissolved arsenic and manganese (USEPA 6010C)

3.5 Equipment Decontamination

All non-disposable sampling equipment will be decontaminated prior to use and between sample locations. Sampling equipment will be scrubbed with an aqueous solution of laboratory-grade detergent (e.g., Simple Green), followed by a rinse with deionized water. To avoid cross contamination between samples, disposable polyethylene tubing and silicone tubing will be changed between sample locations.

3.6 Surveying Activities

Gravity will use a differential GPS during TZW sampling to record horizontal coordinates of the sample locations. Horizontal coordinates will be collected and reported in North American Datum 1983, State Plane, Oregon North, International Feet. Vertical coordinates will be reported in North American Vertical Datum of 1988.

3.7 Investigation Derived Waste Management

Investigation-derived waste generated during TZW sampling will consist of personal protective equipment (e.g., gloves), disposable sampling equipment (i.e., polyethylene and silicone tubing), and water used for decontamination of non-disposable sampling equipment. Solid waste will be containerized in garbage bags or other appropriate containers, sealed, and disposed of off-site as non-hazardous waste. Water

used for decontamination will be placed into a poly drum approved by the United States Department of Transportation and secured shut for transportation. The drums will be stored on-site until they are removed and disposed of by an approved waste handling company. Purge water generated during TZW sampling will be allowed to flow directly back into the Willamette River.

3.8 Quality Assurance and Quality Control

Field quality assurance / quality control samples will be collected in accordance with the Quality Assurance Project Plan in the GW SCM PMP (ERM 2017a), including the following:

- Trip blanks will be placed in all coolers containing samples for volatile analysis.
- A blind field duplicate will be collected and submitted to the laboratory for all the analyses listed above.
- A matrix spike/matrix spike duplicate, a rinsate sample, and an equipment blank sample will be collected for all the analyses (Table 2).

Samples will be shipped to Pace Analytical Laboratory in Minneapolis, Minnesota, in sealed containers under chain-of-custody procedure.

Field notes taken during sampling activities will be recorded in a field logbook using indelible ink. The field notes will include, at minimum, a time stamped record of daily activities, names of site personnel, samples collected, and field instrument calibration records. Piezometer purging data will be recorded electronically using the Environmental Quality Information System (EQuIs) Collect tool. Data recorded using EQuIS Collect will be uploaded to the ERM server at the end of each field day.

4 REPORTING

ERM will perform data validation for laboratory analytical results following US Environmental Protection Agency guidelines and GW SCM PMP (ERM 2017a). The TZW sampling results will be reported in the 2023 Annual Groundwater Monitoring Report, which is expected to be submitted in Q1 2024. The report will include field procedures, deviations from this work plan (if applicable), sample location and elevation data, analytical results, and interpretations.

5 REFERENCES

ERM (ERM-West, Inc.). 2015. “Quality Assurance Project Plan.” In *Revised Final Performance Monitoring Plan—Groundwater Source Control Measure, Premier Edible Oils, Portland, Oregon*, ed. ERM-West, Inc.

ERM (Environmental Resources Management). 2017a. *Revised Final Performance Monitoring Plan—Groundwater Source Control Measure*.

ERM. 2017b. *Upland and Transition Zone Water Investigation Report and Source Control Evaluation*. March.

Floyd-Snider. 2023. Pre-Remedial Design Investigation Evaluation Report - River Mile 3.5 East Remedial Design. April.

Treadwell & Rollo. 2014. TZW Sampling – Southern Barrier Wall Design. September.

USEPA. 2016. *Portland Harbor RI/FS Final Feasibility Study Report.* June.

USEPA. 2022. Standard Operation Procedure Low-Stress (Low-Flow) / Minimal Drawdown Ground-Water Sample Collection.

