Public Review Draft Feasibility Study Report Addendum

8th Avenue Terminals, Inc. Site
Seattle, Washington

November 12, 2025

Prepared for:

Washington State Department of Ecology

On Behalf of:

8th Avenue Terminals, Inc.

SEATTLE
155 NE 100th Street, Ste 302, Seattle, WA 98125 T 206.631.8680

landauinc.com

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This document was prepared by, or under the direct supervision of, the undersigned, whose seal is affixed below.

Name: Mike Staton, LG
Washington No. 695

Date: November 12, 2025

Document prepared by: _____ Bill Haldeman, LHG
Associate Hydrogeologist

Document reviewed by: _____ Mike Staton, LG
Project Manager; Senior Principal Geologist

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Project Coordinator: ljl/tac

LANDAU ASSOCIATES

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LIST OF ABBREVIATIONS AND ACRONYMS

µg/L	micrograms per liter
8th Avenue Terminals	8th Avenue Terminals, Inc.
Addendum	Public Review Draft Feasibility Study Report Addendum
AO	Agreed Order
Apex	Apex Laboratories LLC
APS	Applied Professional Services
bcy	bank cubic yards
bgs	below ground surface
Boeing	The Boeing Company
Cascade	Cascade Environmental Services
CFR	Code of Federal Regulations
City	City of Seattle
CLARC	Cleanup Levels and Risk Calculation
cm	centimeters
COC	chemical of concern
Connelly	Connelly-GPM, Inc.
cPAH	polycyclic aromatic hydrocarbon
CUL	cleanup levels
DER	Data Evaluation Report
D/F	dioxin/furan
DCA	disproportionate cost analysis
DO	dissolved oxygen
DOH	Washington State Department of Health
Draft FS Report	Public Review Draft Feasibility Study Report
DRO	diesel-range organics
DSOA	Duwamish Sediment Other Area
Ecology	Washington State Department of Ecology
EHD Map	Environmental Health Disparities Map
EJ Screening Tool	Environmental Justice Screening and Mapping Tool
EM	electromagnetic
EPA	US Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FS	feasibility study
ft	feet, foot
ft/day	feet per day
g/kg	grams per kilogram
gpm	gallons per minute
GPR	ground-penetrating radar
GPRS	Ground Penetrating Radar Systems, LLC
IHS	indicator hazardous substance

LIST OF ABBREVIATIONS AND ACRONYMS (continued)

ISS ..... *in situ* solidification/stabilization
k ..... hydraulic conductivity
KCIW ..... King County Industrial Waste
Landau ..... Landau Associates, Inc.
LDW ..... Lower Duwamish Waterway
LRI ..... Land Recovery, Incorporated
M&N ..... Moffat & Nichol
MarVac ..... Marine Vacuum Service
MDL ..... method detection limit
mg/kg ..... milligrams per kilogram
mg/L ..... milligrams per liter
mL/min ..... milliliter per minute
MNA ..... monitored natural attenuation
MRL ..... method reporting limit
MSL ..... mean sea level
MTCA ..... Model Toxics Control Act
NAD83 ..... North American Datum of 1983
NAVD88 ..... North American Vertical Datum of 1988
OCA ..... Operations Containment Area
ORO ..... oil-range organics
ORP ..... oxidation reduction potential
PAH ..... polycyclic aromatic hydrocarbon
PCB ..... polychlorinated biphenyl
PCUL ..... preliminary cleanup level
PFAS ..... per- and polyfluoroalkyl substances
PFAS Investigation Work Plan ..... PFAS Work Plan
PFOA ..... perfluorooctanoic acid
PFOS ..... perfluorooctanesulfonic acid
PDI ..... pre-remedial design investigation
PID ..... photoionization detector
PM ..... particulate matter
PQL ..... practical quantitation limit
PRB ..... permeable reactive barrier
PVC ..... polyvinyl chloride
PRIMA ..... PRIMA Environmental, Inc.
RAL ..... remedial action level
REL ..... remediation level
RMP ..... risk management plan
ROW ..... right-of-way
SDCI ..... City of Seattle Department of Construction and Inspections

LIST OF ABBREVIATIONS AND ACRONYMS (continued)

SDOT ..... Seattle Department of Transportation
SGS ..... SGS North America, Inc.
SIM ..... selected ion monitoring
Site ..... 8th Avenue Terminals, Inc. Site
SLR ..... SLR International Corporation
SQS ..... sediment quality standard
SVOC ..... semivolatile organic compound
TEQ ..... toxicity equivalency
TSDF ..... treatment storage and disposal facilities
WAC ..... Washington Administrative Code
WMNS ..... Waste Management National Services, Inc.
Windward ..... Windward Environmental LLC
Wood ..... John Wood Group PLC
Work Plan ..... Additional Assessment and Groundwater Monitoring Work Plan
ZVI ..... zero-valent iron

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1.0 INTRODUCTION

In compliance with Agreed Order (AO) No. DE 6721, Landau Associates, Inc. (Landau), on behalf of 8th Avenue Terminals, Inc. (8th Avenue Terminals), has prepared this addendum to SLR International Corporation's (SLR's) Public Review Draft Feasibility Study Report (Draft FS Report), dated January 2024, that presented the initial results of a feasibility study (FS) of the upland portion of the 8th Avenue Terminals, Inc. Site (Site) in Seattle, Washington. The Site is primarily located at the 8th Avenue Terminals property located at 7400 8th Avenue South.

From March through September 2024, additional assessment and quarterly groundwater monitoring activities were conducted to obtain sufficient information to revise and complete the FS for the Site. The assessment and monitoring activities were designed to address the following data gaps:

- The shallow groundwater conditions at the southern end of 8th Avenue South, adjacent to the western boundary of the 8th Avenue Terminals property, had not been assessed.
- There had been only one groundwater sampling event conducted at the Site since 2014, and the current concentrations of the groundwater indicator hazardous substances (IHSs) beneath the 8th Avenue Terminals property area were not known.
- The hydraulic conductivity (k) of the shallow, intermediate-depth, and deep portions of the aquifer beneath the property had not been calculated based on Site-specific testing data.
- The locations, lengths, and depths of the support structures (tie-backs) of the existing sheet pile seawall located along the Lower Duwamish Waterway (LDW; including Slip 4) were not known.

The Site-specific k values for shallow, intermediate-depth, and deep portions of the aquifer were used to develop a transient groundwater model of the existing hydrogeologic conditions at the Site that replaced the previous steady-state model that was presented in the Draft FS Report (SLR 2024b). To assist in the development and evaluation of groundwater remedial alternatives for the Site, a bench-scale treatability study was conducted from October through December 2024 to assess the effectiveness, the volume required for treatment, and the estimated lifespan of three different types of zero-valent iron (ZVI) products that could be used as permeable reactive barriers (PRB) for the arsenic- and copper-impacted shallow groundwater at the Site.

The objectives of this Draft FS Report Addendum (Addendum) are to 1) present the 2024 assessment and groundwater monitoring data and results, 2) describe the transient groundwater model assumptions and present the modeling results, 3) detail the ZVI treatability study procedures and results, 4) provide the information required to address the Washington State Department of Ecology's (Ecology's) comments regarding the Draft FS Report (Ecology 2023a; Ecology 2025c), 5) describe the revised remedial alternatives for the Site, and 6) present the results of an updated disproportionate cost analysis (DCA). This Addendum is supplemental to the Draft FS Report and only presents the additional information and data that were necessary to revise and complete the FS. Specifically, this Addendum presents information and/or data that add to or replace at least a portion of the content of Sections 2, 3, 5, 6, 7, 8, 9, 10, 11, and 12 of the Draft FS Report.

1.1 Report Organization

This Addendum is organized as follows:

- Section 2—Additional Site Background Information
- Section 3—Summary of Recent Sediment Investigations
- Section 4—2024 Additional Assessment and Groundwater Monitoring Activities
- Section 5—Zero-Valent Iron Treatability Study
- Section 6—Development of Updated Remedial Alternatives
- Section 7—Evaluation of Remedial Alternatives
- Section 8—Recommended Alternative
- Section 9—Use of This Report
- Section 10—References.

The appendices to this Addendum include US Environmental Protection Agency's (EPA's) Environmental Justice Screening and Mapping Tool (EJ Screening Tool) Reports and a Washington State Department of Health (DOH) Environmental Health Disparities Map for Census Tract 53033010900 (Appendix A); figures showing recent sediment sample locations and results (Appendix B); the field logs (including soil boring logs and low-flow groundwater sampling field data sheets) from the 2024 assessment and groundwater monitoring activities and the 2025 groundwater sampling event (Appendix C); the laboratory reports from the 2024 soil and groundwater samples and the 2025 groundwater samples (Appendix D); design drawings of the sheet pile seawall and associated pier at the 8th Avenue Terminals property (Appendix E); the Moffatt & Nichol (M&N) report regarding its December 2024 assessment of the condition of the sheet pile seawall (Appendix F); SLR's description of the transient groundwater modeling assumptions, input data, calibration process, and results, including figures and tables that depict the modeling results (Appendix G); the Landau data validation technical memorandums for the 2024 and 2025 sample analytical results (Appendix H); PRIMA Environmental Inc.'s report that describes the testing procedures and the results of a ZVI bench-scale treatability study (Appendix I); and responses to Ecology's comments regarding the Draft FS Report (Ecology 2025c) that could not be incorporated into the Addendum text, tables, or figures (Appendix J).

2.0 ADDITIONAL SITE BACKGROUND INFORMATION

The previous draft version of the FS for the Site did not include an evaluation of potential impacts to vulnerable populations and overburdened communities (SLR 2024b), in accordance with Ecology's Implementation Memorandum No. 25 (Ecology 2024a). To complete the FS in accordance with the Model Toxics Control Act (MTCA), Landau has prepared the following text to present the results of our evaluation of potential impacts to vulnerable populations and overburdened communities near the Site.

The Final Remedial Investigation Report for the Site (SLR 2024a) did not include an evaluation of current and projected local and regional climatological characteristics and their potential effects on contaminant migration or the resilience of remedial alternatives, in accordance with Washington Administrative Code (WAC) 173-340-350(6)(f). Per Ecology's request (Ecology 2024c), Landau evaluated the potential impacts of climatological characteristics on contaminant migration at the Site and the resilience of the updated remedial alternatives (see Section 7.0). The results of that evaluation are presented in Section 2.2 below.

2.1 Vulnerable Populations and Overburdened Communities

Landau conducted an evaluation of potential impacts to likely vulnerable populations and overburdened communities in the vicinity of the Site in accordance with Ecology's Implementation Memorandum No. 25 (Ecology 2024a). The purposes of this evaluation are to identify and reduce the impact of environmental and health disparities in Washington and improve the health of Washington residents, as well as support Ecology's decisions regarding site prioritization, cleanup decisions, and site hazard rankings. Landau has performed the assessment required by MTCA and Implementation Memorandum No. 25 and, as more fully discussed below, has determined that the evaluated area includes a likely vulnerable population or overburdened community; however, the potential for that population or community to be exposed to Site contamination is low.

Implementation Memorandum No. 25 states that the potentially exposed population includes a likely vulnerable population or overburdened community if the population meets any of the following criteria:

- The potentially exposed population is located in a census tract that is at or above the 80th Washington State percentile of the Demographic Index from the EPA's EJ Screening Tool.
- The potentially exposed population is located in a census tract that is at or above the 80th Washington State percentile of the Supplemental Demographic Index from the EJ Screening Tool.
- The potentially exposed population is located in a census tract that ranks a 9 or 10 on the Environmental Health Disparities Index from the DOH's Environmental Health Disparities Map (EHD Map).

For the purposes of the FS, Landau assessed all populations potentially threatened by the Site. This includes all populations residing either on-Site or off-Site who are reasonably likely to be exposed or potentially exposed to hazardous substances based on their land and resource uses at the Site (WAC

173-340-350[6][h][i]). Landau used the EPA's EJ Screening Tool[1] and the DOH's EHD Map[2] to evaluate whether vulnerable populations are present in the vicinity of the Site. Using both tools, Landau evaluated the area within the census tract encompassing the Site (Census Tract 53033010900). The evaluated census tract, which includes an estimated 1,317 residents, is roughly bounded by the LDW to the west, Airport Way South to the east, South Dawson Street to the north, and South 87th Place to the south. Even though the area of the southern part of Census Tract 53033010900 shown on the EHD Map was different from that shown in the EJ Screening Tool, Landau used the results in each tool for Census Tract 53033010900.

The two demographic indices in the EJ Screening Tool are based on combinations of socioeconomic and health indicators related to a community's potential susceptibility to contamination. The Demographic Index is based on the average score of two indicators: percent low income and percent people of color. The Supplemental Demographic Index is based on the average score of five indicators: percent low income, percent limited English speaking, percent less than high school education, percent persons with disabilities, and low life expectancy. Values for each index greater than the 80th percentile in Washington State are considered indicative of a community that may have a higher environmental burden and potentially vulnerable population.

The EHD Map combines 19 indicators of community and environmental health to create a cumulative rank that allows for comparison with other communities across Washington State. The indicators are ranked on a scale of 1 to 10 and are aggregated into the following four groups, which are also ranked on a scale of 1 to 10:

1. **Environmental Exposures:** diesel exhaust PM2.5 (fine particulate matter) emissions, ozone concentration, PM2.5 concentration, proximity to heavy traffic roadways, and toxic releases from facilities.
2. **Environmental Effects:** lead risk from housing, proximity to hazardous waste treatment storage and disposal facilities (TSDFs), proximity to National Priorities List facilities (Superfund Sites), and proximity to Risk Management Plan (RMP) facilities.
3. **Socioeconomic Factors:** no high school diploma, people of color, population living in poverty, primary language other than English, transportation expense, unaffordable housing, and unemployed.
4. **Sensitive Populations:** death from cardiovascular disease and low birth weight.

The rankings of the four groups are then aggregated into a final EHD ranking.

Appendix A provides the results of the evaluation of Census Tract 53033010900, including a summary of the data used in the EJ Screening Tool (the ACS Summary Report), the EJ Screening Tool results (the EJScreen Community Report), maps displaying the EJ Screening Tool Washington State Demographic and Supplemental Demographic Indices, and the EHD Map. For Census Tract 53033010900, the EJ Screening

[1] EPA. 2024. EJ Screen Mapping Tool, Version 2.3. US Environmental Protection Agency. Revised July 31. https://ejscreen.epa.gov/mapper/.

[2] DOH. 2025. Washington Environmental Health Disparities Map, Version 2.0. Washington State Department of Health. Revised January 8. https://fortress.wa.gov/doh/wtnibl/WTNIBL/.

Tool's Demographic and Supplemental Demographic Indices (Washington State) were 66 and 45 percent, respectively. The EHD Map for Census Tract 53033010900 indicated a final ranking of 10 (the highest ranking). The EHD subgroup rankings were 10 each for Environmental Exposures and Environmental Effects and 6 each for Socioeconomic Factors and Sensitive Populations. The rankings of all the Environmental Exposures and Environmental Effects indicators were 10 except for ozone concentration (2) and wastewater discharge (9). The Socioeconomic Factors and Sensitive Populations rankings varied from 1 (death from cardiovascular disease) to 8 (both people of color and unaffordable housing).

In summary, a potentially exposed population in Census Tract 53033010900 includes a likely vulnerable population or overburdened community based on the EHD Map ranking of 10 (Ecology 2024a). However, both EJ Screening Tool indicators are below the 80th percentile criterion indicative of a likely vulnerable population or overburdened community.

Based on this analysis and the Site conditions, Landau believes that the potential for a likely vulnerable population or overburdened community in Census Tract 53033010900 to be exposed to Site contamination is low. The two environmental factors contributing to the EHD ranking of 10 are either unrelated to the Site conditions (airborne contamination or lead risk from housing) or due to community proximity to non-Site potential contamination sources. Because there is no known surface soil contamination at the Site and most of the 8th Avenue Terminals property is covered by pavement, there are no known airborne contaminant sources at the Site. Furthermore, the Site is located hydraulically downgradient of residences in the area, the brackish groundwater beneath the property is unlikely to be used in the future as a drinking water source, and the future remedial action at the Site will reduce the already low potential impact to human health and the environment.

2.2 Climate Change

In accordance with WAC 173-340-350(6)(f), Landau evaluated current and projected local and regional climatological characteristics to determine whether these characteristics could affect contaminant migration at the Site or the resilience of the identified remedial alternatives at the Site. According to Ecology's *Sustainable Remediation: Climate Change Resiliency and Green Remediation* (Ecology Climate Guidance) dated November 2017 and revised in January 2023 (Ecology 2023b), sea level rise, flooding, extreme precipitation, wildfires, landslides and erosion, and drought are the climate-related impacts that generally pose the highest potential risk for upland cleanup sites.

Based on this evaluation, current and projected local and regional climatological characteristics should have limited effects on the migration of hazardous substances or the resilience of the remedial action alternatives at the Site, and those effects would be assessed by groundwater monitoring. If groundwater concentrations increase during the remedial action due to the effects of current and projected local and regional climatological characteristics, then the action would have to be modified. A summary of this evaluation is presented in the following sections.

2.2.1 Sea Level Rise

The upland portion of the 8th Avenue Terminals property is located at an elevation of approximately 12 to 17 feet (ft) above the North American Vertical Datum of 1988 (NAVD88), along the northern edge of the LDW and along the western edge of Slip 4. The property border along the LDW and Slip 4 consists of a sheet-pile seawall. The top of the seawall is approximately 10 ft above median high tide conditions in the LDW (including Slip 4), and the bottom of the seawall extends approximately 44 ft deep (approximately 30 ft below median low tide conditions in the LDW). According to the Ecology Climate Guidance, high projections estimate up to 4 ft of sea level rise worldwide by the year 2100. Based on University of Washington probabilistic estimates of sea level rise in the LDW near the Site, the high sea level rise projections could be up to 3.5 ft relative to projected land level changes (University of Washington 2020). If the surface water levels of the LDW rose by 3.5 to 4 ft, the water level would not flood the property; however, groundwater levels would rise beneath the property, which could submerge any remaining soil contamination in the lower part of the vadose zone, particularly near the seawall, and increase the potential for contaminant leaching to groundwater. Groundwater gradients beneath the property would flatten overall and be more strongly reversed, potentially projecting further inland during high tide conditions. However, it is important to note that the restoration time frames of all the remedial alternatives for the Site range from approximately 4 to 16 years. During those time frames, the effects of sea level rise to the remaining contamination should be minimal and would be assessed by groundwater monitoring. If groundwater concentrations increase due to the effects of sea level rise, then the remedial action would have to be modified.

2.2.2 Flooding

Landau reviewed Federal Emergency Management Agency (FEMA) flood maps for the area in the vicinity of the Site, which indicated that the Site is just above the 100-year floodplain (12 ft above the NAVD88; FEMA 2025). As described above, flooding of the 8th Avenue Terminals property due to sea level rise is not a concern. Based on these conditions, flooding is not likely to affect contaminant migration or the resilience of the remedial alternatives at the Site.

2.2.3 Wildfires

The Ecology Climate Guidance indicates that increased risk of wildfires is a potential climate-related hazard in areas proximate to fuel sources such as forests or grasslands. Due to the location of the Site in a highly developed area of Seattle, fuel sources for wildfires are not present, and the risk of wildfires is unlikely.

2.2.4 Landslides and Erosion

The 8th Avenue Terminals property is located in a relatively flat and highly developed area of Seattle, with minimal exposed ground surface that could create a landslide or erosion hazard. Due to local topography and extensive development covering much of the ground surface in the vicinity of the Site, the risk of landslides and erosion is low.

2.2.5 Drought

The Ecology Climate Guidance indicates that cleanup sites vulnerable to drought include groundwater sites vulnerable to a lowered water table, sediment sites in drought-prone waterbodies, and mines and landfills reliant on rain to maintain vegetative cover for slope stability. Due to proximity to the LDW, which is hydraulically connected to Elliott Bay, groundwater elevations beneath the 8th Avenue Terminals property should not be significantly impacted by precipitation and the LDW is not a drought-prone waterbody. The remaining drought concern regarding mines and landfills is not applicable to the Site. Because the LDW is hydraulically connected to Elliott Bay, drought is not considered to be a potential climate-related impact for the Site.

3.0 SUMMARY OF RECENT SEDIMENT INVESTIGATIONS

Section 6 of the Draft FS Report presents a summary of the previous sediment dredging and investigation activities on and near the 8th Avenue Terminals property from 1981 through 2014. Because additional sediment investigations have been conducted on and near the property since 2014, this section was prepared to describe those recent investigation activities and the sediment sample analytical results, including for polychlorinated biphenyls (PCBs) and the contaminants that are Site groundwater chemicals of concern (COCs; arsenic, copper, acenaphthene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, fluorene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, naphthalene, total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) toxic equivalency quotient (TEQ), and vinyl chloride).

3.1 Recent Sediment Investigations

A brief description of sediment investigation activities conducted after 2014 is presented below.

- In 2015, 2016, 2018, 2020, and 2022, The Boeing Company (Boeing) conducted post-construction surface sediment monitoring in the LDW as part of their Duwamish Sediment Other Area (DSOA) and Southwest Bank Corrective Measure and Habitat Project (John Wood Group PLC [Wood] 2022). Two surface sediment sample locations (SD-PCM010 and SD-PCM025) were at the Boeing-owned portion of Slip 4. A Wood figure showing the Boeing sample locations and analytical results are presented in Appendix B. Concentrations of total PCBs at SD-PCM010 exceeded the sediment quality standard (SQS) in the surface sediment samples collected in 2020 and 2022 but were below the SQS in 2015, 2016, and 2018. None of the analyzed groundwater COCs for the Site were detected in any of the samples at concentrations greater than the SQSs; vinyl chloride was not analyzed.
- From 2022 through 2024, Anchor QEA and Windward Environmental LLC (Winward) conducted Phase I and Phase II of a pre-remedial design investigation (PDI) to collect additional data to support the remedial design for the middle reach (river mile 1.6 to 3.0) of the LDW Superfund Site (Anchor QEA and Windward 2025). In 2022 and 2023, Phase I included delineation of areas with remedial action level (RAL) exceedances, and visual inspections of structures and banks. Phase I sediment samples were collected from 303 locations within the middle reach of the LDW, including at locations on and near the 8th Avenue Terminals property. In 2024, Phase II included further delineation of areas with RAL exceedances and collection of data for engineering design purposes (i.e., geotechnical). Phase II sediment samples were collected from 325 locations within the middle reach of the LDW, including at locations on and near the 8th Avenue Terminals property. The PDI sediment sample locations are shown on Anchor QEA and Windward Maps 2-2, 3-1i, and 3-ij in Appendix B.

  The sediment sample analytical results from Phase I and Phase II of the PDI indicated two localized RAL exceedance areas on the 8th Avenue Terminals property (Anchor QEA and Windward 2025). Both of these areas, which are designated as Area 3 and Area 5, contained concentrations of total PCBs that exceeded the RAL. Anchor QEA and Windward figures (Maps 3-1i and 3-ij) that depict Area 3 and Area 5, as well as the total PCBs concentrations at those areas, are presented in Appendix B. Area 3 is located beneath and near the northeastern part of the pier on the property, and Area 5 is located beneath and near the southwestern end of the pier.

In Area 3, total PCB concentrations greater than the RAL were detected at two locations, samples LDW23-SS1819 and LDW24-SS157 collected in 2023 and 2024, respectively, from 0-10 centimeters (cm). LDW23-SS1819 was analyzed for PCBs and Site groundwater COCs arsenic, copper, and polycyclic aromatic hydrocarbons (PAHs). LDW24-SS1576 was analyzed for PCBs but not for Site groundwater COCs. None of the Site groundwater COCs were detected at concentrations above the RALs in sample LDW23-SS1819.

In Area 5, total PCB concentrations greater than the RAL were observed at three locations: samples LDW24-SS1830, LDW24-SS1560, and LDW24-IT1560 collected in 2024. None of these samples were analyzed for any of the Site groundwater COCs. LDW24-SS1830 was collected between 0-10 cm as a reoccupation sample of a previous sample, IS-1, which was collected by SLR in 2013. LDW24-IT1560 and LDW24-SS1560 were collected between 0-45 cm and 0-10 cm, respectively.

3.1.1 Reoccupied Sediment Samples

Appendix H of the Draft Final Pre-Design Investigation Data Evaluation Report (DER) for the Middle Reach of the LDW (Anchor QEA and Windward 2025) outlines the criteria to identify sediment sample locations that have been reoccupied so that the most current sample results for the 0-10 cm interval are compared to the RALs. This process involves replacing older data with more recent data at locations collected within 10 ft of the original sampling locations. Table H-1 of the DER compares older surface sediment with recent data at locations where recent samples replaced older samples. Under the "Older Task" in the table designated "Crowley Marine Services 8th Ave S," the following reoccupied surface sediment samples were collected from 2022 through 2024 for specific analytes:

- SSED-04 by SD-PER511-0315 (collected in 2015 rather than 2022 through 2024) for arsenic, cadmium, chromium, copper, lead, mercury, silver, zinc, and total PCBs
- SSED-05 by LDW23-SS1279 for total PCBs
- SSED-06 and SSED-56 (field duplicate) by LDW23-SS1280 for total PCBs
- SSED-07 by LDW23-SS1278 for total PCBs
- SSED-09 by LDW23-SS1232 for arsenic, cadmium, chromium, copper, lead, mercury, silver, zinc, PAHs, phthalates, other semivolatile organic compounds (SVOCs), and total PCBs
- SSED-10 by LDW23-SS1243 for total PCBs
- SSED-11 by LDW23-SS1242 for arsenic, cadmium, chromium, copper, lead, mercury, silver, zinc, PAHs, phthalates, other SVOCs, and total PCBs
- SSED-17A by LDW23-SS1240 for arsenic, cadmium, chromium, copper, lead, mercury, silver, zinc, PAHs, phthalates, other SVOCs, and total PCBs
- SSED-18A by LDW23-SS1230 for PAHs and total PCBs
- SSED-17A by LDW23-SS1240 for total PCBs
- IS-1 by LDW23-SS1830 for total PCBs and dioxins/furans
- IS-2 by LDW23-SS1831 for total PCBs and dioxins/furans
- IS-3 by LDW23-SS1832 for total PCBs and dioxins/furans

- IS-4 by LDW23-SS1833 for total PCBs and dioxins/furans
- IS-5 by LDW24-SS1834 for total PCBs and dioxins/furans.

Of these reoccupied surface sediment sample locations, the following older samples with RAL exceedances were replaced by a recent sample that did not contain any RAL exceedances:

- SSED-05—total PCBs now below RAL
- SSED-06 and SSED-56 (field duplicate)—total PCBs now below RAL
- SSED-07—total PCBs now below RAL
- SSED-09—total PCBs now below RAL
- SSED-10—total PCBs now below RAL
- SSED-11—total PCBs now below RAL
- IS-4—total PCBs and dioxins/furans now below RALs
- IS-5—total PCBs now below RAL.

