

Final MW-82 Area Soil Investigation
Work Plan

Former Gunderson LLC Facility
4350 NW Front Avenue
Portland, Oregon

for
Gunderson LLC

October 3, 2024

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GEOENGINEERS 

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4350 NW Front Avenue
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1.0 Introduction

This Final MW-82 Area Soil Investigation Work Plan (Work Plan) presents the proposed scope of work and approach to conduct a soil investigation on behalf of Gunderson LLC (Gunderson) near monitoring well MW-82 at the facility at 4350 NW Front Avenue in Portland, Oregon (the Site; Site Location Map, Figure 1). This Work Plan has been revised to address Oregon Department of Environmental Quality (DEQ) and United States Environmental Protection Agency (EPA) comments provided in a September 3, 2024, DEQ letter.

The purpose of this soil investigation is to determine whether a subsurface source of arsenic is present in the soil near monitoring well MW-82. Arsenic has been detected in MW-82 groundwater and porewater offshore of the Site at elevated concentrations relative to other monitoring wells at the Site and Portland Harbor Superfund Site (Portland Harbor) Record of Decision groundwater and surface water Cleanup Levels (ROD CULs; EPA 2017). Although porewater arsenic concentrations exceed ROD CULs, the Portland Harbor Pre Remedial Design (Pre-RD) Investigation (AECOM/Geosyntec 2019) demonstrated that background arsenic porewater concentrations in Portland Harbor are higher than the ROD CUL. While the EPA has not accepted the background concentrations proposed by AECOM/Geosyntec (2019), we understand that the EPA is currently engaged in discussions with RD performing parties to address this issue. Testing performed at the Site has demonstrated that stormwater infiltrating near MW-82 is not the source of arsenic detected in groundwater.

The results of this investigation will be used in Gunderson's groundwater source control evaluation for the Site. The DEQ Environmental Cleanup and Site Information (ECSI) number for the Site is 1155. Ongoing source control activities, including the groundwater source control evaluation, are being performed by Gunderson under Consent Order No. LQVC-NWR-13-02.

The Work Plan is organized as follows:

- Site Description – Section 2.0
- Background – Section 3.0
- Proposed Scope of Work – Section 4.0
- Schedule – Section 5.0
- References – Section 6.0

2.0 Site Description

The Site is located at 4350 NW Front Avenue in Portland, Oregon. The Site is an active industrial barge manufacturing facility currently owned and operated by OGM Properties LLC and Gunderson Marine LLC, respectively. Gunderson sold the Site and its interest in Gunderson Marine LLC to OGM Properties LLC on May 15, 2023.

The Site covers approximately 59 acres and 4,000 lineal feet of river frontage on the western bank of the Willamette River between river mile (RM) 8.5 and 9.2. The Site is zoned Heavy Industrial and River Industrial. As shown on Figure 2, the Facility is divided into three areas (from downriver to upriver): Area 1, Area 2 and the Schnitzer ASD Yard (referred to in some historical reports as Area 3). Monitoring well MW-82 is located in Area 2 of the Site near the top of the riverbank, as shown on Figures 2 and 3.

3.0 Background

Monitoring well MW-82 was installed in June 2019 and has been sampled on a quarterly schedule since the second quarter 2019 monitoring event. Groundwater samples collected from well MW-82 have exhibited concentrations of some dissolved metals that exceed Portland Harbor groundwater CULs, most notably arsenic and to a lesser extent, zinc. While arsenic concentrations in groundwater across the Site and in many other parts of the Portland Harbor exceed the Portland Harbor CUL, concentrations of arsenic in groundwater in well MW-82 are elevated relative to other groundwater monitoring wells at the Site.

3.1 2023 POREWATER INVESTIGATION

In August and September 2023, a porewater investigation offshore of well MW-82 was conducted to evaluate arsenic and zinc concentrations in porewater and sediment. The investigation included porewater and sediment sample collection at three locations offshore of the MW-82 area. The results of the porewater investigation were reported in the Final Focused Porewater Investigation Results Report (GeoEngineers 2024).

Freely dissolved arsenic was detected in the three MW-82 area porewater samples at concentrations ranging from 29 to 63 micrograms per liter ($\mu\text{g/L}$). The ROD surface water CUL for arsenic is $0.018 \mu\text{g/L}$. Arsenic concentrations in sediment samples offshore of well MW-82 ranged from 5.11 to 9.23 milligrams per kilogram (mg/kg). The ROD sediment CUL and DEQ Regional Background Metals Concentrations in soil for the Portland Basin are 3.0 and 8.8 mg/kg , respectively (EPA 2017; DEQ 2013). So, while porewater concentrations of arsenic exceed ROD CULs, the concentrations of arsenic in sediment are less than or similar to the DEQ Regional Background Metals Concentration for arsenic.