TABLES

Table 1
2014, 2015 and Proposed 2023 TZW Sampling Locations
Transition Zone Water Sampling Plan
Premier Edible Oils Site
Portland, Oregon

Location ID	Northing NAD83	Easting NAD83	Elevation AMSL (NAVD88)[1]
2014 Sampling Location[2]			
TZW-1-1	717715.32	7617657.06	9.23
TZW-1-2	717715.32	7617657.06	9.23
TZW-2-1	717533.65	7617727.86	2.69
TZW-2-2	717533.65	7617727.86	2.69
TZW-3-1	717420.90	7617863.34	7.00
TZW-3-2	717420.90	7617863.34	7.00
TZW-4-1	717378.52	7617955.16	7.25
TZW-4-2	717378.52	7617955.16	7.25
TZW-5-1	717378.36	7618060.48	7.39
TZW-5-2	717378.36	7618060.48	7.39
2015 Sampling Location			
TZW-06	717582.42	7617726.87	5.74
TZW-07	717472.81	7617803.12	4.74
TZW-08	717412.46	7617856.88	5.44
TZW-09	717366.59	7617951.15	5.19
TZW-10	717378.01	7618060.22	7.30
2023 Proposed Sampling Locations[3,4]			
TZW-2023-01	717582.42	7617726.87	5.74
TZW-2023-02	717472.81	7617803.12	4.74
TZW-2023-03	717412.46	7617856.88	5.44
TZW-2023-04	717366.59	7617951.15	5.19
TZW-2023-05	717378.01	7618060.22	7.30

Notes:

[1] = Elevation data is estimate based on bathymetric data set provided by the Floyd-Snider; *Floyd-Snider. 2023. Pre-Remedial Design Investigation Evaluation Report - River Mile 3.5 East Remedial Design. April.*

[2] = Coordinates for 2014 TZW sampling locations TZW-1-1, TZW-1-2, TZW-2-1, and TZW-2-2 were approximated from Figure 1 in *TZW Sampling - Souther PEO Barrier Wall Design (Treadwell & Rollo 2014)* . Septmeber.

[3] = Target coordinates for the 2023 proposed sampling location are approximate.

[4] = Target elevation data for the proposed 2023 sampling locations are approximate

Horizontal Datum (Northing and Easting) were collected and reported in NAD83, State Plane, Oregon North, International Feet.

AMSL = Above Mean Sea Level

NAD83 = North American Datum 1983

NAVD88 = North American Vertical Datum 1988

TZW = Transition Zone Water

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Table 2
Transition Zone Sampling Matrix
Transition Zone Water Sampling Plan
Premier Edible Oils Site
Portland, Oregon

Sample Location	Sample ID	BTEX (USEPA 8260C LL)	PAH (SM 8270D)	GRO (NWTPH-GRO)	DRO (NWTPH-DRO (with and without Silica Gel))	VPH (NWTPH-VPH)	Total and Dissolved As & Mn (USEPA 6010C)[1]
Primary Samples							
TZW-2023-01	**PEO-TZW-2023-01**	**X**	**X**	**X**	**X**	**X**	**X**
TZW-2023-02	**PEO-TZW-2023-02**	**X**	**X**	**X**	**X**	**X**	**X**
TZW-2023-03	**PEO-TZW-2023-03**	**X**	**X**	**X**	**X**	**X**	**X**
TZW-2023-04	**PEO-TZW-2023-04**	**X**	**X**	**X**	**X**	**X**	**X**
TZW-2023-05	**PEO-TZW-2023-05**	**X**	**X**	**X**	**X**	**X**	**X**
Total Locations Sampled		**5**	**5**	**5**	**5**	**5**	**5**
QA/QC Samples							
Trip Blanks		1	0	1	0	1	0
Rinsate Blank		1	1	1	1	1	1
Filter Blank		0	0	0	0	0	1
Matrix Spike/Matrix Spike Duplicate		1	1	1	1	1	1
Duplicate samples		1	1	1	1	1	1