Of the reoccupied sediment sample locations, only one location without a previous RAL exceedance, SSED-04, was replaced by a more recent sample, SD-PER511-0315 collected in 2015, which contained a total PCB concentration greater than the RAL. SSED-04 and SD-PER511-0315 were located near the center of Slip 4 (shown as sample location 1259 on Anchor QEA and Windward Map 3-1j in Appendix B). A surface sediment sample, SSED-03 (labeled DENW6721-SSED-03-2014 on Map 3-1j), located between the SSED-04 and SD-PER511-0315 area and the 8th Avenue Terminals property, did not contain a total PCB concentration greater than the RAL, which indicates that the total PCB exceedance at SD-PER511-0315 is not likely associated with the property. As described above, the replacement of eight previously impacted surface sediment samples with non-impacted samples provides additional evidence that the property is not a source of contamination in recent sediments in the LDW, including in Slip 4. Refer to Appendix F of the Draft FS Report (SLR 2024b) for figures of older surface sediment locations and to Appendix B of this report for figures of the 2022 through 2024 surface sediment locations at and near the property.

4.0 2024 AND 2025 ADDITIONAL ASSESSMENT AND GROUNDWATER MONITORING ACTIVITIES

This section describes the field activities and presents the results of the assessment and groundwater monitoring activities that were conducted in 2024, in accordance with Landau's Additional Assessment and Groundwater Monitoring Work Plan (Work Plan), dated March 7, 2024 (Landau 2024b). The Work Plan was approved by Ecology (Ecology 2024d) prior to the completion of any fieldwork.

On June 24, 2025, Ecology provided formal notification that an investigation of per- and polyfluoroalkyl substances (PFAS) was required at the Site (Ecology 2025a). This section describes the results of the investigation activities conducted in 2025, in accordance with Landau's PFAS Investigation Work Plan (PFAS Work Plan) dated August 5, 2025 (Landau 2025). The PFAS Work Plan was approved by Ecology (Ecology 2025b) prior to completion of any fieldwork.

4.1 Proposed Cleanup Levels

On October 21, 2025, Landau personnel reviewed Ecology's Cleanup Levels and Risk Calculation (CLARC) and LDW Preliminary Cleanup Level (PCUL) Workbook tables to verify that the proposed cleanup levels (CULs) for the soil and groundwater IHSs in the Draft FS Report are still valid (SLR 2024b). All the proposed CULs are still correct, except for acenaphthene in soil and acenaphthene in groundwater. The LDW PCUL Workbook tables indicated that the proposed soil and groundwater CULs for acenaphthene should be 0.028 milligrams per kilogram (mg/kg) and 5.34 micrograms per liter (µg/L), respectively, because they are lower than the proposed soil and groundwater CULs for acenaphthene in the Draft FS Report (0.16 mg/kg and 30 µg/L, respectively; SLR 2024b). Additionally, based on Apex Laboratories LLC's (Apex's) current practical quantitation limit (PQL) for vinyl chloride in soil (0.010 mg/kg), the proposed soil CUL for vinyl chloride increased from 0.002 to 0.010 mg/kg. The updated proposed soil and groundwater CULs for the soil and groundwater IHSs at the Site are presented in Tables 1 and 2.

Landau also reviewed the CLARC tables to verify that the proposed soil remediation levels (RELs) in Alternative 3 of the Draft FS Report were still valid. The proposed RELs are the MTCA Method C direct contact CULs for arsenic, copper, benzo(a)pyrene, acenaphthene, and vinyl chloride (SLR 2024b), which are listed in Table 1. All the proposed RELs are still correct, except for arsenic. The Method C direct contact CUL for arsenic was reduced from 88 to 4.10 mg/kg; however, because the current REL for arsenic is below the natural background concentration (7.30 mg/kg), which is the Site soil CUL, the arsenic REL (7.30 mg/kg) is now the same as the Site soil CUL.

4.2 Drill and Sample Soil Boring and Install Groundwater Monitoring Well

To assess the off-property groundwater conditions at the southern end of 8th Avenue South, Cascade Environmental Services (Cascade) of Woodinville, Washington, drilled a soil boring near the southern entry into the 8th Avenue Terminals property and completed it as a shallow groundwater monitoring

well (designated EMW-23S). The location of EMW-23S is shown on Figure 1. A Landau geologist directed the drilling and well installation work.

Prior to drilling, Landau obtained Street Use Permit No. SUUTIL0018965 from the Seattle Department of Transportation (SDOT) to drill and install EMW-23S on City of Seattle (City) property. Cascade submitted a Notice of Intent to Ecology for the planned soil boring/monitoring well more than 72 hours prior to commencing the drilling activities, in accordance with WAC 173-160-151. Public and private utility locates identified and marked the underground utilities in the vicinity of the planned drilling location.

4.2.1 Soil Sampling

On March 6, 2024, Cascade conducted drilling and soil sampling activities by using hollow-stem auger drilling methods to a depth of approximately 20 ft below ground surface (bgs). To reduce the likelihood of any damage to underground utilities, Cascade completed pre-drilling utility clearance of the boring by using a vacuum truck and air-knife methods to a depth of approximately 5 ft bgs. During the drilling at depths below 5 ft bgs, Cascade collected soil samples at approximate 2.5-ft intervals by using a decontaminated split-barrel sampler. Landau personnel screened each of the soil samples for the potential presence of contamination by using visual appearance, odors, and photoionization detector (PID) readings. There was no field evidence of contamination in any of the soil samples. The soil lithology, field-screening results, and moisture content in boring EMW-23S are included on the soil boring log presented in Appendix C.

There was no field evidence of contamination in the boring; therefore, in accordance with the Work Plan, the soil sample (designated EMW-23S-7.5-8.0) collected immediately above the groundwater table was submitted to Apex in Tigard, Oregon, and SGS North America, Inc. (SGS) in Wilmington, North Carolina, for analysis. Apex analyzed the soil sample for antimony, arsenic, copper, lead, and selenium by EPA Method 6020B; PAHs by EPA Method 8270E with selected ion monitoring (SIM); semivolatile petroleum hydrocarbons (diesel-range organics [DRO] and oil-range organics [ORO]) by Ecology Method NWTPH-Dx; and vinyl chloride by EPA Method 8260D SIM. SGS analyzed the soil sample for dioxins/furans (D/F) by EPA Method 8290A.

For the sample analyses, Apex's and SGS' current PQLs for their equipment were applied. The PQLs did not typically match the 2012 Target PQLs presented in Ecology's RI/FS Work Plan (Ecology 2012); however, the current PQLs and method detection limits (MDLs) were based on the use of the latest instrumentation available for those methods and the guidance for determining PQLs and MDLs by the Code of Federal Regulations (40 CFR). The analytical results showed that sample EMW-23S-7.5-8.0 did not contain concentrations of the Site soil IHSs (antimony, arsenic, copper, lead, acenaphthene, benzo[a]pyrene, total semivolatile petroleum hydrocarbons [DRO + ORO], vinyl chloride, and total D/F TEQ; SLR 2024b) above either the laboratory's MDLs or the proposed soil CULs (see Table 1) for the Site. However, the non-detect value for benzo(a)pyrene was based on an MDL (0.00586 mg/kg) that exceeded the proposed soil CUL (0.004 mg/kg). Selenium, which is not a soil IHS, was not detected in the sample at a concentration greater than the MDL. The analytical results for sample EMW-23S-7.5-8.0 are presented in Table 3 (soil IHSs only), and a copy of the laboratory report is presented in Appendix D.

4.2.2 Monitoring Well Installation

After the drilling and soil sampling, Cascade completed the soil boring as shallow groundwater monitoring well EMW-23S. The well was constructed with 2-inch-diameter Schedule 40 polyvinyl chloride (PVC) casing and a 15-ft-long screen (0.010-inch slots). The well screen was installed at a depth (from approximately 5 to 20 ft bgs) that intersected the groundwater table. A filter pack of 2/12 Colorado silica sand was placed from the bottom of the boring to approximately 2 ft above the top of the screen. A hydrated bentonite chip seal was installed above the filter pack to approximately 1 ft bgs, and a traffic-rated steel monument was installed (in concrete) flush with the ground surface to protect the well. The well construction details for EMW-23S are presented on the soil boring log in Appendix C.

After installation, Signature Surveying & Mapping, PLLC, of Shoreline, Washington, surveyed the well location relative to the North American Datum of 1983 (NAD83) Washington State Plane North Zone coordinates, and the ground surface and top of well casing elevations relative to the NAVD88. A table (B-1) that lists the location coordinates, top of casing elevation, and the construction details of well EMW-23S, as well as for all the other existing groundwater monitoring wells at the Site, is presented in Appendix C.

On March 8, 2024, Landau personnel developed EMW-23S by repeatedly surging the well with a surge block and pumping the well at a high flow rate with a battery-operated submersible pump, in accordance with the Work Plan. The extracted water from the well did not become clear during development (there was some light brown coloring); however, the development activities were terminated after approximately 40 gallons (more than 20 casing volumes) of water were extracted from the well. The development water was hauled to the Marine Vacuum Service (MarVac) facility in Seattle, Washington, for treatment and disposal. The soil cuttings from the drilling activities were hauled to the Land Recovery, Incorporated (LRI) Landfill facility in Puyallup, Washington, for disposal.

4.3 Conduct 2024 Quarterly Groundwater Monitoring Events

In March, June, and September 2024, Landau conducted quarterly groundwater monitoring events to assess the groundwater conditions at the southern end of 8th Avenue South (at EMW-23S) and to characterize the current concentrations of the groundwater IHSs beneath the 8th Avenue Terminals property area. Prior to the first groundwater monitoring event, Landau personnel located and inspected the existing groundwater monitoring wells for evidence of damage and accessibility. During the inspection, shallow well EMW-8S, which was located within the northern part of WMNS's OCA, could not be located. On the following day, Landau and WMNS personnel discovered that EMW-8S had been destroyed by facility operations. All the other 39 monitoring wells at the Site were in good condition and accessible. The former location of EMW-8S and the locations of the existing monitoring wells are shown on Figure 1.

During each groundwater monitoring event, the shallow monitoring wells located within 250 ft of the shoreline and all the intermediate-depth and deep monitoring wells were sampled during the period from 30 minutes before to 2 hours after a 1.0 ft above mean sea level (MSL) or lower tide in the adjacent LDW, when groundwater should be flowing toward the waterway. Because there is limited tidal

influence on the shallow groundwater at distances more than 250 ft from the shoreline, there were not any timing restrictions on the sampling of the 12 shallow wells (EMW-1S, EMW-6S, EMW-7S, EMW-11S, EMW-17S, EMW-18S, DMW-2, DMW-3, DMW-6B, HC-20, SLR-1, and SLR-7) located more than 250 ft from the shoreline.

During one of the days of each groundwater monitoring event, Landau personnel measured the depths to groundwater in all monitoring wells at the Site and the depth to surface water of the LDW (from the surveyed northeast corner of the 8th Avenue Terminals property pier) within a 1-hour timespan during low tide conditions in the waterway. The depths to groundwater and surface water, and the groundwater and surface water elevations on March 15, June 6, and September 16, 2024, are presented in Table 4.

During each monitoring event, Landau personnel purged and sampled the groundwater from each well with a peristaltic pump and new tubing by using low-flow methods. The intake of the tubing was placed at the mid-screen depth in each well. During the purging of groundwater from each well, temperature, pH, dissolved oxygen (DO), oxidation reduction potential (ORP), turbidity (except in March 2024), and conductivity were measured and allowed to stabilize before the samples were collected. The field parameter measurements from each well are presented on the Groundwater Low-Flow Sample Collection Forms in Appendix C. The final field parameter readings from each well before sampling are presented in Table 5. The groundwater samples were submitted to Apex for analysis of arsenic (total and dissolved) and copper (total and dissolved) by EPA Method 6020B, PAHs by EPA Method 8270E, and vinyl chloride by EPA Method 8260D SIM. During the March monitoring event, the dissolved metals samples were collected after field filtering; however, as described below, laboratory filtration replaced field filtering for the June and September events. The groundwater sample analytical results for the IHSs during the 2024 monitoring events, as well as during the previous groundwater monitoring events since 2013, are presented in Table 7 (dissolved arsenic and dissolved copper), Table 8 (acenaphthene and benzo(a)pyrene), and Table 9 (vinyl chloride). Copies of the laboratory reports for the 2024 monitoring events are presented in Appendix D.

4.3.1 March 2024 Groundwater Monitoring Results

From March 12 through 15, 2024, Landau conducted a quarterly groundwater monitoring event at the Site. On March 15, the surface water elevation in Slip 4 was -0.54 ft above NAVD88 (low tide conditions; based on the depth to surface water from the northeast corner of the 8th Avenue Terminals property pier) when Landau measured the depths to groundwater in the groundwater monitoring wells at the Site. The depths to groundwater in the shallow, intermediate-depth, and deep wells ranged from 5.21 to 14.71, 12.52 to 15.35, and 12.50 to 15.77 ft, respectively, below the tops of the well casings. Based on the results of the previous well elevation surveys, the groundwater elevations in the shallow, intermediate-depth, and deep wells ranged from 1.73 to 10.11, 1.17 to 4.30, and 0.41 to 4.00 ft, respectively, above NAVD88. The depth to groundwater measurements were planned to begin at the northwestern end of the property and then advance to the south and southeast during the allowed timespan; however, in March 2024, Landau personnel did not follow this instruction and, therefore, there were some anomalous groundwater elevations based on timing and tidal influence, particularly

near the waterway. However, the groundwater flow directions of the shallow, intermediate-depth, and deep groundwater on March 15, 2024, during low tide conditions, were primarily to the southeast beneath property with a component of flow to the south-southwest beneath the western edge of the property. There was also a southern flow component beneath the northeastern part of the property. These groundwater flow directions during low tide conditions were similar to the flow directions on June 6, 2024 (see Figures 2, 3, and 4), as well as during the previous low-tide groundwater monitoring events at the Site (SLR 2024a, b).

4.3.2 June 2024 Groundwater Monitoring Results

On June 4, 5, and 6, 2024, Landau conducted a quarterly groundwater monitoring event at the Site. On June 6, the surface water elevation in Slip 4 was -4.77 ft above NAVD88 (low-low tide conditions) when Landau measured the depths to groundwater in the groundwater monitoring wells at the Site. The depths to groundwater in the shallow, intermediate-depth, and deep wells ranged from 7.40 to 15.61, 13.03 to 16.20, and 13.08 to 17.10 ft, respectively, below the tops of the well casings. Based on the results of the previous well elevation surveys, the groundwater elevations in the shallow, intermediate-depth, and deep wells ranged from 0.81 to 8.77, 0.32 to 3.79, and -0.92 to 3.42 ft, respectively, above NAVD88. As described above, the groundwater flow directions of the shallow, intermediate-depth, and deep groundwater on June 6, 2024, during low tide conditions, were primarily to the southeast beneath property with a component of flow to the south-southwest beneath the western edge of the property (see Figures 2, 3, and 4, respectively). Along the sheet pile seawall, the lateral flow of the shallow groundwater was toward the southwestern end of the wall, except within approximately 120 ft of the northeastern end of the wall, which was to the northeast (see Figure 2).

4.3.3 September 2024 Groundwater Monitoring Results

On September 16, 17, and 18, 2024, Landau conducted a quarterly groundwater monitoring event at the Site. On September 16, the surface water elevation in Slip 4 was -3.45 ft above NAVD88 (low-low tide conditions) when Landau measured the depths to groundwater in the groundwater monitoring wells at the Site. The depths to groundwater in the shallow, intermediate-depth, and deep wells ranged from 7.59 to 15.02, 12.99 to 15.66, and 12.78 to 16.26 ft, respectively, below the tops of the well casings. Based on the results of the previous well elevation surveys, the groundwater elevations in the shallow, intermediate-depth, and deep wells ranged from 1.42 to 6.43, 0.86 to 3.83, and -0.08 to 3.68 ft, respectively, above NAVD88. Similar to March 15 and June 6, 2024, the groundwater flow directions of the shallow, intermediate-depth, and deep groundwater on September 16, 2024, during low tide conditions, were primarily to the southeast beneath 8th Avenue Terminals property with a component of flow to the south-southwest beneath the western edge of the property. Similar to June 6, 2024, the lateral flow of the shallow groundwater along the sheet pile seawall was toward the southwestern end of the wall, except within approximately 120 ft of the northeastern end of the wall, which was to the northeast (see Figure 5).

4.3.4 Groundwater Sample Analytical Results

The groundwater sample analytical results from the March, June, and September 2024 monitoring events were compared to the updated proposed groundwater CULs (see Table 2). Because the March 2024 groundwater samples from the deep monitoring wells did not contain groundwater IHS concentrations greater than the proposed CULs, the deep monitoring wells were not sampled during the June and September 2024 monitoring events. The groundwater sample analytical results for each of the groundwater IHSs are discussed below.

4.3.4.1 Dissolved Arsenic

The 2024 groundwater sample analytical results showed that the March, June, and September samples from shallow monitoring wells SLR-3, DMW-2, CMW-2, CMW-3, CMW-4, CMW-6, and EMW-13S contained dissolved arsenic concentrations (8.01 to 222 µg/L) that exceeded the proposed CUL (8.0 µg/L). The March samples from shallow wells DMW-6B and EMW-11S contained dissolved arsenic concentrations (27.9 and 9.45 µg/L, respectively) that exceeded the proposed CUL.

During the March sampling event, several of the groundwater samples contained visible solids and the dissolved arsenic concentrations in five of those samples (from shallow wells CMW-5, CMW-6, EMW-13S, and DMW-2, and deep well EMW-21D) may have been due to solids in the samples. To evaluate if the dissolved arsenic concentrations reflected actual groundwater conditions, Apex filtered the dissolved arsenic samples from those five wells with its 0.45-micron laboratory filter and re-analyzed the samples for dissolved arsenic. After laboratory filtering, the dissolved arsenic concentrations from EMW-21D, CMW-5, and DMW-2 significantly decreased (from 152 to 3.17 µg/L, 93.7 to 5.64 µg/L, and 140 to 9.27 µg/L, respectively), and the concentrations from EMW-13S and CMW-6 were relatively unchanged. Based on the results of the laboratory filtration, Landau prepared an addendum to the Work Plan that presented the dissolved arsenic concentrations before and after laboratory filtration and formally requested that the future dissolved arsenic and dissolved copper samples be filtered by Apex rather than in the field (Landau 2024a). The addendum to the Work Plan was submitted to Ecology, and Ecology approved of the laboratory filtration of the future dissolved arsenic and dissolved copper samples prior to analysis (Ecology 2024b). Based on the dissolved arsenic concentrations after laboratory filtration, the initial dissolved arsenic concentrations in the March samples from EMW-21D, CMW-5, and DMW-2 were due to solids in the samples and did not represent actual groundwater conditions.

The 2024 groundwater samples from the other shallow wells did not contain dissolved arsenic concentrations greater than the proposed CUL, and none of the 2024 samples from the intermediate-depth and deep monitoring wells contained dissolved arsenic concentrations greater than the proposed CUL.

The maximum dissolved arsenic concentrations in the 2024 groundwater samples from the shallow monitoring wells are shown on Figure 6. The greatest dissolved arsenic concentrations are located along the southern, central, and northeastern parts of the sheet pile seawall. Dissolved arsenic concentrations greater than the proposed CUL also occur at localized areas beneath the northeastern, west-central, and

southern parts of the 8th Avenue Terminals property; however, it is important to note that the only dissolved arsenic concentrations in the 2024 samples from shallow wells EMW-11S and DMW-6B that exceeded the proposed CUL were analyzed after field filtering the samples.

4.3.4.2 Dissolved Copper

The 2024 groundwater sample analytical results showed that the March, June, and September samples from shallow monitoring wells SLR-3 and CMW-6 contained dissolved copper concentrations (4.13 to 23.0 µg/L) that exceeded the proposed CUL (3.10 µg/L). The March and June samples from shallow wells EMW-13S and HC-4 contained dissolved copper concentrations (up to 3.60 and 4.21 µg/L, respectively) that exceeded the proposed CUL. The March sample from shallow well CMW-2 and the June sample from shallow well CMW-4 contained dissolved copper concentrations (4.06 and 3.70 µg/L, respectively) that exceeded the proposed CUL. The 2024 groundwater samples from the other shallow wells did not contain dissolved copper concentrations greater than the proposed CUL, and none of the 2024 samples from the intermediate-depth and deep monitoring wells contained dissolved copper concentrations greater than the proposed CUL.

The maximum dissolved copper concentrations in the 2024 groundwater samples from the shallow monitoring wells are shown on Figure 7. The dissolved copper concentrations greater than the proposed CUL occur at localized areas beneath the northeastern part of the 8th Avenue Terminals property and along the southern, central, and northeastern parts of the sheet pile seawall; however, it is important to note that the only dissolved copper concentration in the 2024 samples from shallow well CMW-2 that exceeded the proposed CUL was analyzed after field filtering the sample.

4.3.4.3 Acenaphthene

The 2024 groundwater sample analytical results showed that the March, June, and September samples from shallow monitoring wells DMW-2, DMW-3, and DMW-6B contained acenaphthene concentrations (7.07 to 185 µg/L) that exceeded the proposed CUL (5.34 µg/L). The 2024 groundwater samples from the other shallow wells did not contain acenaphthene concentrations greater than the proposed CUL, and none of the 2024 samples from the intermediate-depth and deep monitoring wells contained acenaphthene concentrations greater than the proposed CUL.

The maximum acenaphthene concentrations in the 2024 groundwater samples from the shallow monitoring wells are shown on Figure 8. The acenaphthene concentrations greater than the proposed CUL only occur at one area beneath the west-central and southern parts of the 8th Avenue Terminals property. The acenaphthene concentrations in the shallow groundwater are naturally attenuating to below the proposed CUL before migrating to within approximately 100 ft of the sheet pile seawall.

4.3.4.4 Benzo(a)pyrene

The 2024 groundwater sample analytical results showed that the March and June samples from shallow monitoring well CMW-4 contained benzo(a)pyrene concentrations (0.0274 and 0.033 µg/L, respectively) that exceeded the proposed CUL (0.015 µg/L). The March sample from shallow well EMW-13S contained a benzo(a)pyrene concentration (0.0178 µg/L) that exceeded the proposed CUL. The 2024 groundwater

samples from the other shallow wells did not contain detected benzo(a)pyrene concentrations greater than the proposed CUL; however, the benzo(a)pyrene MDLs (0.039 to 0.166 µg/L) for at least one of the samples from shallow wells (DMW-2, DMW-3, and SLR-3) exceeded the proposed CUL. None of the 2024 samples from the intermediate-depth and deep monitoring wells contained benzo(a)pyrene concentrations greater than the proposed CUL.

The maximum benzo(a)pyrene concentrations (including the greatest MDLs for the wells that did not contain detectable concentrations) in the 2024 groundwater samples from the shallow monitoring wells are shown on Figure 9. The detected benzo(a)pyrene concentrations greater than the proposed CUL only occur at two localized areas along the southern and central portions of the sheet pile seawall. The non-detect values (MDLs) greater than two times the proposed CUL were present in at least one shallow groundwater sample collected from localized areas beneath the west-central and northeastern parts of the 8th Avenue Terminals property.

4.3.4.5 Vinyl Chloride

The 2024 groundwater sample analytical results showed that the March, June, and September samples from shallow monitoring wells CMW-5 and DMW-6B and intermediate-depth well EMW-4D contained vinyl chloride concentrations (0.20 to 0.435 µg/L) that exceeded the proposed CUL (0.18 µg/L). The September samples from shallow wells CMW-7 and EMW-2S contained vinyl chloride concentrations (0.269 and 0.186 µg/L, respectively) that exceeded the proposed CUL. The 2024 groundwater samples from the other shallow wells and intermediate-depth wells did not contain vinyl chloride concentrations greater than the proposed CUL, and none of the 2024 samples from the deep monitoring wells contained vinyl chloride concentrations greater than the proposed CUL.

The maximum vinyl chloride concentrations in the 2024 groundwater samples from the shallow monitoring wells are shown on Figure 10. The vinyl chloride concentrations greater than the proposed CUL occur in the shallow groundwater beneath the southern part of the 8th Avenue Terminals property and appear to extend to the southeastern part of the sheet pile seawall. There are also two localized areas of vinyl chloride-impacted shallow groundwater at the northeastern corner of the property and near the southwestern end of the sheet pile seawall. The intermediate-depth groundwater that contains vinyl chloride concentrations greater than the proposed CUL is located at the northeastern end of the sheet pile seawall.

4.3.5 Groundwater IHS Concentrations Over Time

The sample analytical results for the groundwater IHSs from 2013 through 2024 are presented in Table 7 (dissolved arsenic and dissolved copper), Table 8 (acenaphthene and benzo(a)pyrene), and Table 9 (vinyl chloride). The groundwater IHS concentrations from 2013 to 2024 at the current and/or previously impacted shallow groundwater monitoring wells at the Site are typically decreasing over time, which indicates that natural attenuation of the groundwater concentrations is occurring. During the 2024 monitoring events, dissolved copper, acenaphthene, and vinyl chloride concentrations greater than two times the proposed CULs were each present at only two shallow groundwater monitoring wells (CMW-6 and SLR-3; DMW-2 and DMW-3; and CMW-5 and DMW-6B, respectively) at the Site. In 2024,

benzo(a)pyrene concentrations greater than two times the proposed CUL were only present at one shallow groundwater monitoring well (CMW-4), and dissolved arsenic concentrations greater than two times the proposed groundwater CUL were present at seven shallow groundwater monitoring wells (CMW-2, CMW-4, CMW-6, DMW-2, DMW-6B, EMW-13S, and SLR-3). The typical decreasing groundwater IHS concentration trends at the shallow groundwater monitoring wells indicate that the natural attenuation rates are greater than the rate of leaching of remaining soil contaminants to the groundwater, except at localized areas, and that natural attenuation should continue to reduce the IHS concentrations over time.

4.4 May 2024 Well Development

To reduce the potential for solids in groundwater samples, Landau personnel developed monitoring wells EMW-4D, EMW-21D, CMW-5, and DMW-2 by surging and pumping methods on May 3, 2024. Landau developed each well with a surge block, and after each round of surging, MarVac used a vacuum truck to extract groundwater and solids from the well. MarVac hauled the extracted groundwater, as well as the drummed purge water from the 2024 groundwater monitoring events, to its facility in Seattle, Washington for treatment and disposal.

4.5 Abandonment of Well EMW-8S

On March 13, 2024, Landau and WMNS personnel observed that the protective monument and the upper portion of the casing of shallow groundwater monitoring well EMW-8S were missing, and the remaining portion of the well was filled with dirt. On May 3, 2024, Cascade abandoned EMW-8S by drilling out the well screen and remaining casing and backfilling the borehole with hydrated bentonite to approximately 6 inches bgs. Cascade capped the borehole with cold-patch asphalt to match the existing surface within the OCA. The abandonment procedures were conducted in accordance with WAC 173-160—Minimum Standards for Construction and Maintenance of Wells. The soil cuttings from the abandonment activities were hauled to the LRI Landfill facility in Puyallup, Washington, for disposal.