Freely dissolved zinc concentrations in the MW-82 area porewater samples were below the ROD surface water CUL, with the exception of one location (82-2), which slightly exceeded the CUL ($51 \mu\text{g/L}$ compared to the CUL, $36.5 \mu\text{g/L}$). Zinc concentrations in sediment samples ranged from 113 to 255 mg/kg , less than the ROD sediment CUL of 459 mg/kg . Only the zinc concentration in sample 82-2 (255 mg/kg) was above the DEQ Regional Background Metals Concentration (180 mg/kg) at a very low exceedance ratio of 1.4.

In summary, while arsenic concentrations in porewater exceeded the ROD CUL, the measured arsenic concentrations in collocated sediment samples indicate that sediment does not contain arsenic concentrations that exceed the corresponding DEQ Regional Background Concentration. Zinc concentrations in both porewater and sediment are less than or similar to the associated CULs.

3.2 PRIOR SOURCE INVESTIGATIONS IN MW-82 AREA

Well MW-82 is located approximately 10 feet downgradient of stormwater infiltration feature INF-2-3. Well MW-82 is between the stormwater infiltration feature and the top of the riverbank. In 2022, the stormwater influent to INF-2-3 was sampled to determine if infiltrating stormwater may be the source of the elevated arsenic detected in MW-82 groundwater. Arsenic was not detected above the laboratory method detection limit (MDL) in the INF-2-3 stormwater influent sample. An evaluation of MW-82 groundwater chemistry parameters (e.g., dissolved oxygen [DO], oxidation-reduction potential [ORP]) was also conducted to determine whether infiltrating stormwater may be influencing the mobility of metals, including arsenic, in the subsurface near well MW-82. Arsenic would be expected to be less mobile and more likely to precipitate out of solution in conditions of higher DO and ORP (i.e., in aerobic environments), so infiltration of stormwater (higher DO and ORP than groundwater) would likely reduce the mobility of

arsenic in groundwater. Nonetheless, no influence of infiltrating stormwater was observed in measured DO and ORP parameters in well MW-82 groundwater. Therefore, these 2022 investigation results show no indication that stormwater infiltration near MW-82 is the source of elevated arsenic in groundwater at well MW-82.

In addition to the INF-2-3 stormwater influent sampling event in 2022, stormwater at the Site has been analyzed for arsenic during 130 sampling events between 2016 and 2022, as part of the Gunderson stormwater source control monitoring program. During that time, arsenic was detected at a maximum concentration of 0.678 µg/L in stormwater samples collected in Area 1 and Area 2 of the Site, which contribute stormwater to infiltration feature INF-2-3. Sitewide, the maximum concentration of arsenic detected in a stormwater sample was 10.3 µg/L. For comparison, the concentration of arsenic detected in MW-82 groundwater samples has ranged from 41.2 to 252 µg/L. This disparity in arsenic concentrations measured in the stormwater and groundwater samples further supports that infiltrating stormwater is unlikely to be the source of the arsenic detected nor to influence the concentration of the arsenic detected in MW-82 groundwater samples.

3.3 HISTORICAL FILL PLACEMENT IN MW-82 AREA

Historical images indicate that that from at least 1957 through the 1960s, vessel launchways (known as Launchways 3), were in operation at the location of well MW-82. Launchways 3 was below the current ground surface elevation, as indicated by the launchway rails that currently project from the riverbank into the Willamette River, well below the current top of the riverbank (Figure 3). FMC, the Site owner/operator at the time, filled Launchways 3 to its current elevation by 1983 with fill of unknown origin.

While documentation of the materials that were used as fill is unavailable, fill materials encountered during completion of soil borings in 2011 and 2016 in the Launchways 3 area included wood/logs, brick, glass and metal material (Shaw 2011; Cascadia 2017). Again, the fill is of unknown origin and has not yet been determined to be the source of arsenic, but it is possible that the arsenic concentrations measured in well MW-82 groundwater are the result of a subsurface source of arsenic present in the historical fill that was placed in the area.

4.0 Proposed Scope of Work

Five borings will be completed at the approximate locations shown on Figure 3. Three borings will be advanced along the riverbank within approximately 5 to 10 feet of well MW-82 and two additional borings will be completed approximately 45 feet upgradient of well MW-82. The hydraulic groundwater gradient in the MW-82 area of the Site is to the north to northeast.