Notes:
[1] = Total metals will not be filtered; dissolved metals will be collected and placed on hold pending the results of the total metals
As = Arsenic
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes
DRO = Diesel Range Organics
GRO = Gasoline Range Organics
Mn = Manganese
NWTPH = Northwest Total Petroleum Hydrocarbon
PAH = Polycyclic Aromatic Hydrocarbons
SM = Standard Method
TZW = Transition Zone Water
USEPA = United States Environmental Protection Agency
VOC = Volatile organic carbon
VPH = Volatile Petroleum Hydrocarbon

ERM (ERM-West, Inc.). 2015. "Quality Assurance Project Plan." In Revised Final Performance Monitoring Plan—Groundwater Source Control Measure, Premier Edible Oils, Portland, Oregon, ed. ERM-West, Inc.
ERM (Environmental Resources Management). 2017a. *Revised Final Performance Monitoring Plan—Groundwater Source Control Measure* .

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Table 3
Bottleware and Hold Times
Transition Zone Water Sampling Plan
Premier Edible Oils Site
Portland, Oregon

Analyte	Analysis Method	Matrix	Preservative[1]	Container	Volume Required	Holding Time
BTEX	USEPA 8260C LL	Water	Hydrochloric Acid	VOA Vial 40 mL	120 mL	14 days
Polycyclic Aromatic Hydrocarbons	SM 8270D	Water	Hydrochloric Acid	Glass 1 L	2 L	7 days
NWTPH-GRO	NWTPH-Gx	Water	Hydrochloric Acid	VOA Vial 40 mL	120 mL	14 days
NWTPH-DRO (with and without Silica Gel)	NWTPH-Dx (Silica Gel)	Water	Hydrochloric Acid	Glass 250 mL	500 mL	7 days
C10-C12 Aliphatics (VPH)	NWTPH-VPH	Water	Hydrochloric Acid	VOA Vial 40 mL	120 mL	14 days
Total and Dissolved As and Mn[2]	USEPA 6010C	Water	Sulfuric Acid	Plastic 250 mL	500 mL	180 days

Notes:
[1] = Samples will be field filtered using glass filters to remove solids.
[2] = Total metals will not be filtered; dissolved metals will be collected and placed on hold pending the results of the total metals
As = Arsenic
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes
DRO = Diesel Range Organics
GRO = Gasoline Range Organics
L = Liter
LL = low level
mL = milliliters
Mn = Manganese
NWTPH = Northwest Total Petroleum Hydrocarbon
SM = Standard Method
USEPA = United States Environmental Protection Agency
VOA = Volatile organic analysis
VPH = Volatile Petroleum Hydrocarbon