4.6 Seawall Tie-Back Assessments

To try to identify the lengths and locations of the uppermost steel tie-back rods of the sheet pile seawall, Applied Professional Services, Inc. (APS) of North Bend, Washington, conducted an electromagnetic (EM) survey along the upland side of the seawall on April 9, 2024. APS energized the steel portion of the seawall and conducted the survey along transects located parallel to the southern end of the seawall, approximately 5, 10, and 15 ft from the wall. The work was conducted during low tide conditions to minimize the effects of groundwater on the survey. APS was not able to identify any tie-back rods during the survey.

On June 6, 2024, Ground Penetrating Radar Systems, LLC (GPRS) of Seattle, Washington, conducted EM and ground-penetrating radar (GPR) surveys on the downward sloping concrete surface beneath the facility's southern loading ramp to decrease the distance between the ground surface and the tie-back rods. Tie-back rods were detected near the seawall and then traced inland approximately 8 to 11 ft from the wall. Because the vertical distance from ground surface to the tie-back rods increased up the slope

beneath the ramp, the survey results showed that the uppermost rods may have been approximately 8 to 11 ft long or the survey techniques could no longer detect the rods at depths of greater than approximately 4 ft.

4.6.1 Seawall Design Drawings

In September 2024, WMNS found the design drawings for the sheet pile seawall and associated pier at 8th Avenue Terminals property. The drawings indicate that there is one set of steel tie-back rods that are 60 ft long throughout the length of the seawall. Additionally, the southern portion of the wall includes a second set of tie-back rods that are 85 ft long. The 85-ft-long rods are 2.5 ft deeper than the 60-ft-long rods. Based on these drawings, it appears that the GPRS geophysical surveys could not locate the tie-back rods at depths of more than approximately 4 ft below the sloped concrete surface. The design drawings for the sheet pile seawall and pier are presented in Appendix E.

4.6.2 Assess Current Conditions of Sheet Pile Seawall

In 2013, SLR personnel inspected the upper part of the 1,135-ft-long sheet pile seawall at the 8th Avenue Terminals property during low tide conditions to check for groundwater seeps along the wall and boulder riprap. Several seeps from small cracks and holes in the wall were observed; however, only five of the seeps had sufficient flow to allow for seep sample collection (SLR 2014). In 2024, Crowley Maritime Corporation contracted M&N to assess the current conditions of the primary structural components of the sheet pile seawall at the property, including the steel sheet piles, tie-back wale, tie-back rods and associated hardware, and the concrete cap (pier). The assessment occurred during low tide conditions on December 30, 2024.

For the purpose of evaluating groundwater leaks through the wall, this summary of the assessment results only focuses on the condition of the steel sheet piles. M&N rated the condition of the steel sheet piles as “Fair” due to moderate corrosion and pitting. At four locations, the tie-back rod closure plates adjacent to the sheet piles were missing or contained severe corrosion that resulted in small holes in the wall. Additionally, five weep holes (up to 2 inches in diameter) with flowing water were observed intermittently throughout the length of the wall. M&N’s assessment report of the sheet pile seawall is presented in Appendix F.

4.7 Conduct Slug Tests

On April 8, 9, and 10, 2024, Landau personnel conducted falling-head and rising-head slug tests at shallow groundwater monitoring wells EMW-13S, EMW-12S, EMW-7S, CMW-2, and CMW-1, at intermediate-depth groundwater monitoring wells EMW-4D, EMW-10D, EMW-14D, EMW-15D and EMW-16D, and deep groundwater monitoring wells EMW-19D, EMW-20D, EMW-21D, and EMW-22D. The objective of the slug tests was to collect the data necessary to calculate Site-specific k values for the shallow, intermediate-depth, and deep portions of the unconfined aquifer beneath the 8th Avenue Terminals property, particularly near the LDW. The locations of the slug test wells are shown on Figure 11.

The slug tests at each well, except shallow well EMW-7S, were conducted during the period from 30 minutes before to 2 hours after a 1.0 ft above MSL or lower tide in the adjacent LDW, when groundwater should have been flowing toward the waterway. Because there is limited tidal influence on the shallow groundwater at distances more than 250 ft from the shoreline, there were no timing restrictions for the slug tests at shallow well EMW-7S.

At each well, Landau conducted at least three consecutive sets of falling-head slug tests and rising-head slug tests, and the water level responses were recorded continuously by using a submersible, datalogging water-level sensor until stabilization was observed. Periodic manual groundwater level meter measurements with an electronic water level meter were used to validate the sensor data and determine when each test was complete. Each test was conducted until the water level in the well was 95 percent of its static (pre-test) level. The assessment of head responses was contingent on the well's screen depth relative to the groundwater table. If the screen depth aligned with the water table (shallow wells), only data from the rising head tests were used for analysis.

At each well, a falling-head slug test was initially conducted by rapidly submerging a PVC slug of known volume (i.e., adding volume, causing a sudden rise in groundwater level) and monitoring the water level in the well as the displaced water flowed into the surrounding formation material. After the groundwater table stabilized, a rising-head slug test was conducted by rapidly removing the PVC slug (i.e., removing volume, causing a sudden drop in water level) and monitoring the water level in the well as water flowed back into the well casing from the surrounding formation material. After the groundwater table stabilized, the falling-head and rising-head tests were repeated at least two more times before the testing at the well was complete. If significant oscillatory responses were observed in a well upon submergence of the slug, only the rising-head test data was analyzed.

SLR personnel evaluated the slug test data by using the Bouwer and Rice (1976) solution method. Based on the results of the slug tests, the calculated k values for the shallow, intermediate-depth, and deep portions of the aquifer ranged from 0.74 to 96.7 ft per day (ft/day), 3.74 to 77.6 ft/day, and 11.12 to 116.9 ft/day, respectively. The arithmetic average k values were 22.10 ft/day (shallow), 29.82 ft/day (intermediate-depth), and 42.45 ft/day (deep), and the geometric average k values were 5.61 ft/day (shallow), 18.10 ft/day (intermediate-depth), and 32.96 ft/day (deep). The calculated k values from the slug test data at each well are presented in Table G-2 of Appendix G.

The continuous transducer data from each well was analyzed using AQTESOLVTM software to estimate the local hydraulic conductivity values from falling-head and rising-head tests. An example method of data modeling used by these software programs is the straight-line method (e.g., Bouwer and Rice 1976, Hvorslev 1951), which assumes a quasi-steady-state model by neglecting the compressibility of the aquifer (storativity).

4.7.1 Transient Groundwater Modeling Results

After calculating the Site-specific geometric average k values and the transmissivity values for the shallow, intermediate-depth, and deep portions of the unconfined aquifer, SLR revised the previous groundwater model for the Site (SLR 2024b) based on Site-specific data and transient (rather than

steady state) simulations. SLR also conducted a sensitivity analysis to assess the effects of variations in key parameters on model outputs. After completing the calibration process, the model was run for the current hydrogeologic conditions (existing sheet pile seawall) at the Site (Scenario 1). There were no other modeled scenarios because none of the updated remedial alternatives include the installation of a groundwater cutoff wall.

The results of the transient modeling indicate shallow groundwater mounding along the upgradient side of the sheet pile seawall during low tide conditions. The groundwater mounding indicates that the wall is retarding the groundwater flow and is diverting some of the flow toward both ends of the wall (most of the laterally diverted flow is toward the southwestern end of the wall). However, there is also some groundwater flow beneath the wall and some relatively minor groundwater leakage through the small holes and cracks in the wall. The groundwater sample analytical results at the Site indicate that there is more lateral flow along the wall than vertical flow under the wall. As described above in Section 4.3.4.5, vinyl chloride was the only groundwater IHS detected in an intermediate-depth well (EMW-4D) at concentrations greater than the proposed CUL during 2024. If most of the groundwater flow was downward along the wall, the dissolved arsenic, dissolved copper, and possibly benzo(a)pyrene concentrations greater than the proposed CULs in the shallow groundwater along the wall should also be present in intermediate-depth wells along the wall at concentrations above the proposed CULs. However, none of the 2024 groundwater samples from the intermediate-depth groundwater monitoring wells along the wall (EMW-4D, EMW-14D, EMW-15D, and EMW-16D) contained dissolved arsenic, dissolved copper, or benzo(a)pyrene concentrations greater than the proposed CULs, and only four of the 12 samples contained detectable dissolved arsenic or dissolved copper concentrations.

The results of the transient modeling indicate that during high tide conditions, the natural gradient reverses, enhancing the effects of the sheet pile seawall and minimizing the shallow groundwater flow from the 8th Avenue Terminals property toward the LDW. The calibrated transient flow model simulations match water levels during both low and high tide conditions, and the potentiometric surfaces and estimated groundwater flow budget for the low and high tide conditions are consistent. However, uncertainties in the model may still limit its predictive capabilities. The Site input data and the assumptions that SLR used to develop and calibrate the model, as well as the results of the modeling and the limitations, are presented in Appendix G.

4.8 PFAS Investigation

In Ecology's letter that required the PFAS investigation at the Site, Ecology recommended using a phased investigation approach beginning with collection and analysis of groundwater samples from selected existing monitoring wells (Ecology 2025a). To assess the potential presence of PFAS in the groundwater at the Site, Landau collected one round of groundwater samples from a total of eight shallow groundwater monitoring wells located at the 8th Avenue Terminals property. In accordance with the PFAS Work Plan (Landau 2025), the groundwater samples were collected from wells (EMW-1S, EMW-6S, EMW-7S, and SLR-2) located hydraulically upgradient (north or northwest) of the historical and current operational areas at the property to assess if any PFAS-impacted groundwater is migrating onto the property, and from wells (DMW-6B, EMW-9SA, CMW-4, and CMW-6) located at or hydraulically

downgradient of historical operational areas on the property that could have used and/or stored PFAS. The locations of the wells that were sampled for the PFAS investigation are shown on Figure 1.

On July 31, 2025, Landau personnel lowered a new disposable bailer to the bottom of each selected groundwater monitoring well for PFAS sampling to assess if there were solids in any of the wells. Solids were encountered at the bottom of all the wells, and Landau personnel developed each well by the methods described above in Section 4.4 to remove the solids prior to the groundwater sampling event. After development, the extracted groundwater from each well was clear and colorless, except for SLR-2, which was cloudy.

On August 6 and 7, 2025, Landau personnel collected the groundwater samples from shallow wells EMW-1S, EMW-6S, EMW-7S, SLR-2, DMW-6B, EMW-9SA, CMW-4, and CMW-6. Consistent with the 2024 groundwater monitoring events described above in Section 4.3, the shallow wells located within 250 ft of the shoreline (SLR-2, EMW-9SA, CMW-4, and CMW-6) were sampled during the period from 30 minutes before to 2 hours after a 1.0 ft above MSL or lower tide in the adjacent LDW, when groundwater should be flowing toward the waterway. Because there is limited tidal influence on the shallow groundwater at distances more than 250 ft from the shoreline, there were not any timing restrictions on the sampling of the shallow wells (EMW-1S, EMW-6S, EMW-7S, and DMW-6B) located more than 250 ft from the shoreline.

During the sampling event, Landau personnel purged and sampled the groundwater from each well with a peristaltic pump and new tubing by using low-flow methods. The intake of the tubing was placed at the mid-screen depth in each well. During the purging of groundwater from each well, temperature, pH, DO, ORP, turbidity, and conductivity were measured and allowed to stabilize before the samples were collected. The field parameter measurements from each well are presented on the Groundwater Low-Flow Sample Collection Forms in Appendix C. The final field parameter readings from each well before sampling are presented in Table 5. The groundwater samples were submitted to SGS for analysis of PFAS by EPA Method 1633. The purge water and well development water were hauled to the US Ecology facility in Grand View, Idaho for disposal.

4.8.1 Groundwater Monitoring Results

On August 6, 2025, Landau personnel measured the depths to groundwater in all monitoring wells at the Site and the depth to surface water of the LDW (from the surveyed northeast corner of the property pier) within a 1-hour timespan during low tide conditions in the waterway. The August 6, 2025 depths to groundwater and surface water, and the groundwater and surface water elevations, are presented in Table 4.

On August 6, the surface water elevation in Slip 4 was -0.89 ft above NAVD88 (low tide conditions) when Landau measured the depths to groundwater in the groundwater monitoring wells at the Site. The depths to groundwater in the shallow, intermediate-depth, and deep wells ranged from 7.58 to 14.81, 13.01 to 15.78, and 12.72 to 15.68 ft, respectively, below the tops of the well casings. Based on the results of the previous well elevation surveys, the groundwater elevations in the shallow, intermediate-depth, and deep wells ranged from 1.92 to 6.21, 0.94 to 3.81, and 0.50 to 3.78 ft,

respectively, above NAVD88. Similar to the groundwater flow directions on March 15, June 6, and September 16, 2024 described above, the groundwater flow directions of the shallow, intermediate-depth, and deep groundwater on August 6, 2025, during low tide conditions, were primarily to the southeast beneath the 8th Avenue Terminals property, with a component of flow to the south-southwest beneath the western edge of the property (see Figures 2 through 5). The lateral flow of the shallow groundwater along the sheet pile seawall was toward the southwestern end of the wall, except within approximately 120 ft of the northeastern end of the wall, which was to the northeast (see Figures 2 and 5).

4.8.2 Groundwater Sample Analytical Results

Because the groundwater CULs for the Site are based on protection of marine surface water and sediment, the groundwater sample analytical results for the PFAS analytes were also compared to proposed groundwater CULs that are the lowest available CULs based on protection of marine surface water or sediment. Based on a review of Ecology's CLARC and LDW PCUL Workbook tables, the only available PFAS CULs based on protection of marine surface water or sediment are for perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA); the MTCA Method B surface water CULs for protection of aquatic life—marine/acute for PFOS and PFOA are 550 and 7,000 µg/L, respectively. There are no other available CULs based on protection of marine surface water or sediment for PFOS, PFOA, or any of the other PFAS analytes.

All the groundwater samples from the wells contained PFOS and PFOA concentrations (up to 0.83 and 0.178 µg/L, respectively) that were below the proposed groundwater CULs (550 and 7,000 µg/L, respectively). Because there were no groundwater concentrations greater than the proposed CULs, the PFAS investigation at the Site has been completed, and there will not be a subsequent phase of work. The groundwater sample analytical results for the PFAS investigation (PFOS and PFOA results only) are presented in Table 6. Copies of the laboratory reports for the PFAS investigation are presented in Appendix D.

4.9 Data Validation

Landau personnel validated the soil and groundwater sample analytical data from the 2024 additional investigation activities and the groundwater sample analytical data from the 2025 PFAS investigation, and all the analytical data are acceptable, with the assigned qualifiers, to characterize the Site conditions. All data qualifiers are included in the soil and groundwater sample analytical data tables (see Tables 3, 6, 7, 8, and 9). Both of Landau's technical memorandums that detail the results of the data validation of the 2024 analytical data or the 2025 analytical data are presented in Appendix H.

5.0 ZERO-VALENT IRON TREATABILITY STUDY

Because two of the remedial alternatives in the Draft FS Report include ZVI as the primary constituent in a PRB to treat the shallow groundwater near the LDW (including Slip 4) that contains dissolved arsenic and copper concentrations above the proposed CULs (SLR 2024b), 8th Avenue Terminals decided that a ZVI bench-scale treatability study should be conducted to evaluate the effectiveness of ZVI prior to updating the remedial alternatives for the Site. From October through December 2024, PRIMA Environmental, Inc. (PRIMA) of El Dorado Hills, California, conducted the treatability study. This section describes the treatability study activities and presents the results of the testing. The work was conducted in accordance with Landau's Final Treatability Study Work Plan (Treatability Work Plan), dated September 24, 2024 (Landau 2024c), except as noted below. The draft version of the Treatability Work Plan was approved by Ecology (Ecology 2024e) prior to finalizing the plan and conducting the work.

The primary objective of the treatability study was to identify the most effective ZVI products for *in situ* treatment of the dissolved arsenic and copper in the shallow groundwater at the Site. Column bench testing simulated flow through several different ZVI PRBs to provide data on needed contact time, ZVI sorption capacity, the effects of ZVI on secondary water quality parameters, and whether arsenic can be co-precipitated once ferrous iron is oxidized downgradient of the PRBs. The results of the treatability study were incorporated into the updated remedial alternatives that include a PRB.

5.1 Groundwater Collection

To test ZVI treatment of arsenic- and copper-impacted groundwater at the Site, PRIMA recommended the collection and testing of 55 gallons of groundwater from the shallow well (EMW-13S) that contained the greatest dissolved arsenic concentrations in March and June 2024 and also contained dissolved copper concentrations greater than the proposed CUL. EMW-13S is located at the southern end of the upland portion of the 8th Avenue Terminals property, approximately 160 ft east of the southwestern end of the sheet pile seawall (see Figure 1). The plan was to collect the groundwater from EMW-13S at a pumping rate of approximately 1 gallon per minute (gpm) during the period of approximately 1 hour before to 1 hour after low tide in the LDW, when the shallow groundwater beneath the property should be flowing toward the LDW.

On September 30 and October 1, 2024, Landau personnel pumped groundwater from EMW-13S in accordance with the Treatability Work Plan procedures. However, the yield of the well was less than 1 gpm and pumping had to periodically stop to allow the groundwater to recover. After 1 day of pumping, less than 25 gallons of groundwater had been pumped from EMW-13S, and Landau added nearby shallow well CMW-6 to the groundwater collection activities on October 1 to ensure that a total of at least 55 gallons of groundwater was collected after the second day of pumping. CMW-6 is located approximately 87 ft to the east-northeast of EMW-13S (see Figure 1), and the March and June 2024 groundwater samples from CMW-6 contained dissolved arsenic and dissolved copper concentrations greater than the proposed CULs. The greatest dissolved copper concentrations in 2024 were collected from CMW-6.

During the 2 days of groundwater collection activities, a total of 60 gallons of groundwater were pumped from EMW-13S and CMW-6 into 12 clean plastic 5-gallon carboys. The filled carboys were shipped to PRIMA for testing.

5.2 Treatability Study

Upon receipt of the groundwater-filled carboys, PRIMA sent a composite sample of the water to an analytical laboratory for pre-treatment analysis of total and dissolved metals (arsenic, calcium, copper, and iron), ferrous iron, alkalinity, anions (chloride, nitrate, and nitrite), DO, ORP, and pH. The dissolved arsenic and dissolved copper concentrations in the sample were 100 and 8 µg/L, respectively, which indicated that the groundwater submitted to PRIMA was representative of approximate worst-case conditions at the Site.

The treatability study included the testing of three different ZVI products for potential *in situ* treatment of the arsenic- and copper-impacted groundwater at the Site. To allow for two potential types of ZVI PRBs in the updated remedial alternatives, the selected ZVI product(s) could be injected (via installed injection points or hydraulic push-probe rigs) or emplaced by trenching into the subsurface to create PRBs near the LDW. The ZVI products that were planned for testing included S-MicroZVI from Regenesis, and Ferox Target and Ferox PRB from Hepure Technologies LLC (Hepure). S-MicroZVI and Ferox Target are injectable ZVI products; Ferox PRB is a larger diameter ZVI that would be installed in trenches.

For the treatability study, PRIMA emplaced sand-ZVI mixes in Plexiglas® columns, flushed the columns with Site groundwater, and monitored the effects of the sand-ZVI mixes on the arsenic and copper concentrations in the water. For the testing of the injectable ZVI products (S-MicroZVI and Ferox Target), Prima used fine- to medium-grained sand in the 2-inch-diameter by 15-inch-long clear PVC columns to approximate the soil conditions within the shallow groundwater zone at the Site. For the testing of the coarser-grained ZVI product (Ferox PRB) that would be mixed with coarse material in a trench, medium- to coarse-grained sand was used in a 1.5-inch-diameter by 8.75-inch-long clear PVC column. However, PRIMA informed Landau that when mixing the Ferox PRB with medium- to coarse-grained sand, the Ferox PRB was too fine-grained to mix and just settled at the bottom of the column. Based on PRIMA's recommendation, a -8+50 Mesh ZVI from Connelly-GPM, Inc. (Connelly) was used instead of the Ferox PRB. After selecting the -8+50 Mesh ZVI (Connelly product CC-1004), the treatability study tested and evaluated a wide range of ZVI particle sizes (S-MicroZVI [<5 microns], Ferox Target ZVI [44 microns], and Connelly CC-1004 ZVI [approximately 780 microns]).

5.2.1 S-MicroZVI and Ferox Target Testing

The objectives of the S-MicroZVI and Ferox Target ZVI PRB column testing were to:

- Assess arsenic and copper removal in separate columns constructed with fine- to medium-grained sand and a low dose of S-MicroZVI (0.3 percent or 3 grams per kilogram [g/kg]) or Ferox Target ZVI (1 percent or 10 g/kg), with the low ZVI dose ideally resulting in partial removal of arsenic and copper.
- Assess arsenic and copper removal in separate columns constructed with fine- to medium-grained sand and a higher dose of S-MicroZVI (1 percent or 10 g/kg) or Ferox Target ZVI

(10 percent or 100 g/kg), with the higher ZVI dose ideally resulting in complete removal of arsenic and copper.

- Evaluate removal for approximately 25 pore volumes in the columns to develop a breakthrough curve or identify a minimum capacity for arsenic and copper sorption onto the ZVI.
- Assess the effect of treatment on secondary water quality parameters (pH and ferrous iron).
- If necessary, determine whether arsenic in the effluents can be co-precipitated once ferrous iron is oxidized.

The four columns (low dose and high dose S-MicroZVI and Ferox Target ZVI) were saturated with Site groundwater, which was pumped upward through each column at a rate of approximately 0.3 milliliters per minute (mL/min), resulting in a hydraulic residence time in the columns of approximately 16 hours. A total of 73 pore volumes of water were pumped through the columns during the study, with influent and effluent samples collected periodically during the test. Prior to the test, a sample of the Site groundwater was analyzed for total and dissolved metals (arsenic, calcium, copper, and iron), alkalinity, anions (chloride, nitrate, nitrite), DO, ORP, and pH. At cumulative pore volumes 2, 10, 14, 20, 25, 31, 35, 51, 62, 72, and 73, influent and effluent samples were collected and analyzed for total metals (arsenic, copper), ferrous iron, DO, ORP, and pH. For pore volumes 2 through 35, PRIMA mistakenly did not analyze the influent and effluent samples for dissolved arsenic and dissolved copper; however, after discovering that error, the influent and effluent samples collected at pore volumes 51, 62, and 73 were analyzed for dissolved arsenic and dissolved copper. PRIMA measured the ferrous iron, DO, ORP, and pH concentrations, and Enthalpy Analytical of Orange, California, conducted the other analyses for all the treatability study testing.

5.2.2 CC-1004 ZVI Testing

The objectives of the CC-1004 ZVI PRB column study were to:

- Determine the contact time needed to establish reducing conditions within the ZVI bed.
- Determine whether arsenic and copper can be removed by -8+50 Mesh ZVI under reducing conditions.
- Evaluate removal for approximately 250 pore volumes to develop a breakthrough curve or identify a minimum capacity for arsenic and copper sorption onto the ZVI.
- Assess the effect of treatment on secondary water quality parameters (pH and ferrous iron).
- If necessary, determine whether arsenic in the effluent can be co-precipitated once ferrous iron is oxidized.

Site groundwater was pumped upward through the column such that the contact time was 30 to 60 minutes (sufficient to obtain reducing conditions). Influent and effluent samples were collected periodically for about 250 pore volumes to determine whether arsenic and copper were removed from the groundwater and provide an estimate of the sorption capacity onto the ZVI. Additionally, DO, ORP, pH, and ferrous iron were monitored periodically during the column study. One column test was performed to evaluate the CC-1004 ZVI. The bed was a mixture of 90 percent (by weight) #12 industrial sand and 10 percent (by weight) CC-1004 ZVI, which is equivalent to 111 g ZVI/kg sand. Groundwater

was pumped up through the column at a rate of 0.64 to 4.1 mL/min, giving a hydraulic residence time of 2.2 to 0.3 hours per pore volume. Four hundred and fifty-two pore volumes of water were pumped through the column. Initial influent and effluent samples were collected, and then influent and effluent samples were collected at cumulative pore volumes of 9, 30, 74, 109, 172, and 452. The samples were analyzed for total and dissolved arsenic and copper, ferrous iron, DO, ORP, and pH.

5.3 Treatability Study Results

A copy of the PRIMA report that details the testing procedures and results is presented in Appendix I. A summary of the treatability study results is presented below.

5.3.1 S-MicroZVI and Ferox Target Testing

As stated above, PRIMA mistakenly did not analyze the influent or effluent samples for dissolved arsenic or dissolved copper during the first 35 pore volumes of the S-MicroZVI and Ferox Target ZVI tests. The S-MicroZVI and Ferox Target ZVI testing results showed that the removal of total arsenic and dissolved arsenic (when measured) was consistently more than 99 percent in both the low concentration and high concentration columns throughout the study. Total arsenic concentrations in the influent samples ranged from 100 to 160 µg/L, and total arsenic in the effluent samples was typically below 1 µg/L. Starting at 51 pore volumes, the influent and effluent samples were analyzed for dissolved arsenic, and the dissolved arsenic concentrations in the influent samples ranged from 100 to 120 µg/L. The maximum dissolved arsenic concentrations in the effluent samples (1.1 and 0.84 µg/L in the low and high concentration S-MicroZVI columns, respectively, and 0.59 and 0.50 µg/L in the low and high concentration Ferox Target ZVI columns, respectively) were consistently below the proposed CUL (8 µg/L).

The influent total copper concentrations in the S-MicroZVI and Ferox Target ZVI columns ranged from 7.4 to 75 µg/L in the first 35 pore volumes, and PRIMA suggested that the variability of the total copper concentrations may have been due to the presence of particulates associated with total iron present in the Site groundwater. Starting at 51 pore volumes, the influent and effluent samples were analyzed for dissolved copper, and the influent dissolved copper concentrations ranged from 6.7 to 7.6 µg/L. The dissolved copper concentrations in the effluent samples were consistently below the laboratory method reporting limits (MRLs), indicating complete removal of dissolved copper in all four columns.

During the initial 51 pore volumes of the tests, DO, ORP, pH, and ferrous iron do not appear to have been affected significantly by the ZVI. DO was typically over 4 milligrams per liter (mg/L), ORP was usually positive, and ferrous iron was not present. However, after 51 pore volumes, decreasing or negative ORP results and detectable ferrous iron in the low concentration S-MicroZVI column and high concentration Ferox Target ZVI column indicated that reducing conditions were starting to occur in those columns.

5.3.2 CC-1004 ZVI Testing

The CC-1004 ZVI testing results showed that dissolved arsenic and dissolved copper were effectively removed throughout the study. Arsenic removal was more than 99 percent, and copper removal was

typically below the laboratory MRLs. The dissolved arsenic concentrations in the influent samples ranged from 96 to 110 µg/L, and the dissolved arsenic concentrations in the effluent samples ranged from less than the MRL (0.18 µg/L) to 0.65 µg/L. The influent dissolved copper concentrations ranged from 6.1 to 7.5 µg/L, and the dissolved copper concentrations in the effluent samples ranged from less than the MRLs (0.73 to 0.79 µg/L) to 1.3 µg/L in one of the samples.

Reducing conditions appear to have been present throughout the study, even after the hydraulic residence time was reduced to 0.3 hours (at 172 pore volumes). Although the DO concentrations were typically more than 4 mg/L, the ORP concentrations were consistently negative and there were detectable ferrous iron concentrations.