Borings will be completed with a track-mounted sonic drill rig or Geoprobe drill rig. Each boring will be completed to 30 feet below the ground surface (bgs), corresponding to the depth of the bottom of the screened interval for well MW-82. Boring locations may be adjusted if practical refusal occurs due to buried debris or other conditions.

Soil cores will be collected continuously to the full depth of the exploration. Conditions in soil cores will be logged in general accordance with ASTM International (ASTM) Method D2488. Soil will be field screened with a photoionization detector (PID) and sheen pan to investigate the presence of general contamination.

Observations of buried debris (e.g., wood, brick, metal, slag) will be recorded in the boring logs. Depth to groundwater will be measured using an electronic water level indicator.

Soil samples for laboratory analysis will be collected across the depth interval where groundwater is typically encountered in monitoring well MW-82. During quarterly monitoring events, depth to groundwater ranges from approximately 18 to 25 feet bgs, corresponding to seasonal high and low groundwater levels, respectively. Beginning at 18 feet bgs, soil samples for laboratory analysis will be collected approximately every 2 feet to the full depth of the boring. Two shallower soil samples will also be collected from each of the three borings near well MW-82. Additional shallow soil samples will be collected if buried debris and/or indications of contamination are observed. If debris is encountered, samples of the debris may also be collected for laboratory analysis. Approximately 41 soil samples will be collected and submitted for laboratory analysis.

A groundwater sample will be collected from one of the two borings to be collected upgradient of well MW-82. Once groundwater is encountered, a temporary polyvinyl chloride (PVC) well casing with a 5 to 10-foot screened interval will be placed in the boring. The well casing will be placed so that the top of the water table intersects the screened interval. Depth to groundwater will be measured using an electronic water level indicator. A peristaltic pump and new tubing will be used to purge groundwater from the casing until the groundwater is visibly clear (typically 2 to 3 gallons). Groundwater field parameters (i.e., pH, temperature, and conductivity) will be recorded using a handheld probe. Following purging, groundwater samples will be collected into new laboratory-supplied containers and placed in an iced cooler. Samples to be analyzed for dissolved metals will be field filtered using a 0.45-micrometer in-line filter.

Soil and groundwater samples will be analyzed for the 11 metals in the facility groundwater monitoring program, which include antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel and zinc, by EPA 6000/7000 series methods. Groundwater samples will be analyzed for both total and dissolved metals. Results of the investigation will be submitted to DEQ in a results report within 4 weeks of the receipt of the final analytical data. The report will include documentation of investigation procedures, field observations and detailed boring logs, tabulated analytical data compared to Portland Harbor CULs and a data quality review.

Investigation derived waste (IDW), consisting of soil cuttings and decontamination water will be placed in a labeled 55-gallon drum and stored on site. The IDW will be disposed of at a licensed disposal facility, pending waste profiling and transportation to the disposal facility.

5.0 Schedule

The investigation will be completed in October 2024, pending DEQ approval of the proposed scope of work, drilling subcontractor availability and Site access.

6.0 References

AECOM/Geosyntec, 2019. PDI Evaluation Report. Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling. June 17, 2019.

Cascadia Associates, LLC (Cascadia), 2017. Revised Updated Groundwater Source Control Evaluation, Gunderson LLC Facility, Portland, Oregon. August 3, 2017.