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FIGURES

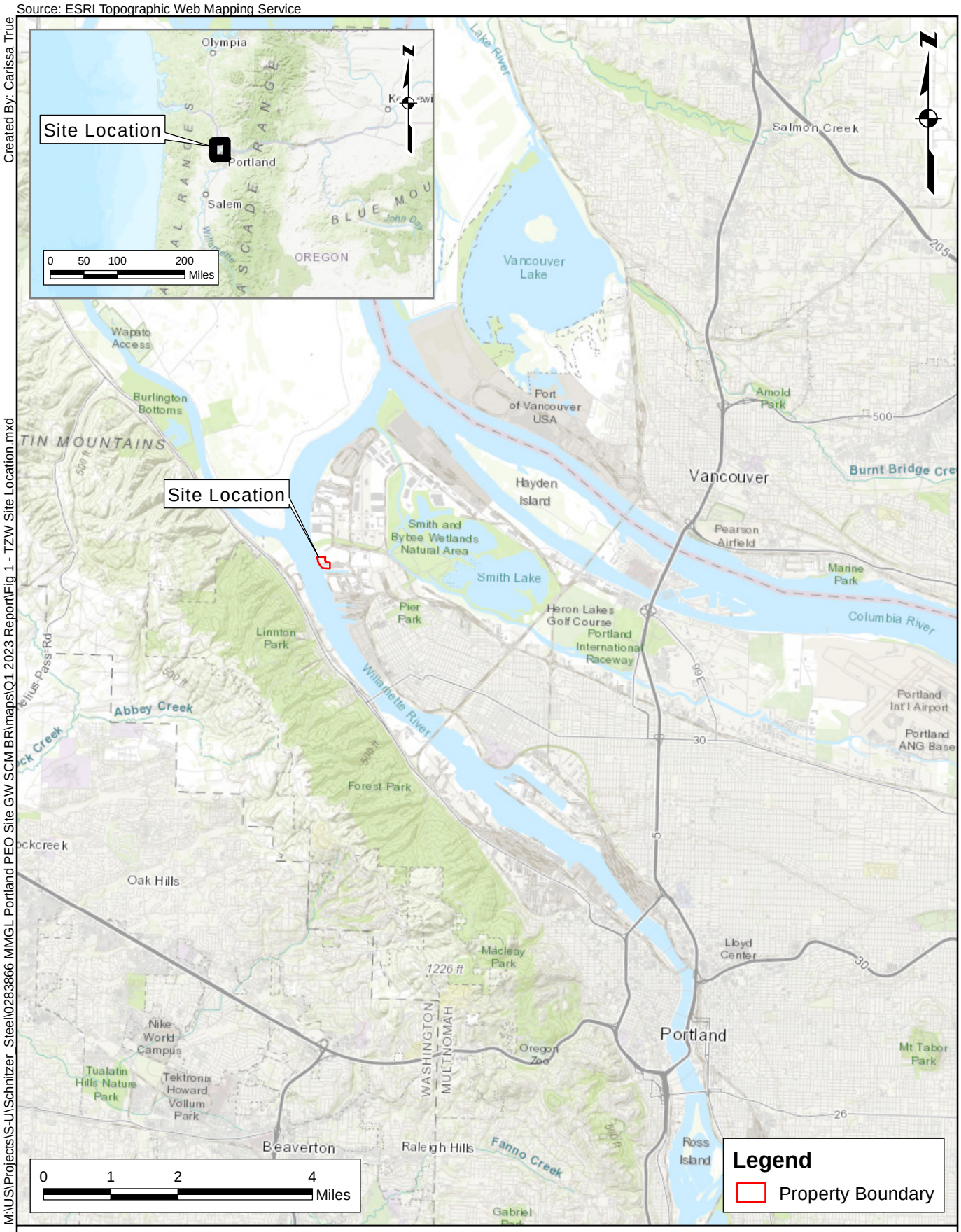

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Figure 1
Transition Zone Water Sampling Plan
Premier Edible Oils Site
Portland, Oregon