5.4 Treatability Study Conclusions

The treatability study demonstrated that all three forms of ZVI (S-MicroZVI, Ferox Target ZVI, and CC-1004 ZVI) reduced the dissolved arsenic and dissolved copper concentrations in Site groundwater to below the proposed CULs. S-MicroZVI and Ferox Target ZVI effectively removed the dissolved arsenic and dissolved copper concentrations to below the proposed CULs for 73 pore volumes at a hydraulic residence time of 16 hours. Connelly CC-1004 removed the dissolved arsenic and dissolved copper to below the proposed CULs for 453 pore volumes at a hydraulic residence time as short as 0.3 hours. Given that the treatability test was not run long enough to achieve arsenic or copper breakthrough above the proposed CULs, it is not possible to estimate the S-MicroZVI, Ferox Target ZVI, or CC-1004 ZVI adsorptive capacities for those contaminants; however, the studies demonstrate the minimum pore volumes that can flow through the emplaced ZVI with effective treatment at hydraulic residence times at or above those tested. The development of reducing conditions during the tests indicates that arsenic and copper may be further treated by ferrous iron precipitation downgradient of the PRB, and benzo(a)pyrene and vinyl chloride may also be treated.

Based on the ease of application (injection versus trench emplacement) and reduced impacts to WMNS' operations at the property, the S-MicroZVI and Ferox Target ZVI are preferable to the coarser grained CC-1004 ZVI. Because the estimated treatment life of Ferox Target ZVI at the Site (approximately 10 years) is significantly longer than the projected treatment life of S-MicroZVI (approximately 2 years), Ferox Target ZVI was carried forward in the remedial alternatives that include a ZVI PRB.

6.0 DEVELOPMENT OF UPDATED REMEDIAL ALTERNATIVES

After completing the 2024 additional assessment, quarterly groundwater monitoring, ZVI treatability study, and transient groundwater modeling, Landau re-evaluated each of the five previous remedial alternatives for the Site (SLR 2024b) and made revisions, as appropriate, to present remedial alternatives that achieve the proposed soil and groundwater CULs presented in Tables 1 and 2, respectively.

6.1 Contamination Beneath 8th Avenue South Right-of-Way

During the remedial investigation and FS, soil borings EMW-17S, EMW-18S, EMW-23S, EB-56, and SSB-1 were drilled and sampled in the 8th Avenue South right-of-way (ROW) to the west of the 8th Avenue Terminals property to delineate the western extents of the arsenic-, copper-, total semivolatile petroleum hydrocarbon-, acenaphthene-, and/or benzo(a)pyrene-impacted soil at the Site (SLR 2024a, b). EMW-17S, EMW-18S, and EMW-23S were completed as shallow groundwater monitoring wells to assess the off-property groundwater conditions and to delineate the western extents of the dissolved arsenic- and/or acenaphthene-impacted groundwater at the Site and to assess the shallow groundwater conditions at the southern end of 8th Avenue South.

Soil samples from EB-56 and EMW-18S contained copper and benzo(a)pyrene concentrations that exceeded the proposed CULs. The copper CUL is the natural background concentration (36 mg/kg), which exceeds the protection of surface water CUL, and the benzo(a)pyrene CUL (0.004 mg/kg) is the laboratory's PQL, which exceeds the protection of surface water CUL. The soil samples from EB-56 and EMW-18S did not contain any other soil IHSs (arsenic, antimony, lead, total semivolatile petroleum hydrocarbons, acenaphthene, vinyl chloride, and total D/F TEQ) at concentrations greater than their respective proposed soil CULs. The soil samples from the other off-property borings (EMW-17S, EMW-23S, and SSB-1 did not contain any soil IHSs at concentrations greater than the proposed CULs.

None of the previous groundwater samples from EMW-17S, EMW-18S, or EMW-23S have contained concentrations of any of the groundwater IHSs, including dissolved copper and benzo(a)pyrene, greater than the proposed CULs, which indicates that the impacted groundwater beneath the 8th Avenue Terminals property does not extend to the west of the property. The dissolved copper and benzo(a)pyrene concentrations below the proposed groundwater CULs provide an empirical demonstration that the copper and benzo(a)pyrene concentrations in the soil to the west of the 8th Avenue Terminals property are protective of surface water. The detected soil concentrations at EB-56 and EMW-18S are below the Method C direct contact CULs for copper and benzo(a)pyrene; therefore, the groundwater sample analytical results provide an empirical demonstration that remediation of the copper- and benzo(a)pyrene concentrations in the soil to the west of the 8th Avenue Terminals property is not necessary. Based on the previous soil and groundwater sample analytical results beneath the 8th Avenue South ROW, the areas of Site soil and groundwater contamination that require remediation are only located on the 8th Avenue Terminals property.

6.2 Revised Description of Remedial Alternatives

During the previous draft FS, the lengths of the steel tie-back rods of the sheet pile seawall were not known, and SLR assumed that the proposed groundwater cutoff wall in Alternatives 1, 2, and 3 could be located approximately 40 ft from the seawall (SLR 2024b). Based on the recently discovered design drawings for the sheet pile seawall, the tie-back rods are 60 to 85 ft long. Therefore, the proposed groundwater cutoff wall for Alternatives 1, 2, and 3 would have to be moved to approximately 70 to 95 ft from the seawall to prevent any potential structural damage to the wall (by damaging the tie-back rods or the anchors at the end of the rods). There would be several areas of groundwater contamination located between the groundwater cutoff wall and the sheet pile seawall, and that was a significant consideration for Landau's re-evaluation of the previous remedial alternatives.

Based on the data collected and information obtained during 2024, the following five remedial alternatives for the Site were evaluated and revised or eliminated, as appropriate:

- Alternative 1: Surface Capping, Groundwater Cutoff, Monitored Natural Attenuation (MNA), and Institutional Controls
  - This alternative was eliminated from further consideration as described below.
- Alternative 2: Surface Capping, Groundwater Cutoff and Treatment, MNA, and Institutional Controls
  - As described below, the groundwater cutoff wall with sections of PRBs was replaced by an injected PRB near the sheet pile seawall. Therefore, Alternative 2 was re-named Surface Capping, Groundwater Treatment, MNA, and Institutional Controls.
- Alternative 3: *In Situ* Solidification/Stabilization (ISS), Groundwater Cutoff and Treatment, and MNA
  - Similar to Alternative 2, the groundwater cutoff wall with sections of PRBs was replaced by an injected PRB near the sheet pile seawall. Therefore, Alternative 3 was re-named ISS, Groundwater Treatment, and MNA.
- Alternative 4: ISS and MNA
  - There were no revisions to Alternative 4; however, the detailed description of Alternative 4 in the Draft FS Report is also included in this document.
- Alternative 5: Soil Excavation, Groundwater Recovery, and MNA
  - There were no revisions to Alternative 5; however, the detailed description of Alternative 5 in the Draft FS Report is also included in this document.

6.2.1 Alternative 1: Surface Capping, Groundwater Cutoff, MNA, and Institutional Controls

For Alternative 1, the unpaved areas on the 8th Avenue Terminals property that occur above soil IHS concentrations greater than the proposed CULs will be capped with asphalt pavement to prevent direct contact with the impacted soil. In the Draft FS Report, surface caps would also be installed at unpaved areas to solely minimize stormwater from infiltrating through the vadose zone soil to the groundwater

table (SLR 2024b); however, the unpaved areas at the property have been uncapped for more than 100 years, and the historical operations that caused contamination in those areas were discontinued more than 40 years ago. Due to stormwater infiltration through the unpaved areas over at least 40 years, Landau believes that any contaminant leaching in the vadose zone to the shallow groundwater table should have already occurred. Furthermore, the groundwater IHS concentrations greater than the proposed CULs beneath the unpaved areas of the property occur in localized areas at the north-central and northeastern parts of the property and are not migrating to the LDW (including Slip 4; see Figures 6 through 10). Therefore, Alternative 1 will only include capping of unpaved areas that occur above soil IHS concentrations greater than the CULs based on protection of direct contact risks. The existing paved areas on the property that occur above soil IHS concentrations greater than the proposed CULs will remain capped with asphalt pavement to minimize direct contact risks. Because the paved areas at the property have been capped for at least 40 years, the existing pavement is also minimizing stormwater infiltration through the vadose zone soil and the leaching of contaminants to the groundwater table.

The sheet pile seawall is 40 years old and some shallow groundwater is leaking through localized small holes and cracks in the wall. To minimize the discharge of groundwater IHS concentrations greater than the proposed CULs to the LDW via small holes and cracks in the seawall, a soil-bentonite wall will be installed upgradient of the sheet pile seawall. As described above, the proposed groundwater cutoff wall would have to be moved to approximately 70 to 95 ft from the seawall to prevent any potential structural damage to the wall (by damaging the tie-back rods or the anchors at the end of the rods). The approximate locations of the asphalt caps and the groundwater cutoff wall are shown on Figure 12.

MNA will be used to remediate the groundwater concentrations at the Site. After completion of the remedial action, IHS concentrations greater than the proposed soil CULs will remain, and institutional controls will be required to minimize the risks associated with the impacted soil and with the remaining impacted groundwater, as necessary.

As shown on Figures 6 and 12, extensive areas of dissolved arsenic concentrations ranging from approximately 40 to 214 µg/L greater than the proposed CUL (8 µg/L) would be located between the groundwater cutoff wall and the sheet pile seawall. Because Alternative 1 will solely rely on MNA to reduce the remaining arsenic concentrations below the CUL, the alternative would not be effective at preventing the migration of dissolved arsenic concentrations greater than the CUL to the LDW (through small holes and cracks in the seawall) for many years. Therefore, Landau eliminated Alternative 1 from further consideration.

6.2.2 Alternative 2: Surface Capping, Groundwater Treatment, MNA, and Institutional Controls

As described above for Alternative 1, Alternative 2 will include asphalt pavement capping over the unpaved areas on the 8th Avenue Terminals property that occur above soil IHS concentrations greater than the proposed CULs based on protection of direct contact risks. Caps would not be installed over the unpaved areas to solely minimize stormwater from infiltrating through the vadose zone soil to the groundwater table. The existing paved areas on the property that occur above soil IHS concentrations greater than the proposed CULs will remain capped with asphalt pavement.

As described above, the sheet pile seawall is 40 years old and shallow groundwater is leaking through small holes and cracks in the wall. To prevent the discharge of dissolved arsenic, dissolved copper, and benzo(a)pyrene concentrations greater than the CULs to the LDW, a ZVI PRB will be installed along the sheet pile seawall at a location within and near the areas of arsenic-, copper-, and benzo(a)pyrene-impacted groundwater. The PRB will remediate the arsenic- and copper-impacted groundwater that flows through it. The reducing conditions created by the ZVI in the PRB should remediate the benzo(a)pyrene concentrations, and possibly the vinyl chloride concentrations, near the seawall. The approximate locations of the asphalt caps and the PRB are shown on Figure 13.

MNA will remediate the acenaphthene and vinyl chloride concentrations in the groundwater at the Site and also remediate the dissolved arsenic, dissolved copper, and benzo(a)pyrene concentrations located hydraulically upgradient of the PRB. The previous groundwater monitoring results indicate the MNA is reducing the acenaphthene concentrations to below the proposed CUL before migrating to within approximately 100 ft of the seawall. The 2024 maximum vinyl chloride concentrations near the seawall are only 0.089 to 0.213 µg/L greater than the proposed CUL and do not warrant additional treatment. However, as stated above, the reducing conditions created by the ZVI in the PRB may remediate the vinyl chloride concentrations near the seawall. After completion of the remedial action, IHS concentrations greater than the soil CULs would remain, and institutional controls would be required to minimize the risks associated with the impacted soil and with the remaining impacted groundwater, as necessary. The conceptual scope of work for Alternative 2 is described below, and the estimated costs are presented in Table 10.

6.2.2.1 Pre-Remediation Activities

To design the PRB, a ZVI PRB pilot test would be conducted at the Site to evaluate the injectability of Ferox Target ZVI into the aquifer, the effectiveness of the PRB to treat dissolved arsenic and copper under the hydrogeologic conditions at the Site, and the effects of the reducing conditions created by the ZVI on the benzo(a)pyrene and vinyl chloride concentrations. The testing results would also be used to identify the appropriate spacing of the direct-push injection borings, evaluate if a single row of injection locations would be effective, and determine the volume of injected ZVI per boring for effective treatment of dissolved arsenic and copper. The pilot testing would consist of the installation of an approximately 100-ft-long PRB at a location perpendicular to the sheet pile seawall (perpendicular to shallow groundwater flow along the wall and in between and parallel to seawall tie-back rods). The southern end of the PRB would be approximately 40 ft east of shallow well EMW-13S, within an area of known arsenic- and copper-impacted shallow groundwater (at the same location as the north-south aligned portion of the PRB shown on Figure 13). The PRB will be installed by injecting an estimated average of 274 pounds of Ferox Target ZVI per vertical foot of the target treatment depth range (6 to 25 ft bgs) in 10 direct-push borings that are spaced approximately 10 to 15 ft apart; however, the volumes of injected ZVI will vary within portions of the wall to determine the required injection volume for effective treatment of dissolved arsenic and copper. To evaluate the PRB performance, groundwater monitoring will be conducted at a network of up to nine new and existing shallow groundwater monitoring wells located within the test PRB and hydraulically upgradient and downgradient of the PRB for an estimated period of at least 7 months. Prior to conducting the pilot test, Landau will prepare a

work plan that details the injection and groundwater monitoring activities and will submit the work plan to Ecology for review and approval.

Prior to constructing the asphalt caps, a grading permit and a shoreline permit would be obtained from the City of Seattle Department of Construction and Inspections (SDCI); however, if the remedial action is conducted under the terms and conditions of a Consent Decree with Ecology, then permits would not be obtained, but the substantive requirements of the permits would be met.

6.2.2.2 Install Permeable Reactive Barrier

To allow for remediation of the arsenic-, copper-, and benzo(a)pyrene-impacted shallow groundwater near the sheet pile seawall, a ZVI PRB will be installed along the seawall at a location within and near the areas of arsenic-, copper-, and benzo(a)pyrene-impacted shallow groundwater (see Figure 13). The PRB will be approximately 1,200 ft long, and most of the PRB will be parallel to the seawall to prevent the discharge of dissolved arsenic, dissolved copper, benzo(a)pyrene, and possibly vinyl chloride concentrations greater than the CULs to the LDW through small holes and cracks in the wall. The PRB will also include two legs oriented perpendicular to the seawall, including the pilot test PRB, to treat the shallow groundwater flowing toward the northeastern and southwestern ends of the wall.

For cost estimating purposes, the PRB will be installed by injecting an estimated 274 pounds of Ferox Target ZVI per vertical foot of the target treatment depth range (6 to 25 ft bgs) in one row of direct-push borings spaced approximately 10 ft apart. Based on the results of the pilot test, the final design of the PRB may be modified. For the purpose of this FS, the ZVI within the PRB is assumed to effectively treat the impacted groundwater for a period of 10 years. Because Alternative 2 does not include active soil remediation, Landau assumed that MNA would not remediate all the impacted groundwater upgradient of the PRB within 10 years and that the ZVI would need be reinjected after 10 years at half of the initial direct-push boring locations.

6.2.2.3 Asphalt Cap Installation

A contractor will construct a 6-inch-thick asphalt cap over each of the three unpaved areas at the 8th Avenue Terminals property that are located above soil IHS concentrations greater than the proposed CULs based on direct contact. The ground surface at the property is currently covered with asphalt pavement, except at the northern and northeastern parts of Parcel F (see Figure 13). As discussed in the Draft FS Report (SLR 2024b), total semivolatile petroleum hydrocarbon concentrations greater than CUL based on direct contact are present beneath three unpaved areas (at and near borings EB-16 and SLR-5, and test pit TP100810) at the northern and northeastern parts of Parcel F. There are no other soil IHSs that contain concentrations greater than their CULs based on direct contact within the unpaved portion of the property. The three proposed asphalt caps over the impacted soil at and near borings EB-16 and SLR-5, and test pit TP100810 are shown on Figure 13.

The total area of asphalt cap installation will be approximately 11,800 square feet. The rest of the property that contains soil IHS concentrations greater than the CULs based on direct contact risks is already covered by asphalt pavement. The asphalt surfaces will be inspected on an annual basis for

cracks, breaks, and areas of subsidence. The asphalt will be repaired or replaced, as needed, to maintain the integrity of the caps.

6.2.2.4 Monitored Natural Attenuation

After installing the PRB and asphalt caps, a licensed well driller will install three shallow groundwater compliance wells and two intermediate-depth groundwater compliance wells near the sheet pile seawall (see Figure 13). The shallow wells would be screened across the groundwater table (from 5 to 20 ft bgs) and the intermediate-depth wells would be screened from 40 to 50 ft bgs. The proposed wells and existing shallow wells CMW-1, CMW-2, CMW-3, CMW-6, and EMW-3S and intermediate-depth wells EMW-4D, EMW-14D, EMW-15D, and EMW-16D will serve as groundwater compliance wells to evaluate the effectiveness of the remedial action. All the proposed groundwater compliance wells are located near the LDW because the PRB is located along the sheet pile seawall (see Figure 13).

Because active remediation would not be conducted to address the remaining impacted soil at the Site, groundwater monitoring would be conducted to evaluate the natural attenuation of the IHS concentrations within the areas of impacted soil and to monitor the effectiveness of the PRB. Because the groundwater sample analytical results since 2013 indicate that natural attenuation of the IHS concentrations is occurring and the maximum groundwater IHS concentrations in 2024 at locations hydraulically upgradient of the PRB are relatively low or will not likely migrate to the sheet pile seawall or the LDW (see Figures 6 through 10), Landau estimates that MNA will reduce the groundwater IHS concentrations to below the proposed CULs before migrating to the groundwater compliance wells in 15 years.

During each groundwater monitoring event, groundwater samples would be collected from the eight shallow groundwater compliance wells, the six intermediate-depth groundwater compliance wells, and from 10 shallow groundwater monitoring wells (DMW-2, DMW-3, DMW-6B, EMW-2S, EMW-5SA, EMW-11S, EMW-12S, EMW-23S, SLR-3, and SLR-6) that are located within areas of IHS-impacted groundwater or along migration pathways from impacted areas to the PRB or LDW (including Slip 4). The locations of the groundwater compliance wells and the selected shallow groundwater monitoring wells are shown on Figure 13.

The groundwater monitoring events would be conducted on a quarterly basis for the first year, then on a semiannual basis for 13 years (during the periods of high and low groundwater elevations), and on a quarterly basis for the fifteenth year of monitoring to verify that the groundwater IHS concentrations at the compliance wells are consistently below the proposed CULs. Each groundwater monitoring event would be conducted during low tide conditions in the LDW to minimize any effects of groundwater-surface water mixing at the compliance wells. The groundwater samples would be collected by using low-flow sampling methods. During purging, natural attenuation parameters (DO, redox potential, and pH) would be monitored. The groundwater samples would be submitted to an Ecology-certified laboratory for analysis of the groundwater IHSs (dissolved arsenic, dissolved copper, acenaphthene, benzo[a]pyrene, and vinyl chloride).

6.2.2.5 Institutional Controls

After completing the remedial action, institutional controls (i.e., a deed restriction) would be implemented in accordance with WAC 173-340-440 to document the remaining areas of impacted shallow soil and groundwater at the 8th Avenue Terminals property and to restrict access to the subsurface at those areas. The institutional controls would also prevent the use of the groundwater beneath the property, if necessary.

6.2.3 Alternative 3: ISS, Groundwater Treatment, and MNA

As discussed in Section 10.4 of the Draft FS Report (SLR 2024b), Alternative 3 includes the use of RELs (the MTCA Method C direct contact CULs) for the soil IHSs (arsenic, copper, benzo[a]pyrene, acenaphthene, and vinyl chloride) that have CULs that are based on protection of surface water, the natural background concentration, or the PQL, whichever is greater; however, as described above in Section 4.1, the Method C direct contact CUL for arsenic was recently reduced from 88 to 4.10 mg/kg; therefore, the current REL for arsenic is now equal to the Site CUL (the natural background concentration of 7.30 mg/kg). The CULs (based on direct contact) for the other soil IHSs (antimony, lead, total D/F TEQ, and total semivolatile petroleum hydrocarbons) and the CULs for all the groundwater IHSs will be applied.

The remedial action will consist of ISS at the areas on the 8th Avenue Terminals property (one large area on Parcel D and six smaller areas throughout the property; see Figure 14) that contain arsenic and benzo(a)pyrene concentrations greater than the soil RELs and antimony, lead, and total semivolatile petroleum hydrocarbons concentrations greater than the soil CULs to depths of up to 15 ft bgs to eliminate the direct contact risks associated with the impacted soil and also to reduce the leaching of the contaminants into the groundwater, particularly at depths below the groundwater table. Alternative 3 also includes *in situ* groundwater treatment by a ZVI PRB similar to Alternative 2, except that the top of the PRB will be at the base of the ISS, where both are present at the same location. The approximate locations of the ISS areas and the PRB are shown on Figure 14.

In addition to the PRB, MNA would be used to remediate the groundwater concentrations outside the ISS areas at the Site. The conceptual scope of work for Alternative 3 is described below, and the estimated costs are presented in Table 11.

6.2.3.1 Pre-Remediation Activities

To properly design the ISS, up to four geotechnical soil borings would be drilled within the largest proposed ISS area to evaluate soil stability and to collect soil samples for a bench-scale ISS study. The soil samples would be submitted to a laboratory for bench testing analysis of unconfined compressive strength, hydraulic conductivity, and leachability. The testing results would be used to determine the appropriate mixture of binding reagents to create a mass that is structurally stable and has a reduced permeability.

Similar to Alternative 2, a ZVI PRB pilot test would be conducted at the Site to evaluate the injectability of Ferox Target ZVI into the aquifer, the effectiveness of the PRB to treat dissolved arsenic and copper

under the hydrogeologic conditions at the Site, and the effects of the reducing conditions created by the ZVI on the benzo(a)pyrene and vinyl chloride concentrations. The testing results would also be used to identify the appropriate spacing of the direct-push injection borings and if a single row of injection locations will be effective.

Prior to conducting the remedial action, a grading permit and a shoreline permit would be obtained from the SDCI; however, if the remedial action is conducted under the terms and conditions of a Consent Decree, then permits would not be obtained, but the substantive requirements of the permits would be met. Additionally, a licensed well driller will abandon the 10 shallow, 4 intermediate-depth, and 3 deep groundwater monitoring wells located within the proposed ISS areas by filling the wells with hydrated bentonite.

Landau will create a grid across each of the planned ISS areas that will be the basis for the soil sample locations at the lateral extents and base of the ISS. An anchor point of the grid will be established on the property as the starting point for the X-axis and the Y-axis coordinates of the grid. The grid nodes will be surveyed at 25-ft intervals (each grid cell will cover an area of up to 625 square feet).

6.2.3.2 Install *In Situ* Solidification/Stabilization

For the installation of the ISS, a contractor would conduct *in situ* mixing of the binding reagents with the soil by using an excavator. Based on the areas and depths of the soil IHS concentrations greater than the RELs or CULs, there will be six areas of ISS treatment at the Site and the depths will range from approximately 3 to 15 ft bgs (a total ISS volume of approximately 107,800 bank cubic yards [bcy]). The top 2 ft of soil from the ISS areas (approximately 39,300 tons) would be hauled offsite for disposal at an Ecology-licensed facility. The ground surface above the ISS areas that are currently in paved areas would be covered with asphalt pavement (approximately 6 inches thick).

To verify that the ISS areas are encapsulating all of the soil at the Site that contains soil concentrations greater than the RELs or CULs, an Ecology-certified mobile laboratory will be on Site during the ISS installation and soil samples will be collected and analyzed for antimony, arsenic, lead, PAHs, DRO, and ORO to determine if additional ISS is required and to document the soil conditions at the lateral and vertical extents of the ISS. If a sidewall or floor sample from the extents of an ISS grid cell area contain soil IHS concentrations greater than the RELs or CULs, as appropriate, then the entire sidewall of the grid cell would be extended up to 5 ft and re-sampled or the bottom of the grid cell would be deepened by at least 1 ft and re-sampled. The depths of the ISS will typically extend below the groundwater table.

6.2.3.3 Install Permeable Reactive Barrier

PRB installation would be the same as Alternative 2, except that within the areas of ISS, the top of portions of the PRB will be installed at depths ranging from 8 to 15 ft bgs (the depths of the bottoms of the ISS at those locations).

6.2.3.4 Monitored Natural Attenuation

After installing the ISS and the PRB, a licensed well driller will install five shallow groundwater compliance wells and five intermediate-depth groundwater compliance wells along the sheet pile

seawall (see Figure 14). The shallow wells would be screened across the groundwater table (from 5 to 20 ft bgs) and the intermediate-depth wells would be screened from 40 to 50 ft bgs. The proposed wells and remaining shallow wells CMW-1 and EMW-3S, and intermediate-depth well EMW-4D, will serve as groundwater compliance wells to evaluate the effectiveness of the remedial action. All the proposed groundwater compliance wells are located near the LDW because the PRB is located along the sheet pile seawall (see Figure 14).

Natural attenuation will remediate the remaining groundwater IHS concentrations upgradient of the PRB. Groundwater monitoring would be conducted to evaluate the natural attenuation of the IHS concentrations outside the ISS areas and to monitor the effectiveness of the PRB. Because the groundwater sample analytical results since 2013 indicate that natural attenuation of the IHS concentrations is occurring, and ISS will reduce the leaching of contaminants into the groundwater, particularly at depths below the groundwater table, Landau estimates that MNA will reduce the groundwater IHS concentrations to below the proposed CULs before migrating to the groundwater compliance wells in 6 years.

During each groundwater monitoring event, groundwater samples would be collected from the seven shallow groundwater compliance wells, the six intermediate-depth groundwater compliance wells, and from seven shallow groundwater monitoring wells (EMW-2S, EMW-5SA, EMW-11S, EMW-12S, EMW-23S, SLR-3, and SLR-6) that are located outside the ISS areas, but within areas of IHS-impacted groundwater or along migration pathways from impacted areas to the PRB or LDW (including Slip 4). The locations of the groundwater compliance wells and the selected shallow groundwater monitoring wells are shown on Figure 14.

The groundwater monitoring events would be conducted on a quarterly basis for the first year, then on a semiannual basis for 4 years (during the periods of high and low groundwater elevations), and on a quarterly basis for the sixth year of monitoring to verify that the groundwater IHS concentrations at the compliance wells are consistently below the proposed CULs. Each groundwater monitoring event would be conducted during low tide conditions in the LDW to minimize any effects of groundwater-surface water mixing at the compliance wells. The groundwater samples would be collected by using low-flow sampling methods. During purging, natural attenuation parameters (DO, redox potential, and pH) would be monitored. The groundwater samples would be submitted to an Ecology-certified laboratory for analysis of the groundwater IHSs (dissolved arsenic, dissolved copper, acenaphthene, benzo[a]pyrene, and vinyl chloride).