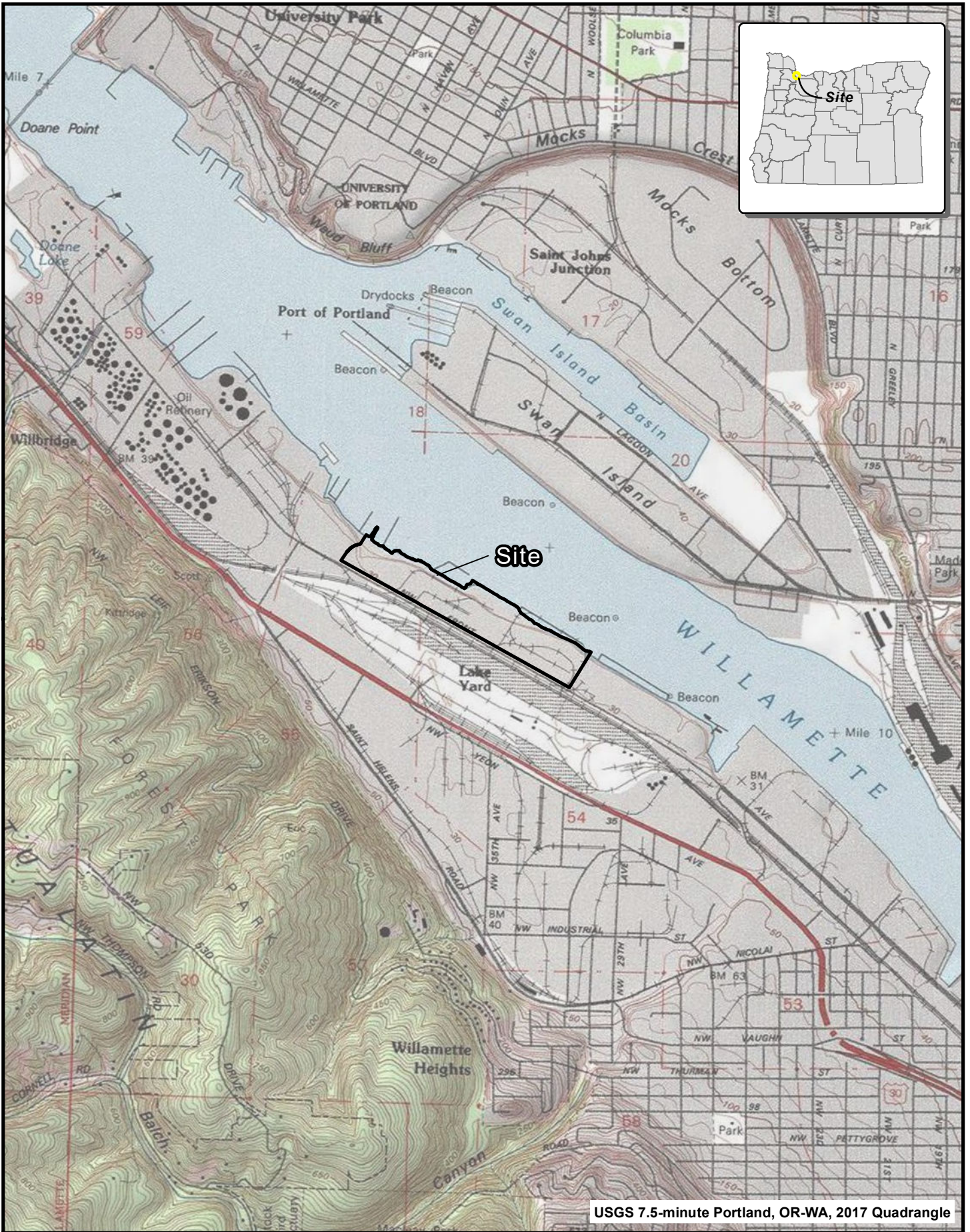
Oregon Department of Environmental Quality (DEQ), 2013. Development of Oregon Background Metals Concentrations in Soil. State of Oregon Department of Environmental Quality Land Quality Division Cleanup Program. March 2013.

U.S. Environmental Protection Agency (EPA), 2017. Record of Decision, Portland Harbor Superfund Site, Portland, Oregon. January 2017.

GeoEngineers, Inc. (GeoEngineers), 2024. Final Focused Porewater Investigation Results Report. May 10, 2024.

Shaw, 2011. Area 2 – Erodible and Riverbank Soil Source Control Evaluation, Gunderson Facility, 4350 NW Front Avenue, Portland, Oregon. August 2011.