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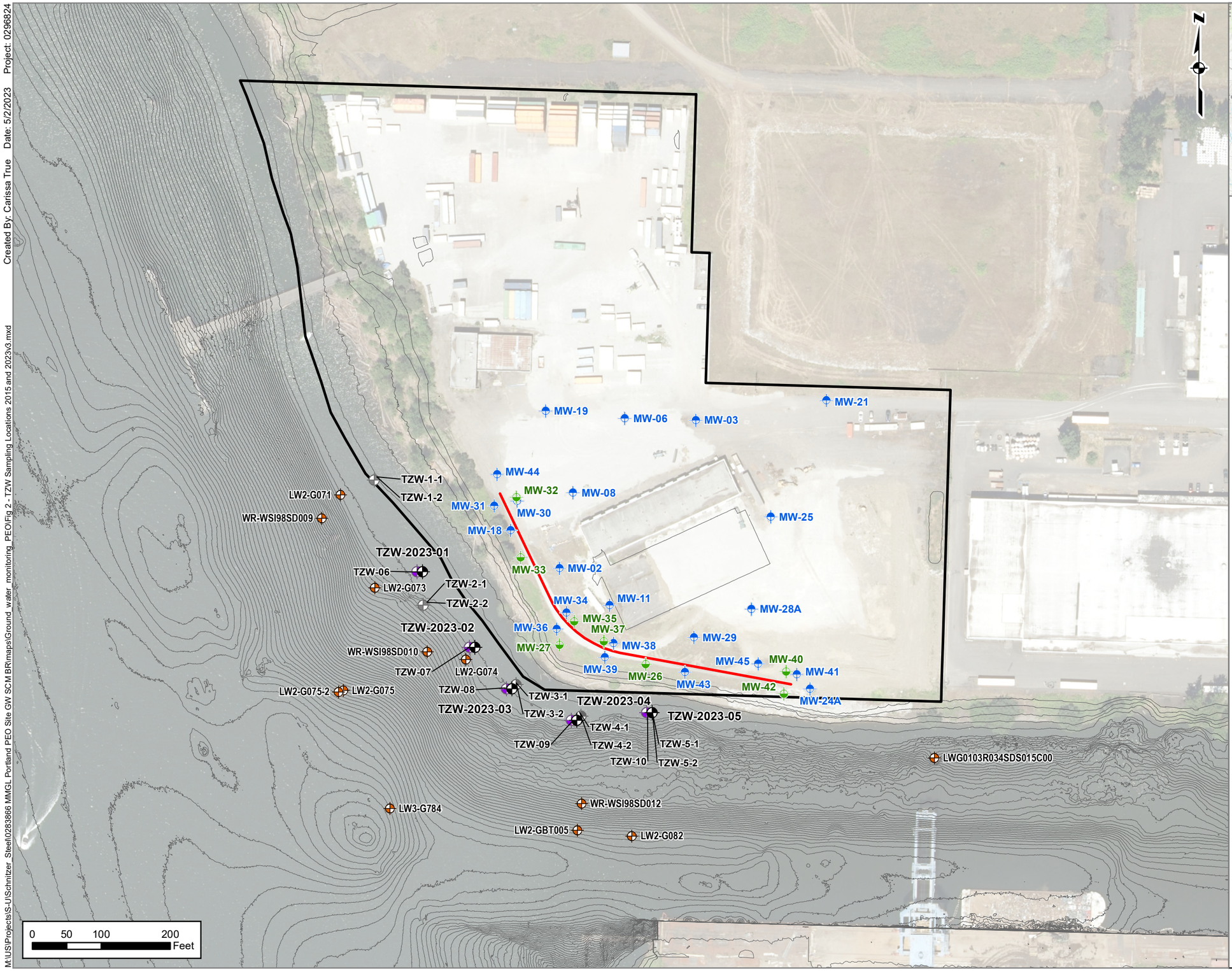
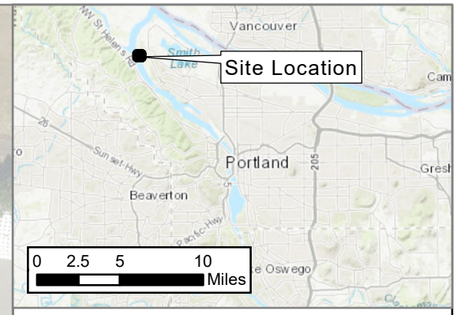
Project: 0296824 Date: 5/2/2023 Created By: Carissa True M:\US\Projects\S-U\Schnitzer_Steel\0283866 MMGL Portland PEO Site GW SCM BR\maps\Ground_water_monitoring_PEO\Fig 2 - TZW Sampling Locations 2015 and 2023v3.mxd





Legend

TZW Sample Location

- Proposed 2023
- 2015
- 2014
- Sediment Sample Location
- Monitoring Well, Shallow
- Monitoring Well, Deep
- Willamette River 5 ft Contours (14-18 January 2021)
- Groundwater Barrier Wall
- Property Boundary

Notes:
-The following sample locations are approximate: TZW-1-1,TZW-1-2, TZW-2-1,TZW-2-2.
-Sediment samples from Portland Harbor RI/FS Environmental Data Portal (USEPA, 2016).

Source: Floyd-Snider. 2023. Pre-Design and Investigation Evaluation Report – River Mile 3.5 East Remedial Design. April.