6.2.3.5 Institutional Controls

If there are areas of impacted groundwater that are not migrating to the PRB and are slowly naturally attenuating to below the CULs, then institutional controls (i.e., a deed restriction) would be implemented in accordance with WAC 173-340-440 to document the remaining areas of impacted groundwater at the interior of the 8th Avenue Terminals property and to prevent the use of the groundwater.

6.2.4 Alternative 4: ISS and MNA

Alternative 4 would also consist of ISS as the primary remediation method; however, Alternative 4 would include ISS at the areas on the 8th Avenue Terminals property that contain soil IHS concentrations greater than the proposed CULs to depths of up to 15 ft bgs. The use of ISS for Alternative 4 would eliminate the direct contact risks associated with the impacted soil and significantly reduce the leaching of the contaminants into the groundwater, particularly at depths below the groundwater table. It would be difficult to install ISS to the depths that would encompass all of the soil IHS concentrations greater than the CULs (greater than 50 ft bgs), and groundwater monitoring data at the groundwater compliance points (an empirical demonstration) would be used to show that the remaining soil concentrations below 15 ft bgs are not significant sources of impacted groundwater. Due primarily to benzo(a)pyrene concentrations greater than the CUL, the area of the ISS would extend throughout the entire property. The approximate area of the ISS is shown on Figure 15. MNA would be used to remediate the groundwater concentrations beneath the ISS. The conceptual scope of work for Alternative 4 is described below, and the estimated costs are presented in Table 12.

6.2.4.1 Pre-Remediation Activities

The permitting and bench-scale testing for Alternative 4 will be the same as Alternative 3, except that there would not be any pilot testing for the PRB.

Prior to constructing the ISS, a licensed well driller would abandon all the groundwater monitoring wells located at the property by filling the wells with hydrated bentonite.

Landau will create a grid across the property that will be the basis for the soil sample locations at the base of the ISS. An anchor point of the grid will be established on the property as the starting point for the X-axis and the Y-axis coordinates of the grid. The grid nodes will be surveyed at 25-ft intervals (each grid cell will cover an area of up to 625 square feet).

6.2.4.2 Install *In Situ* Solidification/Stabilization

The ISS would be installed by using the methods described in Alternative 3; however, to solidify the soil that contains IHS concentrations greater than the CULs, the area of ISS treatment is throughout the entire 8th Avenue Terminals property and the depths will range from approximately 3 to 15 ft bgs (a total of approximately 198,400 bcy). The top 2 ft of the excavated material (approximately 77,600 tons) would be hauled offsite for disposal at an Ecology-licensed facility for disposal. The ground surface above the ISS areas would be covered with asphalt pavement (approximately 6 inches thick).

To verify that the ISS areas are encapsulating all the soil at the property that contains IHS concentrations greater than the CULs, an Ecology-certified mobile laboratory will be on Site during the ISS installation, and soil samples will be collected and analyzed for arsenic and PAHs to determine if additional ISS is required and to document the soil conditions at the vertical extents of the ISS. At the specific areas where antimony, copper, lead, total semivolatile petroleum hydrocarbons, and/or vinyl chloride concentrations in the soil exceed their CULs, the soil samples would also be analyzed for antimony, copper, lead, DRO, ORO, and/or vinyl chloride. If a floor sample from an ISS grid cell contains any soil IHS

concentrations greater than the CULs, then the bottom of the grid cell area would be deepened by at least 1 ft (to a maximum depth of 15 ft bgs) and re-sampled.

6.2.4.3 Monitored Natural Attenuation

After installing the ISS, a licensed well driller will install six shallow groundwater compliance wells and six intermediate-depth groundwater compliance wells along the sheet pile seawall and one additional shallow groundwater compliance well along the eastern property line, to the north of the seawall (see Figure 15). The shallow wells would be screened across the groundwater table (from 5 to 20 ft bgs) and the intermediate-depth wells would be screened from 40 to 50 ft bgs. The proposed wells will serve as groundwater compliance wells to evaluate the effectiveness of the remedial action. All the proposed groundwater compliance wells are located near the LDW because the ISS extends to the sheet pile seawall and the northeastern property line (see Figure 15).

The groundwater at the seven shallow groundwater compliance wells and the six intermediate-depth compliance wells would be monitored over a period of approximately 3 years to assess the effectiveness of the remedial action and to monitor natural attenuation of the remaining IHS concentrations. The groundwater monitoring events would be conducted on a quarterly basis for the first year, then on a semiannual basis for the second year (during the periods of high and low groundwater elevations), and on a quarterly basis for the third year of monitoring to verify that the groundwater IHS concentrations at the compliance wells are consistently below the proposed CULs. Each groundwater monitoring event would be conducted during low tide conditions in the LDW to minimize any effects of groundwater-surface water mixing at the compliance wells. The groundwater samples would be collected from each of the groundwater compliance wells by using low-flow sampling methods. During purging, natural attenuation parameters (DO, redox potential, and pH) would be monitored. The groundwater samples would be submitted to an Ecology-certified laboratory for analysis of the groundwater IHSs (dissolved arsenic, dissolved copper, acenaphthene, benzo[a]pyrene, and vinyl chloride).

6.2.5 Alternative 5: Soil Excavation, Groundwater Recovery, and MNA

For Alternative 5, the soil on the 8th Avenue Terminals property that contains IHS concentrations greater than the soil CULs, at depths of up to 15 ft bgs, would be excavated and transported offsite for disposal. It would be difficult to excavate soil to the depths that would encompass all the soil IHS concentrations greater than the CULs (greater than 50 ft bgs), and groundwater monitoring data at the groundwater compliance points (an empirical demonstration) would have to show that the remaining soil concentrations below 15 ft bgs are not significant sources of impacted groundwater. Due primarily to benzo(a)pyrene concentrations greater than the CUL, the area of soil excavation would extend throughout the entire property. The approximate area of soil excavation is shown on Figure 16. Where the excavation extends to depths below the shallow groundwater table, groundwater that enters the open excavation would be extracted to remove groundwater IHS concentrations that exceed the CULs. The extracted groundwater would be pumped through a temporary treatment system prior to discharge to the sanitary sewer system. After backfilling the excavation, MNA would address the remaining impacted groundwater at the Site. The conceptual scope of work for Alternative 5 is described below, and the estimated costs are presented in Table 13.

6.2.5.1 Pre-Remediation Activities

Prior to conducting the remedial action, Landau would design a shoring plan for the excavation, and a grading permit and a shoreline permit would be obtained from the SDCI. Additionally, a discharge permit would be obtained from King County Industrial Waste (KCIW) to discharge the extracted groundwater, after treatment, into the sanitary sewer system on the property. However, if the remedial action is conducted under the terms and conditions of a Consent Decree, then permits would not be obtained, but the substantive requirements of the permits would be met.

Landau will create a grid across the property that will be the basis for the soil sample locations at the base of the excavation. An anchor point of the grid will be established on the property as the starting point for the X-axis and the Y-axis coordinates of the grid. The grid nodes will be surveyed at 25-ft intervals (each grid cell will cover an area of up to 625 square feet).

Prior to conducting the soil excavation activities, a licensed well driller would abandon all the groundwater monitoring wells located at the property by filling the wells with hydrated bentonite.

6.2.5.2 Soil Excavation and Groundwater Recovery/Treatment

To remediate the soil at the 8th Avenue Terminals property that contains IHS concentrations greater than the soil CULs and remove the primary remaining source of the impacted groundwater, a contractor would excavate the impacted soil to a maximum depth of 15 ft bgs. The excavation would extend to depths of approximately 3 to 15 ft bgs (see Figure 16). To protect the neighboring properties to the west, north, and northeast of the property, a controlled-density fill gravity wall (total length of approximately 2,150 ft) would be installed along the western, northern, and northeastern property lines to shore the areas of excavation. The wall would be approximately 6 ft wide, and the average depth of the wall would be approximately 8 ft bgs.

An estimated 194,600 bcy of soil would be excavated and transported offsite for disposal at an Ecology-licensed facility. To ensure that the excavation removes all of the soil at the Site, at depths to 15 ft bgs, that contains IHS concentrations greater than the CULs, an Ecology-certified mobile laboratory will be at the property during the excavation. Floor samples from the grid cells will be collected and analyzed for arsenic and PAHs to determine if additional excavation is required and to document the soil conditions at the vertical extents of the excavation. At the specific areas where antimony, copper, lead, total semivolatile petroleum hydrocarbons, and/or vinyl chloride concentrations in the soil exceed their CULs, the soil samples would also be analyzed for antimony, copper, lead, DRO, ORO, and/or vinyl chloride. If a floor sample from an excavation grid cell contains any soil IHS concentrations greater than the CULs, then the bottom of the grid cell area would be deepened by at least 1 ft (to a maximum depth of 15 ft bgs) and re-sampled. After completing the soil excavation activities and the groundwater extraction activities described below, the excavation contractor would backfill the excavation to the current ground surface with a total of 345,200 tons of imported clean sand and/or gravel. The backfill material will be compacted and tested in accordance with City compaction standards. The ground surface of the backfilled area would be completed with a 6-inch-thick layer of asphalt.

6.2.5.3 Groundwater Recovery

The groundwater that collects in the open excavation would be pumped through a temporary treatment system that consists of four, 21,000-gallon settling tanks in series followed by two sand filters in series to remove the solids in the water prior to discharge to the sanitary sewer system. In accordance with the anticipated discharge requirements, the groundwater pumping rate would not exceed 15 gpm. The treatment system would operate on a continuous basis and the treated water would be sampled in accordance with KCIW requirements. An estimated 3,000,000 gallons of groundwater would be pumped from the excavation.

6.2.5.4 Monitored Natural Attenuation

After backfilling the soil excavations, a licensed well driller will install six shallow groundwater compliance wells and six intermediate-depth groundwater compliance wells along the sheet pile seawall and one additional shallow groundwater compliance well along the eastern property line, to the north of the seawall (see Figure 16). The shallow wells would be screened across the groundwater table (from 5 to 20 ft bgs) and the intermediate-depth wells would be screened from 40 to 50 ft bgs. The proposed wells will serve as groundwater compliance wells to evaluate the effectiveness of the remedial action. All the proposed groundwater compliance wells are located near the LDW because the excavation will extend to the sheet pile seawall and the northeastern property line (see Figure 16).

The groundwater at the seven shallow groundwater compliance wells and the six intermediate-depth compliance wells would be monitored over a period of approximately 2 years to assess the effectiveness of the remedial action and to monitor natural attenuation of the remaining IHS concentrations. The groundwater monitoring events would be conducted on a quarterly basis. Each groundwater sampling event would be conducted during low tide conditions in the LDW to minimize any effects of groundwater-surface water mixing at the compliance wells. The groundwater samples would be collected from each of the groundwater compliance wells by using low-flow sampling methods. During purging, natural attenuation parameters (DO, redox potential, and pH) would be monitored. The groundwater samples would be submitted to an Ecology-certified laboratory for analysis of the groundwater IHSs (dissolved arsenic, dissolved copper, acenaphthene, benzo[a]pyrene, and vinyl chloride).

7.0 EVALUATION OF REMEDIAL ALTERNATIVES

This section provides a detailed evaluation of each of the remedial alternatives in accordance with MTCA requirements, including the General Requirements (WAC 173-340-360[3][a]), the Action-Specific Requirements (WAC 173-340-360[3][b]), the Media-Specific Requirements (WAC 173-340-360[3][c]), the requirement to consider public concerns (WAC 173-340-360[3][d]), the requirement for a reasonable restoration time frame (WAC 173-340-360[4]), and the requirement for a permanent solution to the maximum extent practicable (WAC 173-340-360[5]). Table 14 summarizes Landau's evaluation of the four alternatives relative to these requirements.

7.1 MTCA Requirements for Remedial Alternatives

7.1.1 Compliance with General Requirements

Cleanup actions are subject to the general requirements set forth in WAC 173-340-360(3)(a). Under the general requirements, the cleanup action shall:

- Protect human health and the environment.
- Comply with cleanup standards.
- Comply with applicable state and federal laws.
- Prevent or minimize present or future releases and migration of hazardous substances in the environment.
- Provide resilience to climate change impacts that have a high likelihood of occurring and severely compromising its long-term effectiveness.
- Provide for compliance monitoring.
- Not rely primarily on institutional controls and monitoring at a site, or portion thereof, if it is technically possible to implement a more permanent cleanup action.
- Not rely primarily on dilution and dispersion unless the incremental costs of any active remedial measures over the costs of dilution and dispersion grossly exceed the incremental degree of benefits of active remedial measures over the benefits of dilution and dispersion.

7.1.1.1 Protect Human Health and the Environment and Comply with Cleanup Standards

The four remaining remedial alternatives would protect human health and the environment through compliance with CULs for groundwater, compliance with CULs and/or RELs for soil, and/or the use of capping and institutional controls for soil. Alternatives 3, 4, and 5 rely on more active treatment to meet the CULs or RELs than Alternative 2; however, MNA is reducing the groundwater concentrations over time and if the remaining groundwater concentrations greater than the CULs are not migrating to the LDW, then Alternative 2 would also be protective of human health and the environment after the implementation of institutional controls.

7.1.1.2 Comply with Applicable State and Federal Laws

As discussed in Sections 8 and 10 of the Draft FS Report (SLR 2024b), the selected CULs and RELs for each of the remedial alternatives are consistent with MTCA and also comply with federal regulations.

7.1.1.3 Prevent Releases and Migration of Hazardous Substances

The remedy components for all four alternatives prevent or minimize releases of hazardous substances to the environment and migration of hazardous substances in the environment. Surface capping, *in situ* groundwater treatment, and MNA would meet these criteria in Alternative 2. These criteria would be met through the use of ISS, *in situ* groundwater treatment, and MNA in Alternative 3 and through the use of more extensive ISS and MNA in Alternative 4. Extensive soil excavation, groundwater recovery, and MNA would meet these criteria in Alternative 5.

7.1.1.4 Provide Resilience to Climate Change Impacts

The remedy components of all four alternatives would not be significantly affected by the anticipated impacts of climate change as discussed in detail in Section 2.2.

7.1.1.5 Provide for Compliance Monitoring

The four remedial alternatives include compliance monitoring as required by WAC 173-340-410. Compliance monitoring will consist of protection monitoring, performance monitoring, and confirmational monitoring to determine short- and long-term safety and effectiveness of the alternative that is implemented. Protection monitoring is used to confirm that human health and the environment are adequately protected during construction and monitoring periods. Performance monitoring confirms that the remedial action has attained cleanup standards or other performance standards, including those outlined in any permits. Confirmational monitoring verifies the long-term effectiveness of the remedial action. The four alternatives would include programs designed to conduct the work safely and in a manner that is protective of the environment; to document the performance of the remedial action components; and to confirm the long-term effectiveness of the remedial action.

7.1.1.6 Reliance on Institutional Controls and Monitoring, Dilution, and Dispersion

Alternatives 3, 4, and 5 do not include the use of institutional controls as part of the remedy, and none of the alternatives rely primarily on dilution and dispersion for Site cleanup. Although Alternative 2 includes the use of institutional controls and monitoring as a remedy component, the primary remedy components are surface capping, *in situ* groundwater treatment, and MNA. Therefore, all four alternatives meet these criteria.

7.1.2 Compliance with Action-Specific Requirements

Compliance with these requirements would be met through the use of institutional controls per WAC 173-340-440 in Alternative 2, the use of remediation levels per WAC 173-340-355 in Alternative 3, and the use of financial assurance and periodic reviews per WAC 173-340-440(11) and WAC 173-340-420(2), respectively, in all four alternatives.

7.1.3 Compliance with Media-Specific Requirements

WAC 173-340-360(3)(c) outlines the media-specific requirements for soil and groundwater cleanup actions.

7.1.3.1 Soil

Per MTCA, soil cleanup actions must treat, remove, or contain contaminated soil located on sensitive sites, including schools, childcare centers, and residential areas based on current use or based on zoning, comprehensive plans, or adjacent land use. These criteria do not apply to the Site because the 8th Avenue Terminals property area does not contain schools, childcare centers, or residences and is not zoned for residential use in the future.

7.1.3.2 Groundwater

MTCA states that groundwater cleanup actions must be permanent if practicable or if Ecology determines that it is in the public interest. A nonpermanent cleanup action must either 1) treat or remove groundwater contamination at sites where there are liquid wastes, areas contaminated with high concentrations of hazardous substances, highly mobile hazardous substances, or hazardous substances that cannot be reliably contained, or 2) contain contaminated groundwater to the maximum extent practicable to prevent lateral and vertical expansion of the contaminated groundwater volume and to prevent migration of hazardous substances.

All four remedial alternatives meet the media-specific requirements for groundwater. Sections 7.1.6 and 7.2 discuss the alternatives using permanent solutions to the maximum extent practicable. The groundwater cleanup remedies for all the alternatives meet the MTCA requirements by *in situ* groundwater treatment with the PRB and MNA (Alternatives 2 and 3), MNA (Alternative 4), and groundwater removal and MNA (Alternative 5).

7.1.4 Consideration of Public Concerns

Public concerns, including by likely vulnerable populations and overburdened communities, will be considered during the cleanup process through public notice and participation. Indian tribes' rights and interests will be considered through Ecology's development and implementation of a tribal engagement plan for the Site that seeks meaningful tribal engagement in the cleanup process.

7.1.5 Provide for a Reasonable Restoration Time Frame

Per WAC 173-340-360(4)(c), the following factors must be considered when determining whether a cleanup action provides for a reasonable restoration time frame:

- Potential risks to human health and the environment, including likely vulnerable populations and overburdened communities.
- Practicability of achieving a shorter restoration time frame. A restoration time frame is not reasonable if an active remedial measure with a shorter restoration time frame is practicable.

- Long-term effectiveness of the alternative: A longer restoration time frame may be reasonable if the alternative has a greater degree of long-term effectiveness than an alternative that primarily relies on onsite or offsite disposal, isolation, or containment.
- Current and potential future use of the site, surrounding areas, and associated resources that are, or may be, affected by releases from the site.
- Availability of alternative water supplies.
- Likely effectiveness and reliability of institutional controls.
- Ability to control and monitor migration of hazardous substances from the site.
- Toxicity of the hazardous substances at the site.
- Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the site or under similar site conditions.
- For Ecology-conducted or Ecology-supervised remedial actions, public concerns identified under WAC 173-340-600(13) and (14), and Indian tribes' rights and interests identified under WAC 173-340-620.

As noted in Table 14, these requirements are met due to the low potential risks to human health and the environment based on the proposed remedy components for each alternative, the long-term effectiveness of the alternatives, the current and potential future use of the property, the availability of alternative water supplies, the ability to monitor migration of hazardous substances, the reduction in toxicity of the contaminants of concern by the remedy components for each alternative, the natural degradation processes active at the Site, public notice and participation, and the plan for and engagement of tribal interests in the cleanup process. As discussed in Section 7.2 below, it is impractical to achieve shorter restoration time frames than the recommended alternative.

7.1.6 Use Permanent Solutions to the Maximum Extent Practicable

Steps to determining whether a cleanup action uses permanent solutions to the maximum extent practicable are provided in WAC 173-340-360(5). WAC 173-340-200 defines a permanent solution as one in which cleanup standards "can be met without further action being required at the Site being cleaned up or any other site involved with the cleanup action, other than the approved disposal site of any residue from the treatment of hazardous substances." MTCA recognizes that completely permanent solutions may not be practicable for all sites and provides a procedure for DCA (WAC 173-340-360[5][c][iv]) to determine whether a cleanup action is permanent to the maximum extent practicable.

As part of the analysis of whether an alternative uses permanent solutions to the maximum extent practicable, the DCA is performed to determine whether the incremental increase in costs of a cleanup alternative over that of a lower cost alternative is justified by providing a corresponding incremental increase in human health and environmental benefits through the steps described under WAC 173-340-360[5][c]). The DCA is detailed in Section 7.2 below.

7.2 Disproportionate Cost Analysis

The MTCA DCA described in WAC 173-340-360(5)(c) is used to evaluate and compare each remedial action alternative to determine whether a cleanup action is permanent to the maximum extent practicable. This analysis involves comparing the costs and benefits of alternatives and selecting the alternative which has incremental costs that are not disproportionate to the incremental benefits. The evaluation criteria for the DCA are specified in WAC 173-340-360(5)(d) and include protectiveness, permanence, effectiveness over the long term, management of implementation risks, technical and administrative implementability, and costs. Further definition of the evaluation criteria provided in WAC 173-340-360(5)(d) is presented in the following subsections.

To favor the benefits of criteria associated with the primary goals of the remedial action, a weighting system is used for the DCA. That is, the criteria associated with environmentally based benefits are more highly weighted than other criteria that are associated with non-environmental factors. Each of the MTCA criteria used in the DCA and the weighting factors for the criteria are described below and are shown in Table 15.

7.2.1 Protectiveness

The remedial alternatives were evaluated for overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, the time required to reduce the risks at the Site and attain cleanup standards, the on-Site and off-Site risks resulting from implementing the alternative, and the improvement of the overall environmental quality. For the protectiveness criterion, a weighting factor of 30 percent is applied toward the overall benefit analysis. The high weight placed on protectiveness relative to the other factors is warranted due to the overall importance of protection of human health and the environment as the primary goal of cleanup at the Site.

With proper implementation, all four alternatives can be adequately protective of human health and the environment during implementation and after the remedial action has been completed. Due to the excavation and offsite disposal of the soil containing IHS concentrations greater than the CULs (to a depth of 15 ft bgs) and the extraction and treatment of contaminated groundwater from the open excavation, Alternative 5 was given the highest score (9). Because the soil containing IHS concentrations greater than the CULs (to a depth of 15 ft bgs) would be solidified/stabilized on the property rather than excavated, Alternative 4 has a slightly lower score (8) than Alternative 5. Because the *in situ* groundwater treatment (the PRB) will address most of the uncertainty about whether the soil RELs and smaller ISS footprint will be protective of groundwater, Alternative 3 has a slightly lower score (7) than Alternative 4. Alternative 2 has the lowest score (4) because it includes *in situ* groundwater treatment by the PRB but relies on natural attenuation and institutional controls rather than active soil remediation.

7.2.2 Permanence

The permanence of a remedial action is defined as the degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance

releases and sources of releases, the degree of irreversibility of the waste treatment process, and the characteristics and quantity of the generated treatment residuals. A weighting factor of 25 percent is applied to the numeric values associated with the permanence criterion.

Alternative 5 was given the highest permanence score (9) because the soil containing IHS concentrations greater than the CULs (to a depth of 15 ft bgs) would be excavated and hauled to a licensed facility for disposal, and contaminated groundwater would be extracted from the open excavation and treated at the 8th Avenue Terminals property. Alternatives 4 and 3 have slightly lower permanence scores (8 and 7, respectively) because the certainty of ISS is not as great as soil excavation; however, ISS should permanently eliminate the direct contact risk and reduce the leachability of the soil contamination within the extensive solidification area. Alternative 4 has a higher score than Alternative 3 because there is slightly more certainty associated with the effectiveness of solidification/stabilization of the soil containing IHS concentrations greater than the CULs rather than the RELs even though Alternative 3 includes *in situ* groundwater treatment by PRB. Alternative 2 has the lowest score (4) because it also includes PRB for *in situ* groundwater treatment but relies on natural attenuation and institutional controls rather than active soil remediation.

7.2.3 Effectiveness Over the Long Term

Long-term effectiveness is defined as the degree to which an alternative is likely to be effective over the long term, including for likely vulnerable populations and overburdened communities. The criteria include the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on site at concentrations that exceed CULs, the resilience of the alternative to climate change impacts, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes. The MTCA regulations provide guidelines for ranking cleanup action components when assessing the relative degree of long-term effectiveness. These elements are, in descending order: reuse or recycling; destruction or detoxification; immobilization or solidification; on-site or off-site disposal in an engineered, lined, and monitored facility; on-site isolation or containment with attendant engineering controls; and institutional controls and monitoring. The MTCA preference ranking must be considered along with other site-specific factors in the evaluation of long-term effectiveness. A weighting factor of 25 percent is assigned to the long-term effectiveness criteria.

Alternative 4 was given the highest score (9) for effectiveness over the long term because ISS should permanently eliminate the direct contact risk and reduce the leachability of the soil contamination within the extensive solidification area. Alternative 3 has a slightly lower score (8) due to less certainty of effectiveness by using RELs, although *in situ* groundwater treatment by the PRB will reduce the risks associated with the impacted groundwater by treating the dissolved arsenic-, dissolved copper-, benzo(a)pyrene-, and possibly vinyl chloride-impacted groundwater. Alternative 5 has a score of 6 because the contamination in the excavated soil will not be treated but transferred to an engineered landfill. Alternative 2 has a score of 5 because it includes the same *in situ* groundwater treatment by the PRB as Alternative 3 but relies on natural attenuation and institutional controls rather than active soil remediation.

7.2.4 Management of Implementation Risks

This criterion considers potential risk to human health and the environment, including by likely vulnerable populations and overburdened communities, associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks. Examples of risks include potential exposure to hazardous substances by site workers during implementation, mobilization of contaminants during construction, or general safety risks and construction hazards. A weighting factor of 10 percent is assigned to this criterion. This lower weighting is based on the limited time frame associated with the risks and the general ability to correct short-term risks during construction without significant effect on human health and the environment.

Alternative 2 has the highest score of 9 for management of short-term risks because it includes significantly less potential exposure by contractors and facility workers to hazardous substances than the other alternatives and it has the most limited general safety risks. Alternative 3 has a score of 4 because ISS is difficult to implement, will take more than 4 months to complete, and there will be truck traffic on 8th Avenue South and East Marginal Way. Alternative 4 has a score of 1 due to difficulty of implementing ISS, the duration of the project (more than 10 months), and the significant truck traffic (more than 77,000 tons of soil). Alternative 5 also has a score of 1 due to the long duration of the excavation work (more than 9 months) and the resulting significant truck traffic on 8th Avenue South and East Marginal Way (more than 345,000 tons).

7.2.5 Technical and Administrative Implementability

Technical and administrative implementability considers the feasibility of a selected remedy to be implemented, including consideration of:

- The technical difficulty of designing, constructing, and otherwise implementing the alternative in a reliable and effective manner, regardless of cost.
- The availability of necessary off-site facilities, services, and materials.
- Administrative and regulatory requirements.
- Scheduling, size, and complexity.
- Monitoring requirements.
- Access for construction operations and monitoring.
- Integration with existing facility operations and other current or potential remedial actions.

Implementability is less associated with the primary goal of the cleanup action (protection of human health and the environment) and, therefore, has a lower weighting factor. Additionally, the issues associated with the implementability are reflected in the remedy costs. Therefore, the weighting factor for implementability is 10 percent.

The 8th Avenue Terminals property is actively used throughout the year by WMNS, and its most critical operations occur along the pier and within the OCA, which occupies a significant portion of Parcel D (see Figure 1). Alternative 2 was given the highest score (9) for technical and administrative implementability

because it is the least complex of the alternatives to implement and it would have limited impacts to WMNS' operations. Alternative 3 has a score of 4 due to the extensive total area of ISS on the property, particularly within the OCA and at an extensive area of the Facility's stormwater drainage system, and the construction period of more than 4 months, which would prevent WMNS from operating (including accepting dredged sediments from the LDW). Alternatives 4 and 5 have the lowest scores (1 and 2, respectively) because the construction areas will extend throughout the entire property, and the work will last for more than 10 months and 8 months, respectively.