Figures



USGS 7.5-minute Portland, OR-WA, 2017 Quadrangle

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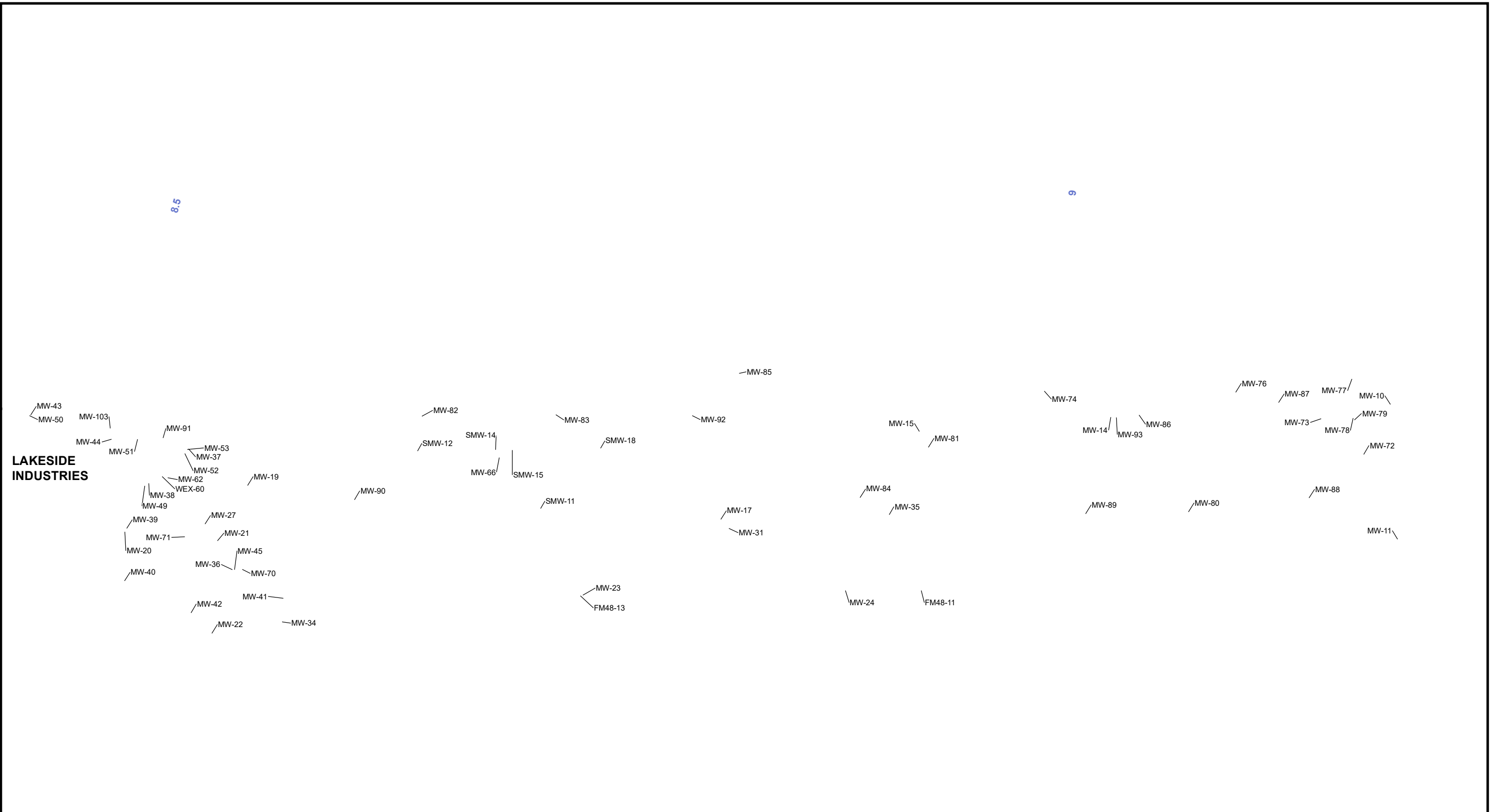
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Site Location Map
 MW-82 Area Soil Investigation Work Plan
 Former Gunderson LLC Facility
 Portland, Oregon

Figure 1

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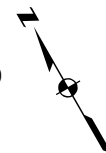
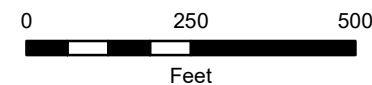


Legend

Well Network

- ⊕ Decommissioned Monitoring Well
- ⊙ Monitoring Well - In Current Groundwater Monitoring Program
- ⊗ Monitoring Well - Not in Current Groundwater Monitoring Program

- River Mile
- - - Site Property Boundary



Groundwater Monitoring Well Network
 MW-82 Area Soil Investigation Work Plan
 Former Gunderson LLC Facility, Portland, Oregon



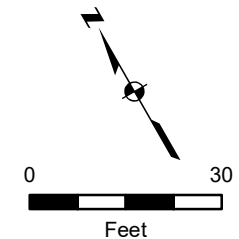
Figure
2

Sources:
 Johnson Land Surveying; Minister and Glaeser Surveying.
Coordinate System:
 North American Datum of 1983 (2011) State Plane Oregon North (International Feet)



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- Legend**
- Site Property Boundary
 - + Monitoring Well
 - + Proposed Soil Boring Location



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|--|-----------------|------------------------------------|
| Proposed Boring Locations | | |
| MW-82 Area Soil Investigation Work Plan Former Gunderson LLC Facility, Portland, Oregon | | |
| GEOENGINEERS | | Figure 3 |
| PREPARED BY: estrandhagen | DATE: 10/2/2024 | PROJECT: 025323-001 -15/-16/-17 |

Sources:
Johnson Land Surveying; Minister and Glaeser Surveying.
Coordinate System:
North American Datum of 1983 (2011) State Plane Oregon North (International Feet)