Figure 2
Proposed 2023 TZW Sampling Locations
Transition Zone Water Sampling Plan
Premier Edible Oils Site
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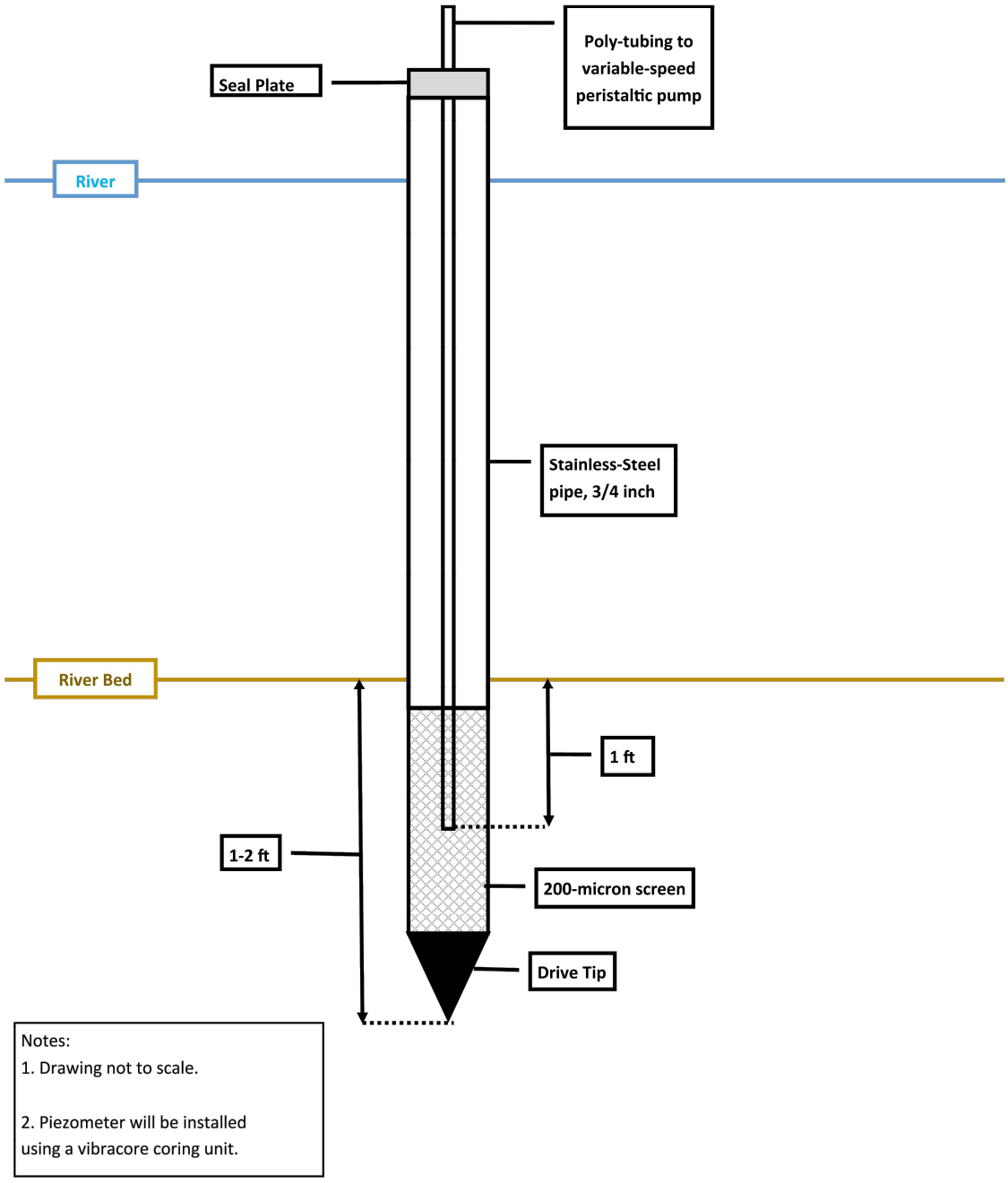

Figure 3

TZW Sampling Piezometer
Transition Zone Water Sampling Plan
Premier Edible Oils Site
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