7.2.6 Cost

The estimated costs to implement the remedial alternatives were developed and evaluated, including the cost of construction and operation, and the net present value of the long-term project costs (a discount rate of 4.4 percent for a 20-year period was applied).[3] For the alternatives, the long-term costs primarily include groundwater monitoring and reporting costs. The effective duration of the remediation components is estimated, and the cost of replacement or repair of those components is included in the estimate. Costs were compared against benefits to assess cost effectiveness and practicability of the remedial alternatives (see Table 15). No weighting factor was applied to this quantitative category.

The total estimated costs for Alternatives 2, 3, 4, and 5 are $6,160,000, $23,010,000, $32,530,000, and $69,980,000. Detailed cost estimates for each alternative are provided in Tables 10, 11, 12, and 13, respectively. The estimated costs include a 20 percent contingency for the pre-remediation and construction components of each alternative.

[3] OMB Circular No. A-94 (Executive Office of the President, Office of Management and Budget, 2025 Discount Rates memorandum dated January 16, 2025).

8.0 RECOMMENDED ALTERNATIVE

The results of Landau's evaluation of the remedial alternatives are summarized as a numeric scoring system in Table 15. The highest total weighted score (benefit value) was 6.9 for Alternative 4, followed by 6.8 for Alternative 5, 6.7 for Alternative 3, and 5.0 for Alternative 2. Based on the total estimated costs and total benefit values, the cost-per-benefit value for each alternative was calculated. The cost-per-benefit values were $1,232,000 for Alternative 2, $3,460,150 for Alternative 3, $4,748,905 for Alternative 4, and $10,367,407 for Alternative 5.

Based on the results of the DCA, Alternative 2 is the recommended alternative. The installation of the groundwater treatment PRB and MNA should remediate the groundwater and prevent the discharge of groundwater IHS concentrations greater than the CULs to the LDW. The implementation of surface capping and institutional controls will minimize the direct contact risks associated with the remaining impacted soil. The institutional controls would also prevent the use of the groundwater beneath the 8th Avenue Terminals property, if necessary. The reliance on natural attenuation to reduce the groundwater IHS concentrations to below the CULs will take longer than a typical remedial action; however, the restoration time frame for Alternative 2 (16 years) is considered reasonable based on the factors in WAC 173-340-360(4)(c). Furthermore, Alternative 2 will more cost effectively address the risks associated with the remaining soil contamination than Alternatives 3, 4, and 5, and it will allow the property tenant, WMNS, to operate at the property with limited interruption.

9.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of 8th Avenue Terminals and Ecology for specific application to the 8th Avenue Terminals Site. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau, shall be at the user's sole risk. Landau warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau makes no other warranty, either express or implied.

10.0 REFERENCES

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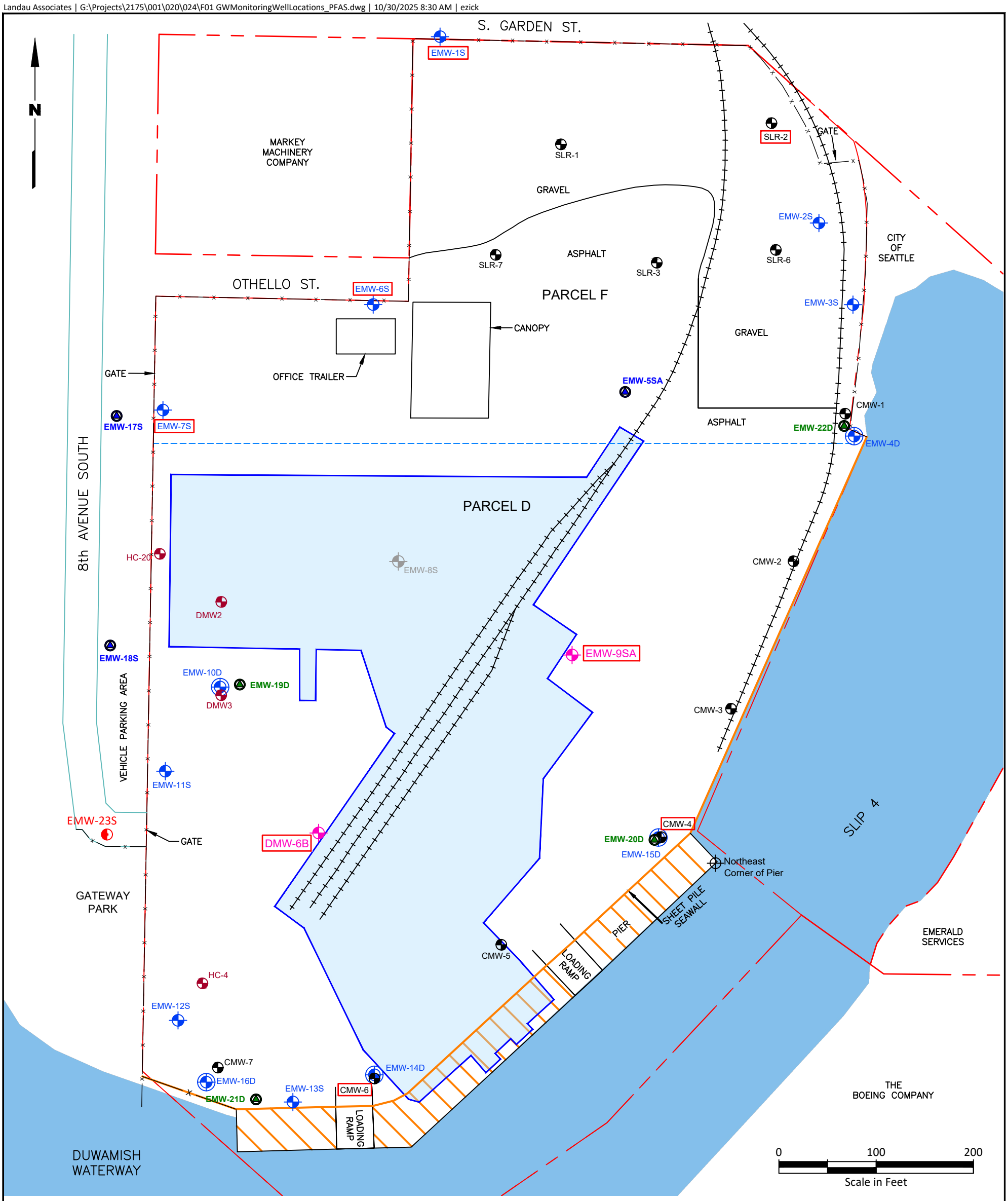


LEGEND

- PARCEL D/PARCEL F BOUNDARY
- PROPERTY BOUNDARIES
- RAIL LINE
- FENCE
- SHEET PILE SEAWALL
- OPERATIONS CONTAINMENT AREA (OCA) (MIN. 6" ASPHALT CONTAINMENT BERM)
- CMW-6 — GROUNDWATER SAMPLE LOCATION FOR PFAS INVESTIGATION
- 2024 SHALLOW GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- 2020 REPLACEMENT SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 2013 SHALLOW GROUNDWATER MONITORING WELL
- 2013 INTERMEDIATE-DEPTH GROUNDWATER MONITORING WELL
- 2008 GROUNDWATER MONITORING WELL
- 1989 OR 1990 GROUNDWATER MONITORING WELL
- 2014 SHALLOW GROUNDWATER MONITORING WELL
- 2014 DEEP GROUNDWATER MONITORING WELL
- WELL ABANDONED DURING 2024

NOTES

1. DRAWING COMPILED FROM TRIAD ASSOCIATES, KIRKLAND, WA. SURVEY PLAN, DRAWING 06133-CC052908.DWG.
2. PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES.
3. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

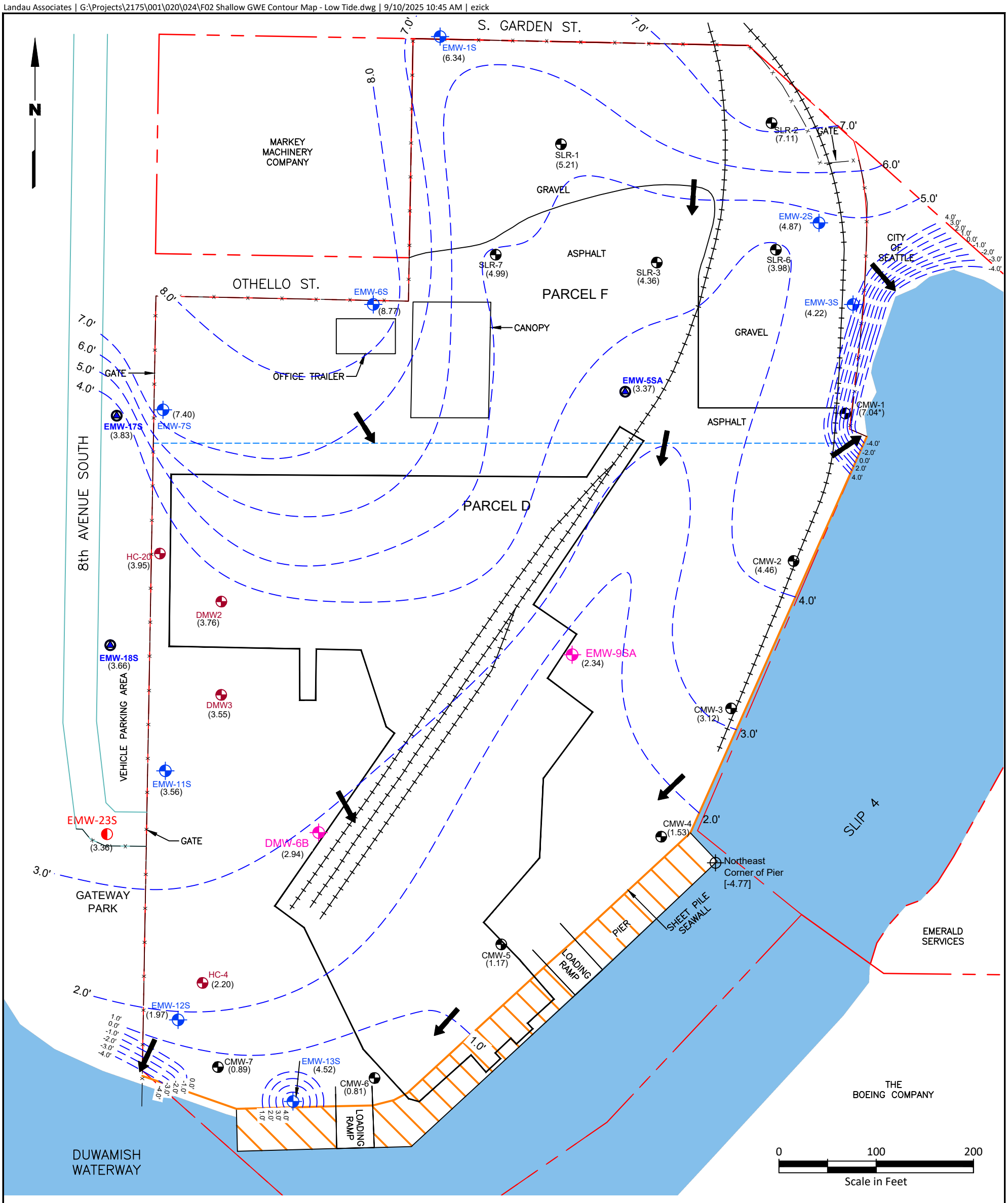
Source: SLR, 2023

LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Groundwater Monitoring Well Locations

Figure 1



LEGEND

- PARCEL D/PARCEL F BOUNDARY
- PROPERTY BOUNDARIES
- RAIL LINE
- FENCE
- SHEET PILE SEAWALL
- OPERATIONS CONTAINMENT AREA (OCA) (MIN. 6" ASPHALT CONTAINMENT BERM)
- 2024 SHALLOW GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- 2020 REPLACEMENT SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 2013 SHALLOW GROUNDWATER MONITORING WELL
- 2008 SHALLOW GROUNDWATER MONITORING WELL
- 1989 OR 1990 SHALLOW GROUNDWATER MONITORING WELL
- 2014 SHALLOW GROUNDWATER MONITORING WELL
- [-4.77] SLIP 4 SURFACE WATER ELEVATION (FT; NAVD88 DATUM)
- (1.17) SHALLOW GROUNDWATER ELEVATION (FT; NAVD88 DATUM)
- -3.0' INFERRED SHALLOW GROUNDWATER ELEVATION CONTOUR LINE (FT; NAVD88 DATUM)
- GENERAL SHALLOW GROUNDWATER FLOW DIRECTION

NOTES

1. DRAWING COMPILED FROM TRIAD ASSOCIATES, KIRKLAND, WA. SURVEY PLAN, DRAWING 06133-CC052908.DWG.
2. * = THE GROUNDWATER ELEVATION WAS ANOMALOUS AND NOT USED FOR CONTOURING.
3. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

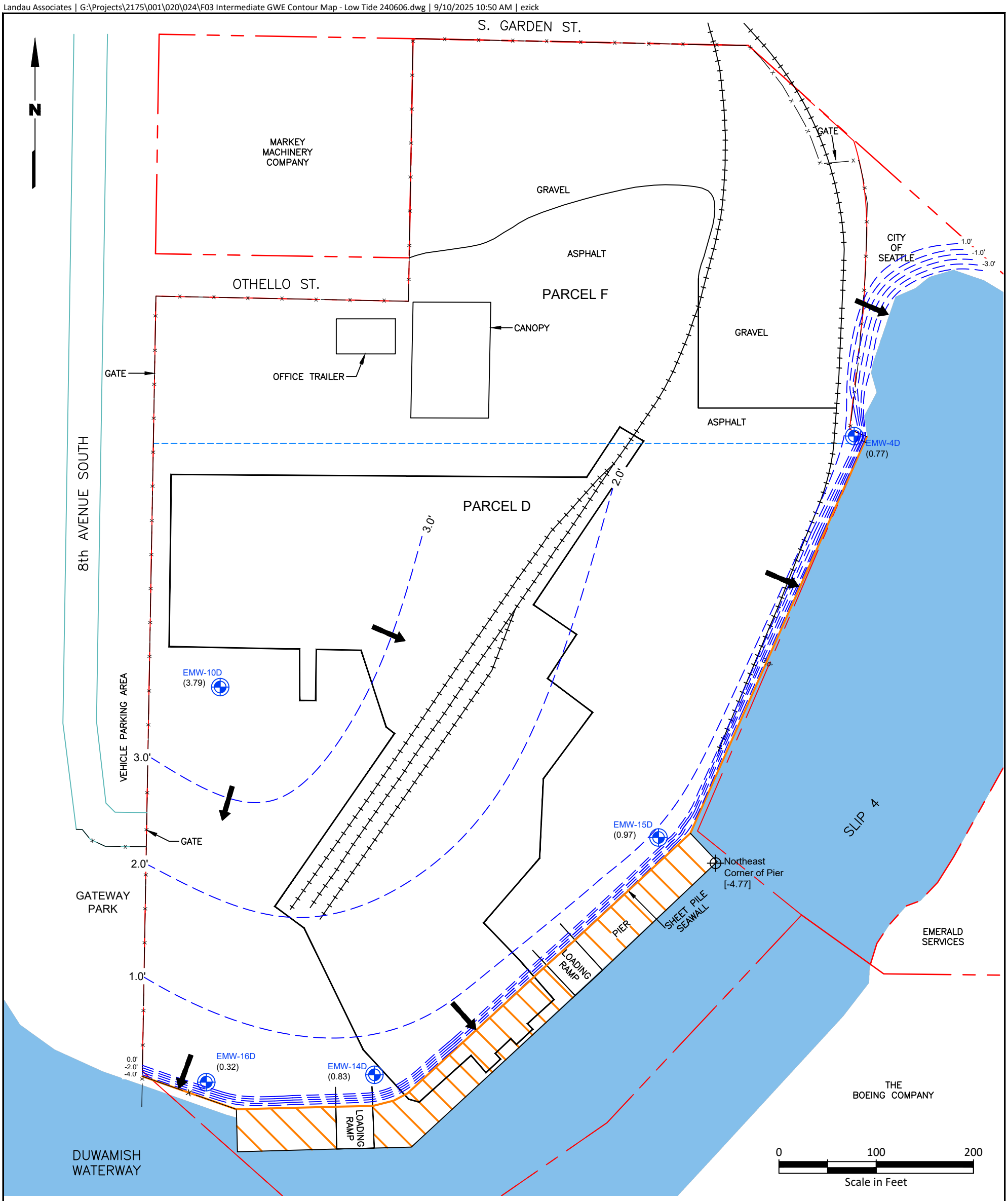
Source: SLR, 2023

LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Shallow Groundwater Elevation Contour Map - June 6, 2024 Low Tide Conditions

Figure 2



LEGEND

- PARCEL D/PARCEL F BOUNDARY
- PROPERTY BOUNDARIES
- RAIL LINE
- FENCE
- SHEET PILE SEAWALL
- OPERATIONS CONTAINMENT AREA (OCA) (MIN. 6" ASPHALT CONTAINMENT BERM)
- 2013 INTERMEDIATE DEPTH GROUNDWATER MONITORING WELL
- [-4.77] SLIP 4 SURFACE WATER ELEVATION (FT; NAVD88 DATUM)
- (0.97) INTERMEDIATE-DEPTH GROUNDWATER ELEVATION (FT; NAVD88 DATUM)
- 1.0' INFERRED INTERMEDIATE-DEPTH GROUNDWATER ELEVATION CONTOUR LINE (FT; NAVD88 DATUM)
- GENERAL INTERMEDIATE-DEPTH GROUNDWATER FLOW DIRECTION

NOTES

1. DRAWING COMPILED FROM TRIAD ASSOCIATES, KIRKLAND, WA. SURVEY PLAN, DRAWING 06133-CC052908.DWG.
2. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

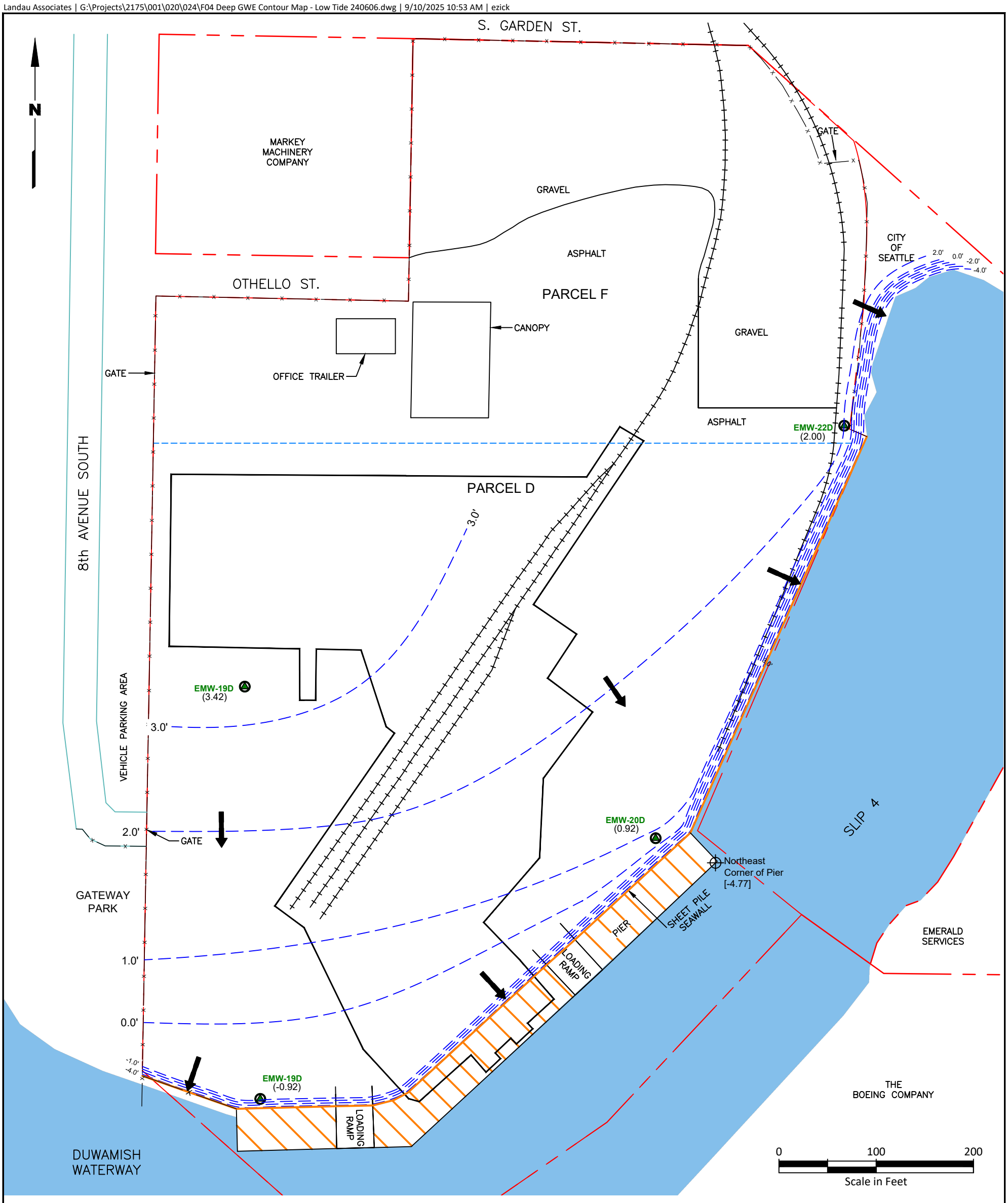
Source: SLR, 2023

LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Intermediate-Depth Groundwater Elevation Contour Map - June 6, 2024 Low Tide Conditions

Figure 3



LEGEND

- PARCEL D/PARCEL F BOUNDARY
- PROPERTY BOUNDARIES
- RAIL LINE
- FENCE
- SHEET PILE SEAWALL
- OPERATIONS CONTAINMENT AREA (OCA) (MIN. 6" ASPHALT CONTAINMENT BERM)
- 2014 DEEP GROUNDWATER MONITORING WELL
- [-4.77] SLIP 4 SURFACE WATER ELEVATION (FT; NAVD88 DATUM)
- (3.42) DEEP GROUNDWATER ELEVATION (FT; NAVD88 DATUM)
- 1.0' INFERRED DEEP GROUNDWATER ELEVATION CONTOUR LINE (FT; NAVD88 DATUM)
- GENERAL DEEP GROUNDWATER FLOW DIRECTION

NOTES

1. DRAWING COMPILED FROM TRIAD ASSOCIATES, KIRKLAND, WA. SURVEY PLAN, DRAWING 06133-CC052908.DWG.
2. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

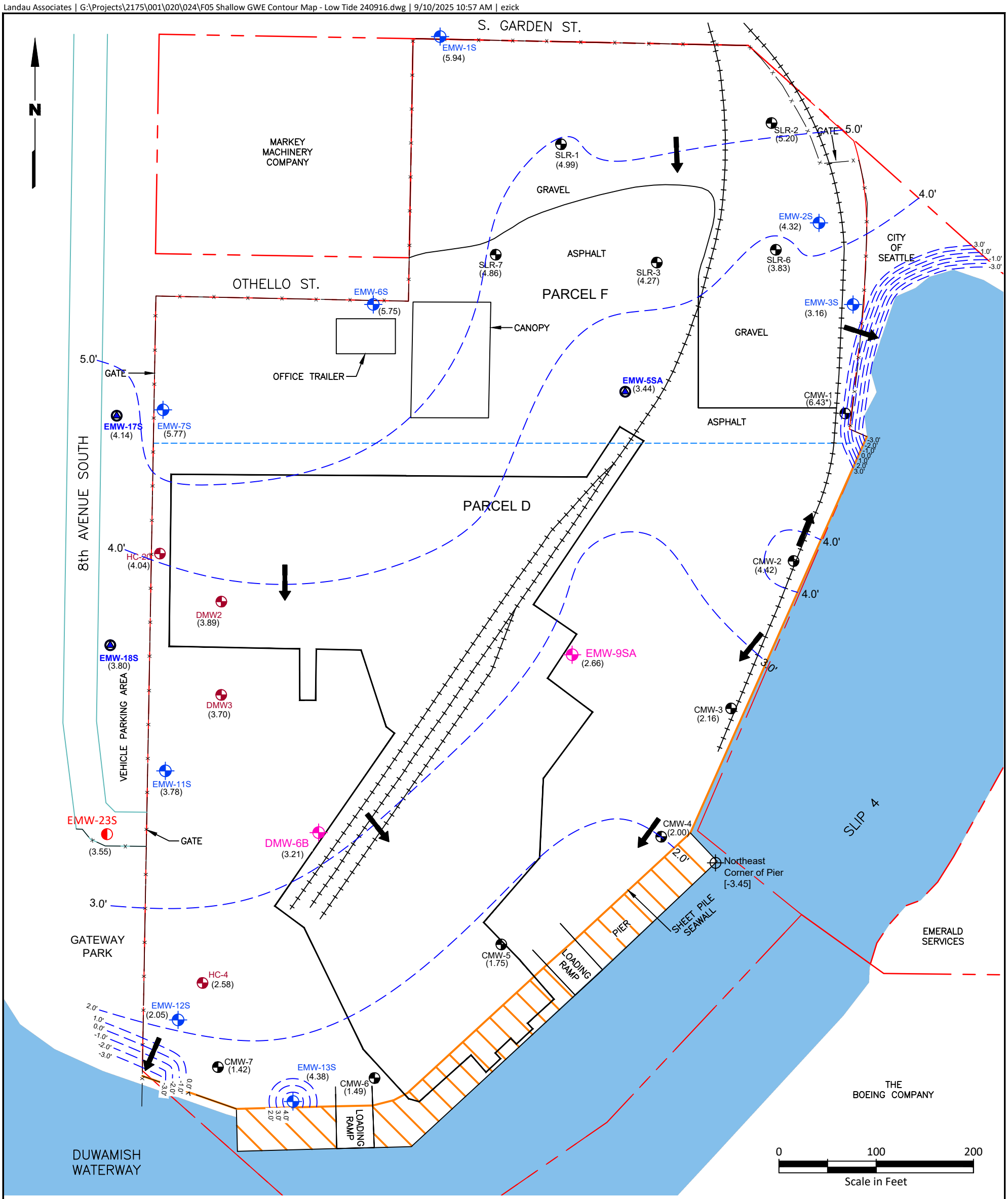
Source: SLR, 2023

LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Deep Groundwater Elevation Contour Map - June 6, 2024 Low Tide Conditions

Figure 4



LEGEND

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- PROPERTY BOUNDARIES
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- OPERATIONS CONTAINMENT AREA (OCA) (MIN. 6" ASPHALT CONTAINMENT BERM)
- -3.0' INFERRED SHALLOW GROUNDWATER ELEVATION CONTOUR LINE (FT; NAVD88 DATUM)
- 2024 SHALLOW GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- 2020 REPLACEMENT SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 2013 SHALLOW GROUNDWATER MONITORING WELL
- 2008 SHALLOW GROUNDWATER MONITORING WELL
- 1989 OR 1990 SHALLOW GROUNDWATER MONITORING WELL
- 2014 SHALLOW GROUNDWATER MONITORING WELL
- [-3.45] SLIP 4 SURFACE WATER ELEVATION (FT; NAVD88 DATUM)
- (1.75) SHALLOW GROUNDWATER ELEVATION (FT; NAVD88 DATUM)
- GENERAL SHALLOW GROUNDWATER FLOW DIRECTION

NOTES

1. DRAWING COMPILED FROM TRIAD ASSOCIATES, KIRKLAND, WA. SURVEY PLAN, DRAWING 06133-CC052908.DWG.
2. * = THE GROUNDWATER ELEVATION WAS ANOMALOUS AND NOT USED FOR CONTOURING.
3. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

Source: SLR, 2023

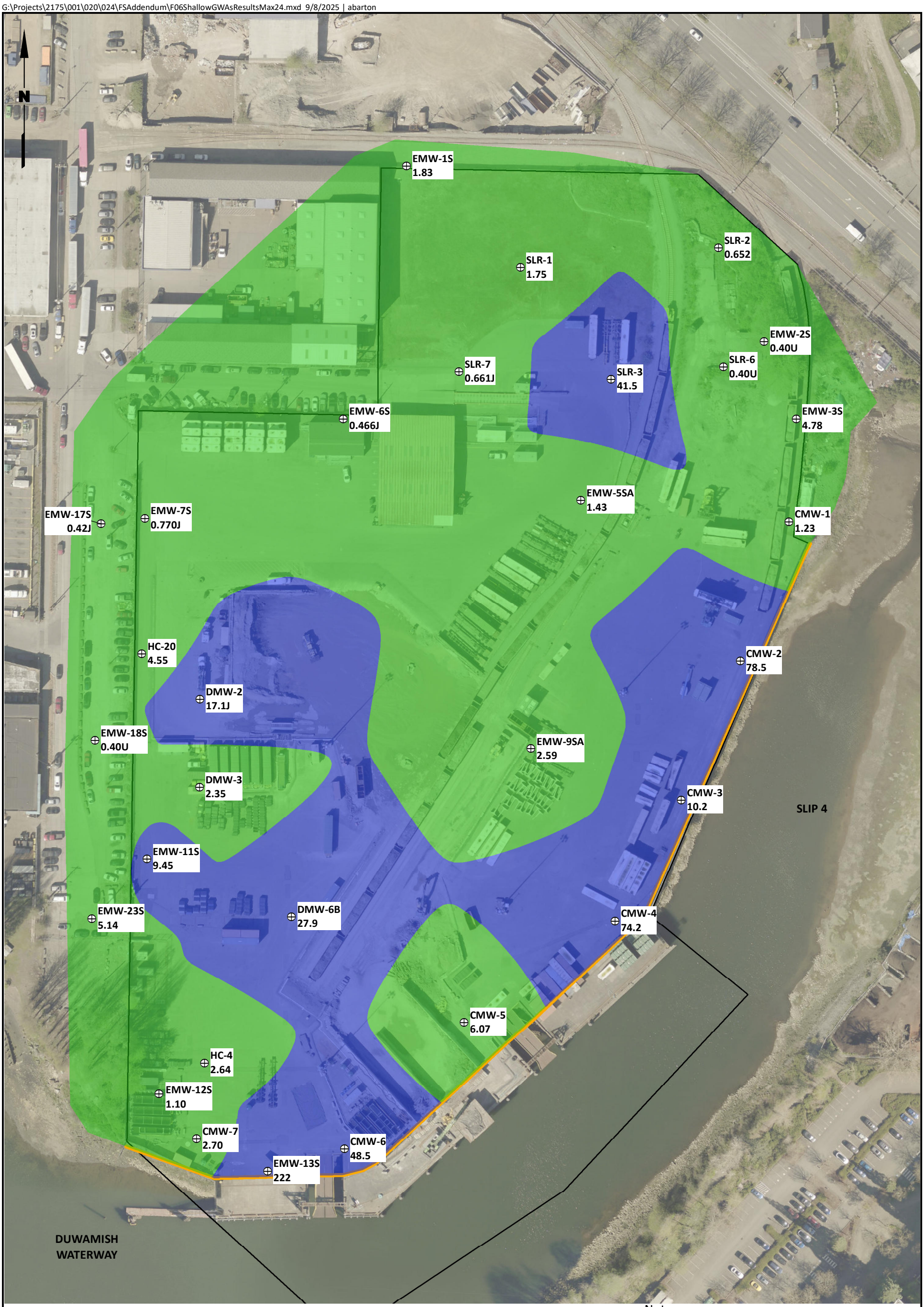
LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Shallow Groundwater Elevation Contour Map - September 16, 2024 Low Tide Conditions

Figure 5

G:\Projects\2175\001\020\024\FSAddendum\F06ShallowGWAsResultsMax24.mxd 9/8/2025 | abarton



Legend

- Shallow Monitoring Well Location
- Sheet Pile Seawall
- Property Boundary

Dissolved Arsenic Concentration (µg/L)

- < 8.0 (cleanup level)
- > 8.0

Notes

1. U = not detected above the reported method quantitation limit. For a non-detect value, ½ of the highest method quantitation limit was compared to the cleanup level.
2. J = laboratory estimated value
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 100 200

Scale in Feet

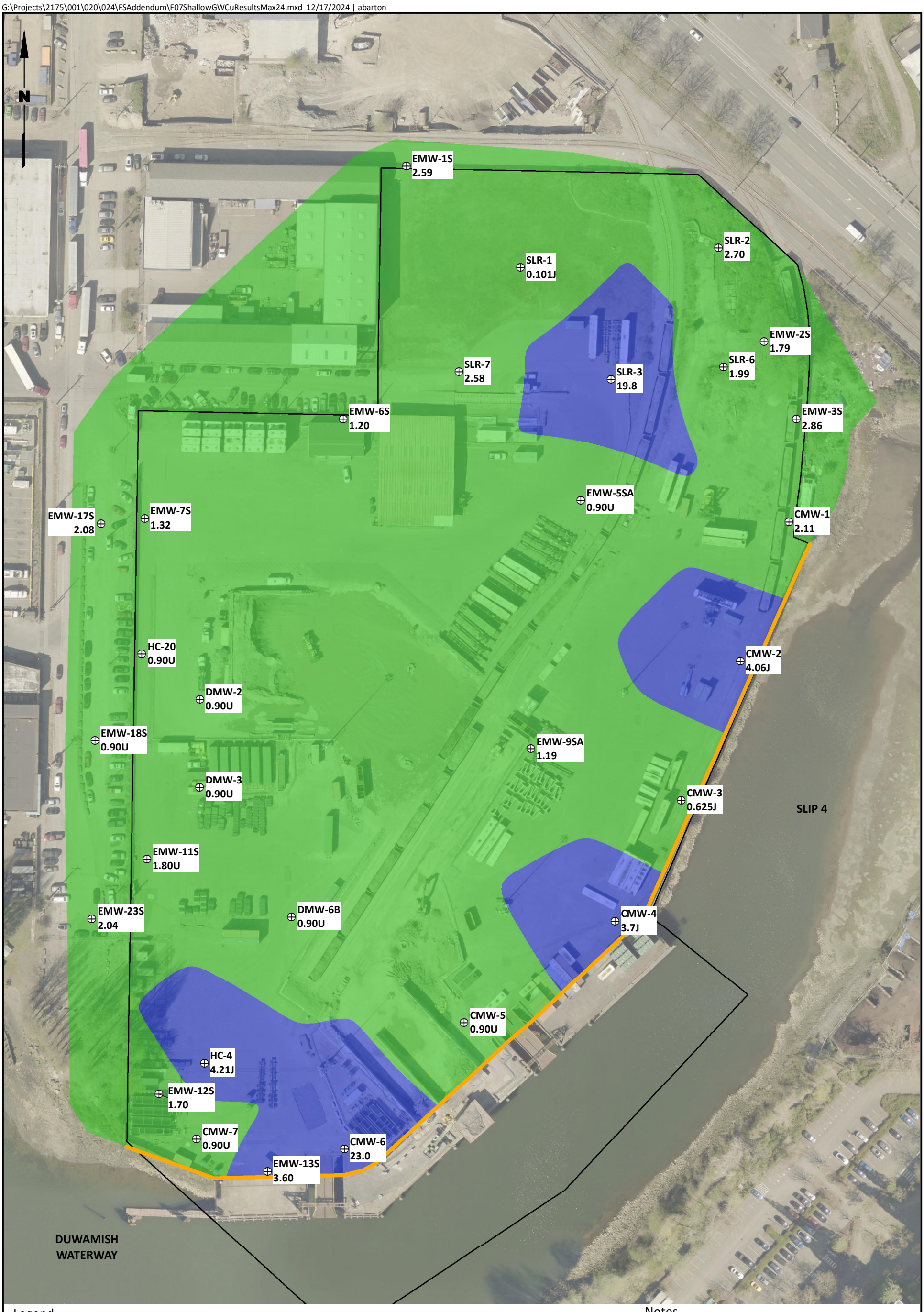
LANDAU ASSOCIATES

8th Avenue Terminals, Inc. Site
7400 8th Avenue South
Seattle, Washington

Maximum Dissolved Arsenic Concentrations in Groundwater Samples From Shallow Monitoring Wells in 2024

Figure 6

G:\Projects\2175\001\020\024\FSAddendum\F07ShallowGWCuResultsMax24.mxd 12/17/2024 | abarton



Legend

- Shallow Monitoring Well Location
- Sheet Pile Seawall
- Property Boundary

Dissolved Copper Concentration (µg/L)

- < 3.10 (cleanup level)
- > 3.10

Notes

1. U = not detected above the reported method quantitation limit. For a non-detect value, ½ of the highest method quantitation limit was compared to the cleanup level.
2. J = laboratory estimated value
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 100 200

Scale in Feet

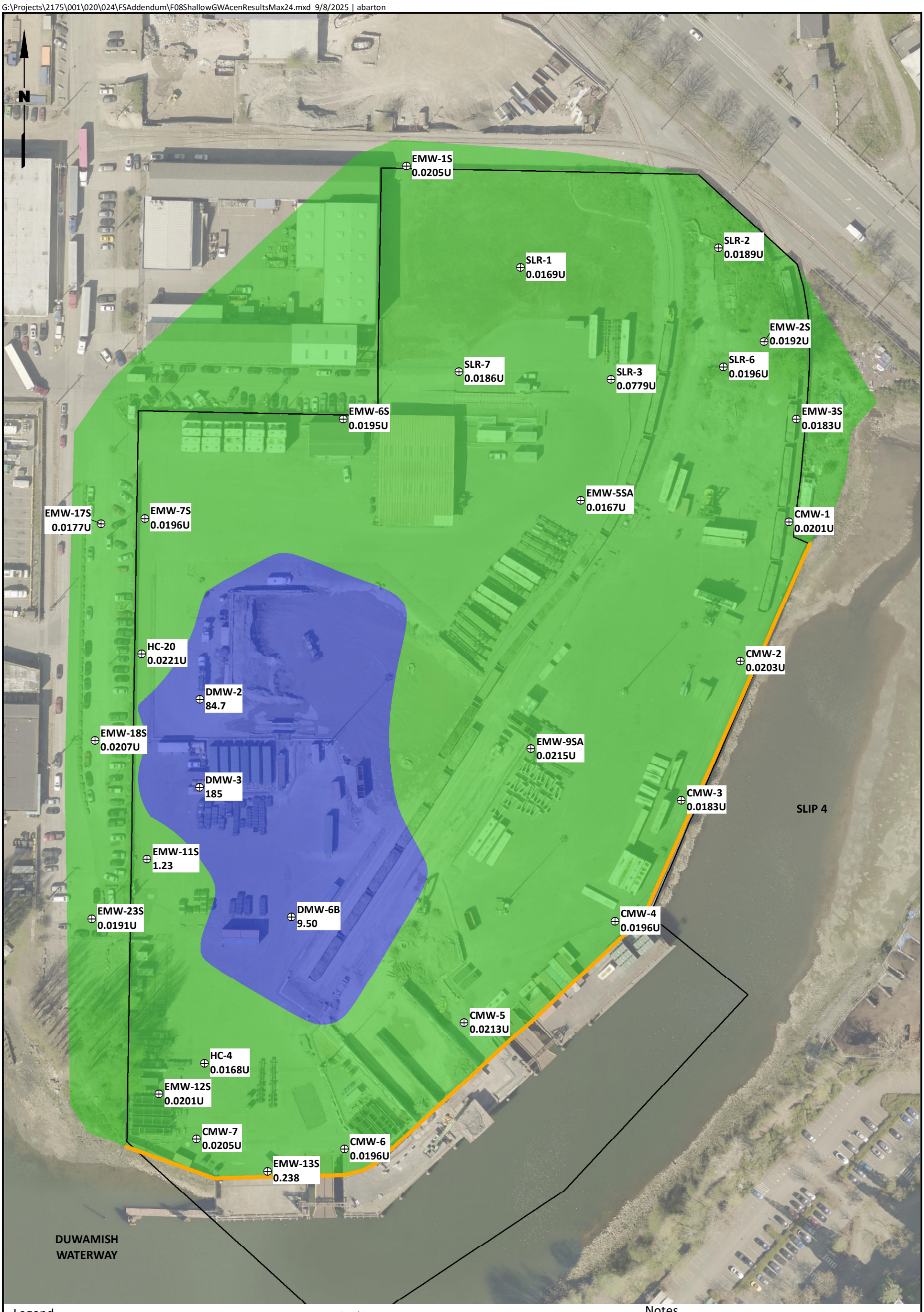
LANDAU ASSOCIATES

8th Avenue Terminals, Inc. Site
7400 8th Avenue South
Seattle, Washington

Maximum Dissolved Copper Concentrations in Groundwater Samples From Shallow Monitoring Wells in 2024

Figure 7

G:\Projects\2175\001\020\024\FSAddendum\F08ShallowGWAcenResultsMax24.mxd 9/8/2025 | abarton



Legend

- ⊕ Shallow Monitoring Well Location
- Sheet Pile Seawall
- Property Boundary

Acenaphthene Concentration (µg/L)

- < 5.34 (cleanup level)
- > 5.34

Notes

1. U = not detected above the reported method quantitation limit. For a non-detect value, ½ of the highest method quantitation limit was compared to the cleanup level.
2. J = laboratory estimated value
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 100 200

Scale in Feet

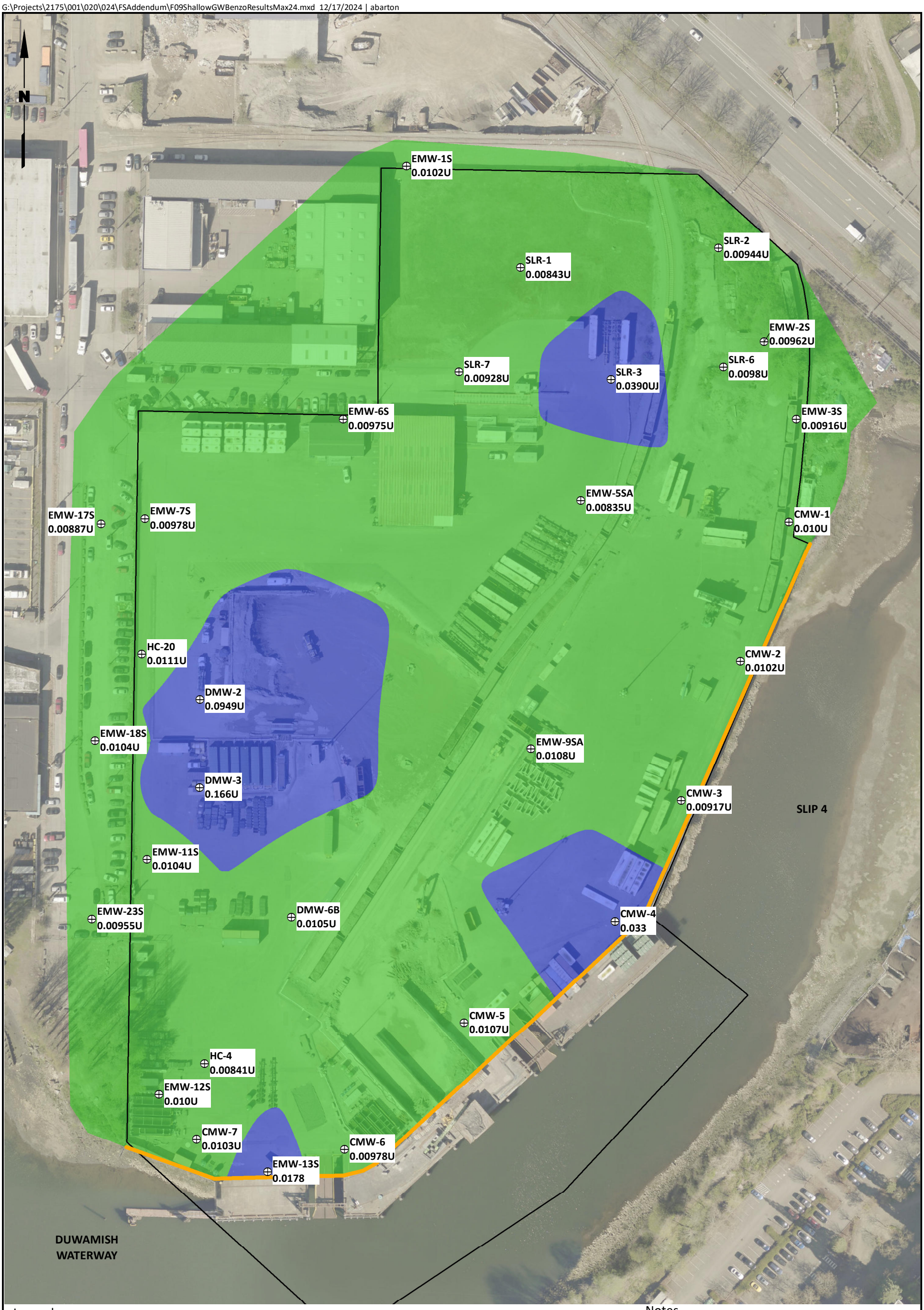
LANDAU ASSOCIATES

8th Avenue Terminals, Inc. Site
7400 8th Avenue South
Seattle, Washington

Maximum Acenaphthene Concentrations in Groundwater Samples From Shallow Monitoring Wells in 2024

Figure 8

G:\Projects\2175\001\020\024\FSAddendum\F09ShallowGWBenzoResultsMax24.mxd 12/17/2024 | abarton



Legend

- ⊕ Shallow Monitoring Well Location
- Sheet Pile Seawall
- Property Boundary

Benzo(a)pyrene Concentration (µg/L)

- < 0.015 (cleanup level)
- > 0.015

Notes

1. U = not detected above the reported method quantitation limit. For a non-detect value, ½ of the highest method quantitation limit was compared to the cleanup level.
2. J = laboratory estimated value
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 100 200

Scale in Feet

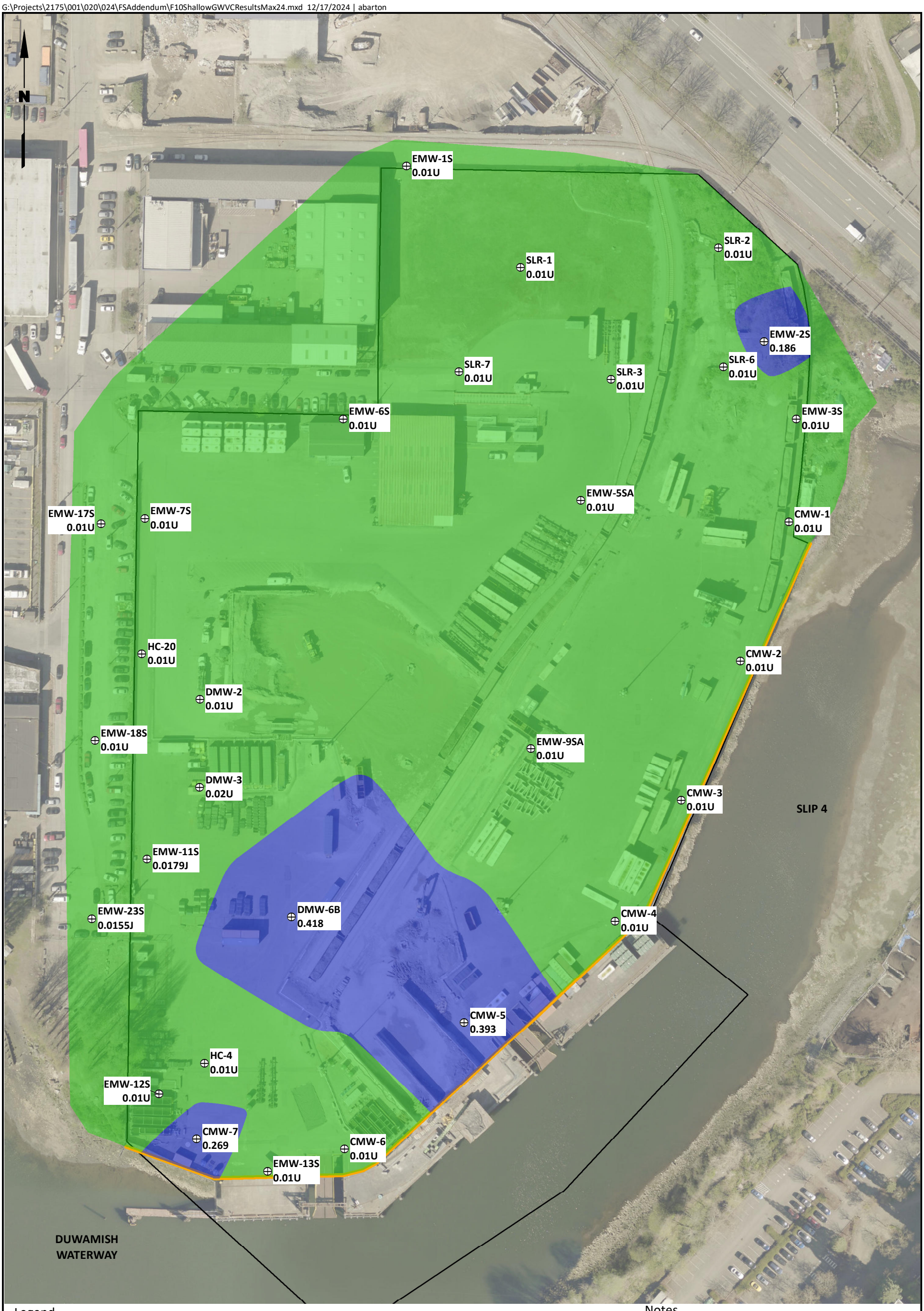
LANDAU ASSOCIATES

8th Avenue Terminals, Inc. Site
7400 8th Avenue South
Seattle, Washington

Maximum Benzo(a)pyrene Concentrations in Groundwater Samples From Shallow Monitoring Wells in June 2024

Figure 9

G:\Projects\2175\001\020\024\FSAddendum\F10ShallowGWVCResultsMax24.mxd 12/17/2024 | abarton



Legend

- ⊕ Shallow Monitoring Well Location
- Sheet Pile Seawall
- Property Boundary

Vinyl Chloride Concentration (µg/L)

- < 0.18 (cleanup level)
- > 0.18

Notes

1. U = not detected above the reported method quantitation limit. For a non-detect value, ½ of the highest method quantitation limit was compared to the cleanup level.
2. J = laboratory estimated value
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 100 200

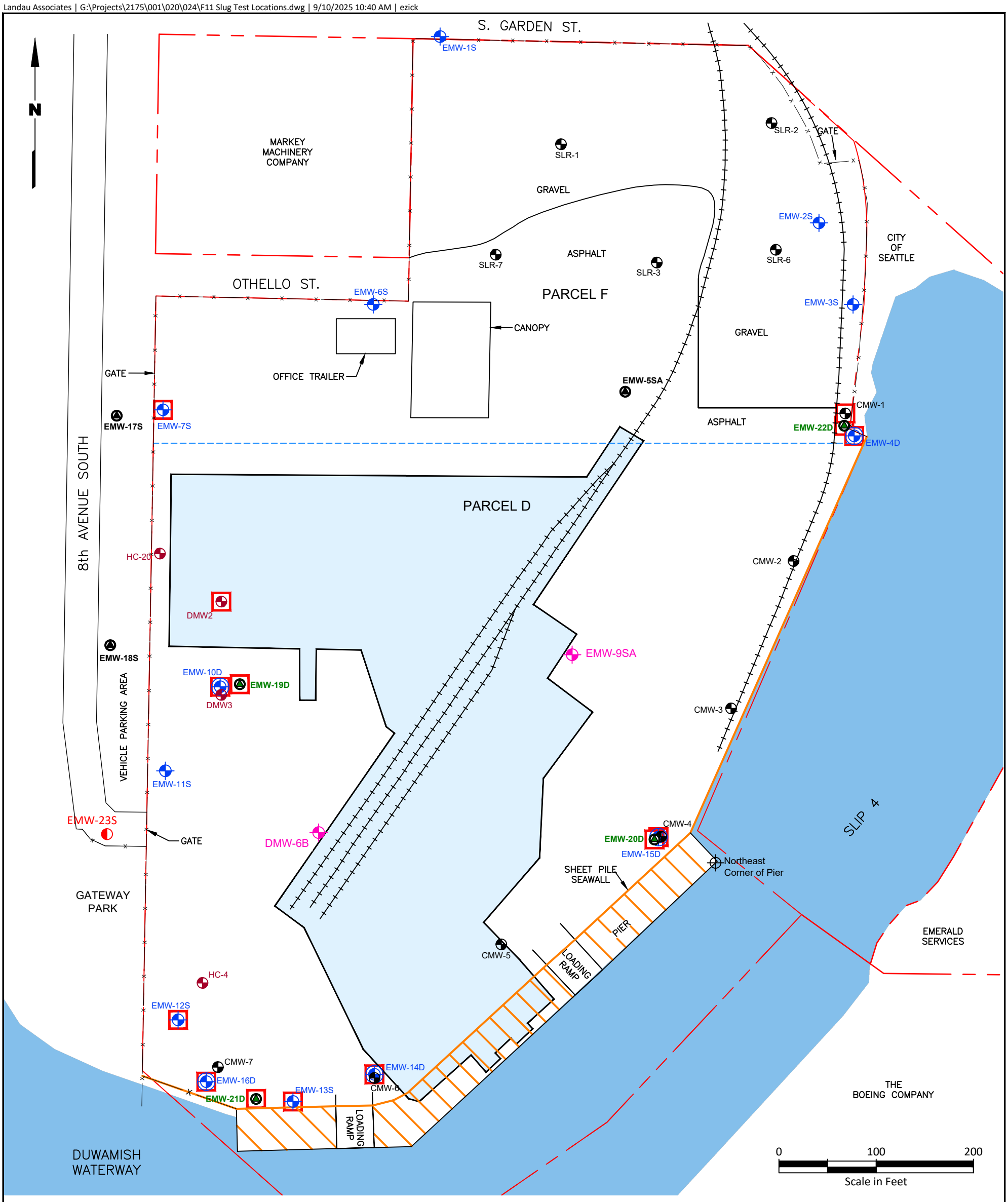
Scale in Feet

LANDAU ASSOCIATES

8th Avenue Terminals, Inc. Site
7400 8th Avenue South
Seattle, Washington

Maximum Vinyl Chloride Concentrations in Groundwater Samples From Shallow Monitoring Wells in June 2024

Figure 10



LEGEND

- PARCEL D/PARCEL F BOUNDARY
- PROPERTY BOUNDARIES
- RAIL LINE
- FENCE
- SHEET PILE SEAWALL
- OPERATIONS CONTAINMENT AREA (OCA) (MIN. 6" ASPHALT CONTAINMENT BERM)
- PROPOSED SHALLOW GROUNDWATER MONITORING WELL
- 2020 REPLACEMENT SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 2013 SHALLOW GROUNDWATER MONITORING WELL
- 2013 INTERMEDIATE-DEPTH GROUNDWATER MONITORING WELL
- 2008 GROUNDWATER MONITORING WELL
- 1989 OR 1990 GROUNDWATER MONITORING WELL
- 2014 SHALLOW GROUNDWATER MONITORING WELL
- 2014 DEEP GROUNDWATER MONITORING WELL
- SLUG TEST LOCATION

NOTES

1. DRAWING COMPILED FROM TRIAD ASSOCIATES, KIRKLAND, WA. SURVEY PLAN, DRAWING 06133-CC052908.DWG.
2. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

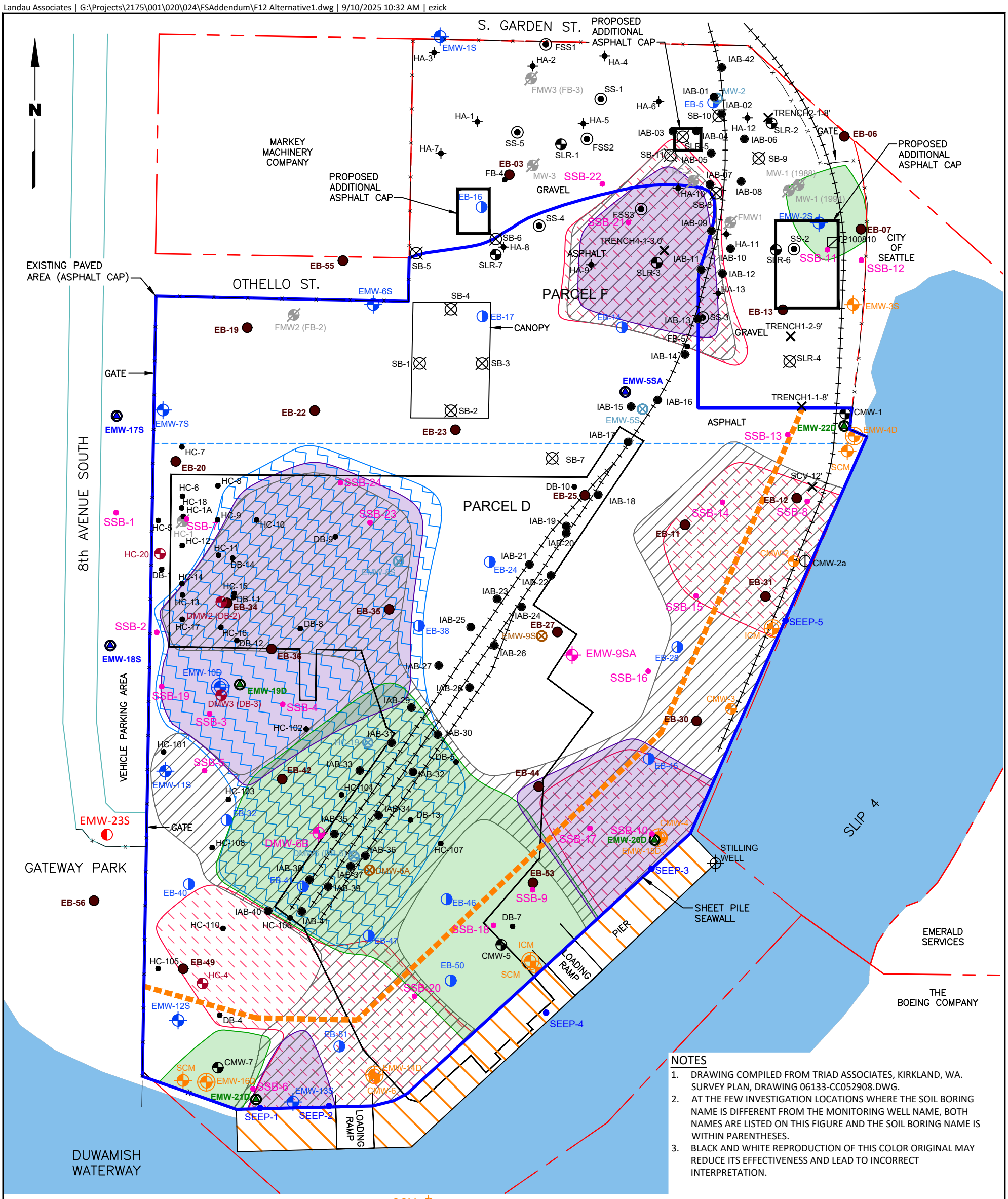
Source: SLR, 2023

LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Slug Test Locations

Figure 11



NOTES

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2. AT THE FEW INVESTIGATION LOCATIONS WHERE THE SOIL BORING NAME IS DIFFERENT FROM THE MONITORING WELL NAME, BOTH NAMES ARE LISTED ON THIS FIGURE AND THE SOIL BORING NAME IS WITHIN PARENTHESES.
3. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

LEGEND

- APPROXIMATE AREA OF ARSENIC-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF ACENAPHTHENE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF COPPER-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF BENZO(A)PYRENE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF VINYL CHLORIDE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- OPERATIONS CONTAINMENT AREA (OCA) 6" ASPHALT CONTAINMENT BERM)
- GROUNDWATER CUTOFF WALL
- PARCEL D/PARCEL F BOUNDARY
- PROPERTY BOUNDARIES
- RAIL LINE
- FENCE

- SCM PROPOSED SHALLOW GROUNDWATER COMPLIANCE WELL
- ICM PROPOSED INTERMEDIATE-DEPTH GROUNDWATER COMPLIANCE WELL
- 2020 SOIL BORING LOCATION AND DESIGNATION
- 2020 REPLACEMENT SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 2013 SOIL BORING
- 2013 SHALLOW GROUNDWATER MONITORING WELL
- 2013 INTERMEDIATE-DEPTH GROUNDWATER MONITORING WELL
- 2012 TRENCH SAMPLE
- 2008 GROUNDWATER MONITORING WELL
- 1989 OR 1990 GROUNDWATER MONITORING WELL (ABANDONED OR DESTROYED)
- 1989 OR 1990 GROUNDWATER MONITORING WELL
- 1989 OR 1990 SOIL BORING (APPROX. LOCATION)
- 1989 OR 1990 SURFACE SOIL SAMPLE (APPROXIMATE LOCATION)
- 1994 SOIL BORING (APPROXIMATE LOCATION)
- 2008 SOIL BORING (APPROXIMATE LOCATION)
- 2009 SOIL BORING (APPROXIMATE LOCATION)
- 2010 TEST PIT (APPROXIMATE LOCATION)
- 2013 GROUNDWATER SEEP SAMPLE
- JULY 2014 SOIL BORING
- DECOMMISSIONED GROUNDWATER MONITORING WELL
- DECEMBER 2014 SOIL BORING
- 2014 SHALLOW GROUNDWATER MONITORING WELL
- 2014 DEEP GROUNDWATER MONITORING WELL
- 2018 DESTROYED GROUNDWATER MONITORING WELL
- 2024 SHALLOW GROUNDWATER MONITORING WELL

Source: SLR, 2022

LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Alternative 1 - Surface Capping, Groundwater Cutoff, MNA, and Institutional Controls

Figure 12

S. GARDEN ST.
PROPOSED ADDITIONAL ASPHALT CAP
MARKEY MACHINERY COMPANY
PROPOSED ADDITIONAL ASPHALT CAP
EXISTING PAVED AREA (ASPHALT CAP)
OTHELLO ST.
PARCEL F
PARCEL D
ASPHALT
GRAVEL
CANOPY
GATE
8th AVENUE SOUTH
VEHICLE PARKING AREA
GATEWAY PARK
DUWAMISH WATERWAY
CITY OF SEATTLE
EMERALD SERVICES
THE BOEING COMPANY
SLIP 4
PIER
LOADING RAMP
SHEET PILE SEAWALL
STILLING WELL
ICM
SCM
EMW-1S
FSS1
HA-3
HA-2
HA-4
FMW3 (FB-3)
SS-1
HA-1
HA-5
HA-6
SS-5
SLR-1
FSS2
HA-7
EB-03
FB-4
MW-3
SSB-22
EB-16
SB-6
SS-4
SB-5
SLR-7
HA-8
EB-55
SSB-21
FSS3
TRENCH4-1-3.0'
SLR-3
HA-9
IAB-01
MW-2
EB-5
IAB-02
SB-10
TRENCH2-1-8'
SLR-2
GATE
EB-06
IAB-42
IAB-03
IAB-04
SLR-5
IAB-06
HA-12
SB-11
IAB-05
SB-9
IAB-07
IAB-08
HA-10
SB-8
MW-1 (1988)
MW-1 (1994)
PROPOSED ADDITIONAL ASPHALT CAP
FMW1
EMW-2S
EB-07
SS-2
SLR-6
SSB-11
SSB-12
CITY OF SEATTLE
IAB-09
HA-11
IAB-10
IAB-12
HA-13
IAB-13
SS-3
EB-13
TRENCH1-2-9'
GRAVEL
EMW-3S
EB-14
EB-5
IAB-14
SLR-4
EB-19
FMW2 (FB-2)
EMW-6S
SB-4
EB-17
SB-1
SB-3
SB-2
EB-22
EB-23
EMW-5SA
IAB-15
IAB-16
EMW-5S
TRENCH1-1-8'
CMW-1
EMW-4D
EMW-22D
SSB-13
ASPHALT
EMW-17S
EMW-7S
HC-7
EB-20
SB-7
IAB-17
DB-10
EB-25
IAB-18
SSB-24
SSB-23
SSB-1
SSB-7
HC-5
HC-1
HC-20
DB-1
HC-6
HC-18
HC-1A
HC-12
HC-8
HC-9
HC-10
HC-11
DB-14
DB-9
HC-14
HC-15
DB-11
EB-34
DMW2 (DB-2)
HC-13
HC-17
HC-16
DB-12
DB-8
EB-35
EB-36
EB-38
IAB-25
EB-27
EMW-9S
IAB-26
EMW-9SA
IAB-27
IAB-28
EB-28
SSB-16
SSB-15
SCV-12'
EB-12
SSB-8
SSB-14
EB-11
CMW-2
CMW-2a
EB-31
SEEP-5
ICM
EMW-10D
EMW-19D
DMW3 (DB-3)
SSB-19
SSB-4
SSB-3
HC-102
IAB-29
IAB-30
IAB-31
HC-19
DB-5
HC-101
SSB-5
EMW-11S
EB-42
IAB-33
IAB-32
EB-44
EB-45
HC-103
HC104
IAB-34
DB-13
EB32
IAB-35
CMW-4
EMW-15D
SSB-10
EMW-20D
SSB-17
SCM
STILLING WELL
EMW-23S
GATE
HC108
DMW-6B
DMW6 (DB-6)
IAB-36
HC-107
DMW-6A
IAB-37
IAB-38
EB-41
IAB-39
EB-53
SSB-9
SEEP-3
EB-40
EB-56
EB-46
IAB-40
IAB-41
HC-110
HC-106
SSB-18
DB-7
EB-47
CMW-5
HC-105
EB-49
HC-4
EB-50
SSB-20
EMW-12S
DB-4
SEEP-4
EB-51
EMW-14D
CMW-6
CMW-7
EMW-16D
SSB-6
EMW-13S
EMW-21D
SEEP-1
SEEP-2
LOADING RAMP
0
100
200
Scale in Feet
Source: SLR, 2022

NOTES

1. DRAWING COMPILED FROM TRIAD ASSOCIATES, KIRKLAND, WA. SURVEY PLAN, DRAWING 06133-CC052908.DWG.
2. AT THE FEW INVESTIGATION LOCATIONS WHERE THE SOIL BORING NAME IS DIFFERENT FROM THE MONITORING WELL NAME, BOTH NAMES ARE LISTED ON THIS FIGURE AND THE SOIL BORING NAME IS WITHIN PARENTHESES.
3. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

LEGEND

- APPROXIMATE AREA OF ARSENIC-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF ACENAPHTHENE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF COPPER-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF BENZO(A)PYRENE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF VINYL CHLORIDE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- OPERATIONS CONTAINMENT AREA (OCA) 6" ASPHALT CONTAINMENT BERM)
- PERMEABLE REACTIVE BARRIER
- PARCEL D/PARCEL F BOUNDARY
- PROPERTY BOUNDARIES
- RAIL LINE
- FENCE

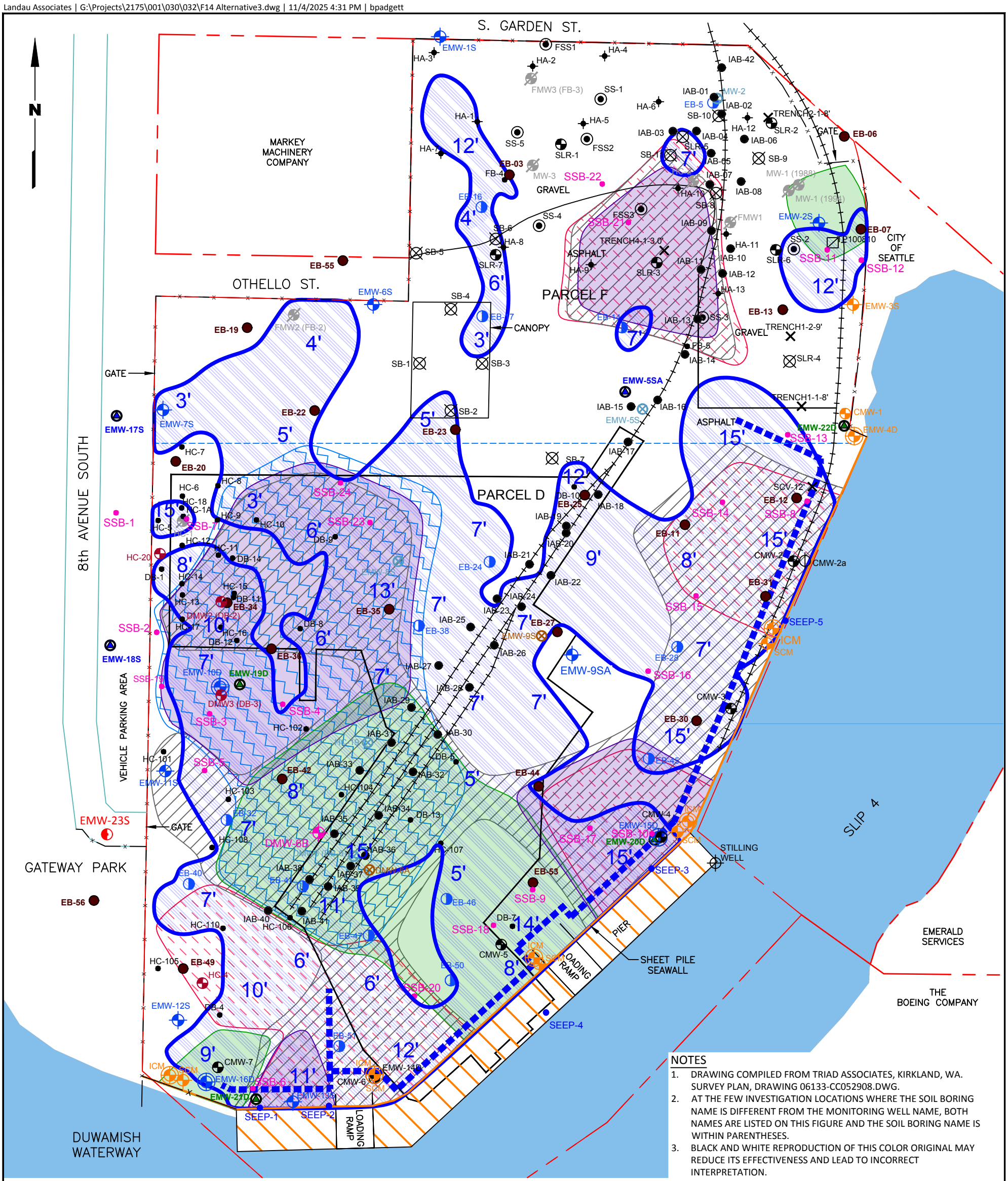
- SCM PROPOSED SHALLOW GROUNDWATER COMPLIANCE WELL
- ICM PROPOSED INTERMEDIATE-DEPTH GROUNDWATER COMPLIANCE WELL
- 2020 SOIL BORING LOCATION AND DESIGNATION
- 2020 REPLACEMENT SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 2013 SOIL BORING
- 2013 SHALLOW GROUNDWATER MONITORING WELL
- 2013 INTERMEDIATE-DEPTH GROUNDWATER MONITORING WELL
- 2012 TRENCH SAMPLE
- 2008 GROUNDWATER MONITORING WELL
- 1989 OR 1990 GROUNDWATER MONITORING WELL (ABANDONED OR DESTROYED)
- 1989 OR 1990 GROUNDWATER MONITORING WELL
- 1989 OR 1990 SOIL BORING (APPROX. LOCATION)
- 1989 OR 1990 SURFACE SOIL SAMPLE (APPROXIMATE LOCATION)
- 1994 SOIL BORING (APPROXIMATE LOCATION)
- 2008 SOIL BORING (APPROXIMATE LOCATION)
- 2009 SOIL BORING (APPROXIMATE LOCATION)
- 2010 TEST PIT (APPROXIMATE LOCATION)
- 2013 GROUNDWATER SEEP SAMPLE
- JULY 2014 SOIL BORING
- DECOMMISSIONED GROUNDWATER MONITORING WELL
- DECEMBER 2014 SOIL BORING
- 2014 SHALLOW GROUNDWATER MONITORING WELL
- 2014 DEEP GROUNDWATER MONITORING WELL
- 2018 DESTROYED GROUNDWATER MONITORING WELL
- 2024 SHALLOW GROUNDWATER MONITORING WELL

LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Alternative 2 - Surface Capping, Groundwater Treatment, MNA, and Institutional Controls

Figure 13



NOTES

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3. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

LEGEND

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- APPROXIMATE AREA OF ACENAPHTHENE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF COPPER-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF BENZO(A)PYRENE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF VINYL CHLORIDE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- OPERATIONS CONTAINMENT AREA (OCA) 6" ASPHALT CONTAINMENT BERM)
- PERMEABLE REACTIVE BARRIER
- AREA OF IN-SITU SOLIDIFICATION/STABILIZATION (ISS)
- 6' APPROXIMATE DEPTH OF ISS
- PARCEL D/PARCEL F BOUNDARY
- PROPERTY BOUNDARIES
- RAIL LINE
- FENCE
- SCM PROPOSED SHALLOW GROUNDWATER COMPLIANCE WELL
- ICM PROPOSED INTERMEDIATE-DEPTH GROUNDWATER COMPLIANCE WELL
- 2020 SOIL BORING LOCATION AND DESIGNATION
- 2020 REPLACEMENT SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 2013 SOIL BORING
- 2013 SHALLOW GROUNDWATER MONITORING WELL
- 2013 INTERMEDIATE-DEPTH GROUNDWATER MONITORING WELL
- 2012 TRENCH SAMPLE
- 2008 GROUNDWATER MONITORING WELL
- 1989 OR 1990 GROUNDWATER MONITORING WELL (ABANDONED OR DESTROYED)
- 1989 OR 1990 GROUNDWATER MONITORING WELL
- 1989 OR 1990 SOIL BORING (APPROX. LOCATION)
- 1989 OR 1990 SURFACE SOIL SAMPLE (APPROXIMATE LOCATION)
- 1994 SOIL BORING (APPROXIMATE LOCATION)
- 2008 SOIL BORING (APPROXIMATE LOCATION)
- 2009 SOIL BORING (APPROXIMATE LOCATION)
- 2010 TEST PIT (APPROXIMATE LOCATION)
- 2013 GROUNDWATER SEEP SAMPLE
- JULY 2014 SOIL BORING
- DECOMMISSIONED GROUNDWATER MONITORING WELL
- DECEMBER 2014 SOIL BORING
- 2014 SHALLOW GROUNDWATER MONITORING WELL
- 2014 DEEP GROUNDWATER MONITORING WELL
- 2018 DESTROYED GROUNDWATER MONITORING WELL
- 2024 SHALLOW GROUNDWATER MONITORING WELL

0 100 200
Scale in Feet

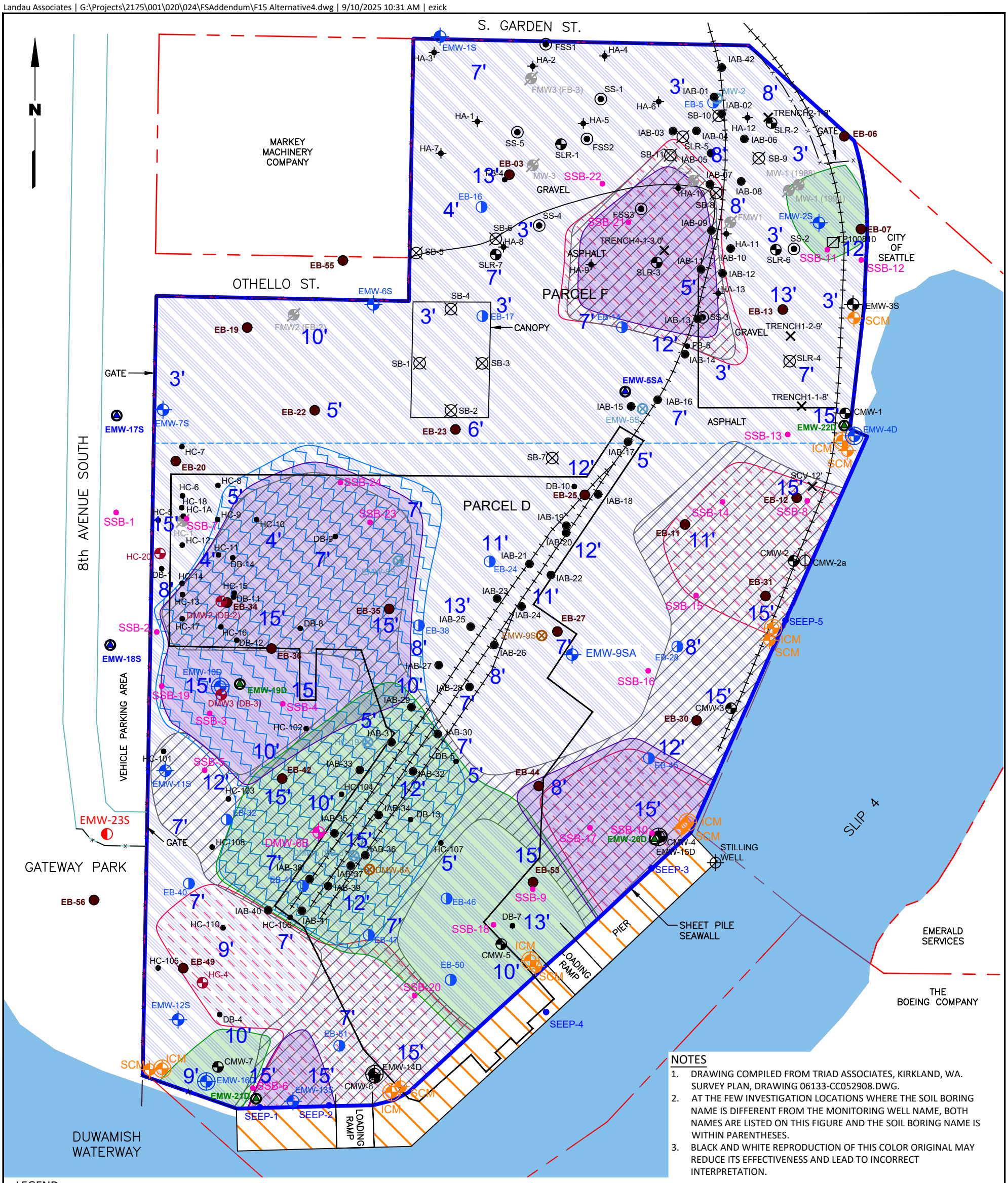
Source: SLR, 2022

LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Alternative 3 - ISS, Groundwater Treatment, and MNA

Figure 14



NOTES

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3. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

LEGEND

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- APPROXIMATE AREA OF ACENAPHTHENE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF COPPER-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF BENZO(A)PYRENE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF VINYL CHLORIDE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- OPERATIONS CONTAINMENT AREA (OCA) 6" ASPHALT CONTAINMENT BERM)
- AREA OF IN-SITU SOLIDIFICATION/STABILIZATION (ISS)
- 6' APPROXIMATE DEPTH OF ISS
- PARCEL D/PARCEL F BOUNDARY
- PROPERTY BOUNDARIES
- RAIL LINE
- FENCE
- SCM PROPOSED SHALLOW GROUNDWATER COMPLIANCE WELL
- ICM PROPOSED INTERMEDIATE-DEPTH GROUNDWATER COMPLIANCE WELL
- 2020 SOIL BORING LOCATION AND DESIGNATION
- 2020 REPLACEMENT SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 2013 SOIL BORING
- 2013 SHALLOW GROUNDWATER MONITORING WELL
- 2013 INTERMEDIATE-DEPTH GROUNDWATER MONITORING WELL
- 2012 TRENCH SAMPLE
- 2008 GROUNDWATER MONITORING WELL
- 1989 OR 1990 GROUNDWATER MONITORING WELL (ABANDONED OR DESTROYED)
- 1989 OR 1990 GROUNDWATER MONITORING WELL
- 1989 OR 1990 SOIL BORING (APPROX. LOCATION)
- 1989 OR 1990 SURFACE SOIL SAMPLE (APPROXIMATE LOCATION)
- 1994 SOIL BORING (APPROXIMATE LOCATION)
- 2008 SOIL BORING (APPROXIMATE LOCATION)
- 2009 SOIL BORING (APPROXIMATE LOCATION)
- 2010 TEST PIT (APPROXIMATE LOCATION)
- 2013 GROUNDWATER SEEP SAMPLE
- JULY 2014 SOIL BORING
- DECOMMISSIONED GROUNDWATER MONITORING WELL
- DECEMBER 2014 SOIL BORING
- 2014 SHALLOW GROUNDWATER MONITORING WELL
- 2014 DEEP GROUNDWATER MONITORING WELL
- 2018 DESTROYED GROUNDWATER MONITORING WELL
- 2024 SHALLOW GROUNDWATER MONITORING WELL

0 100 200
Scale in Feet

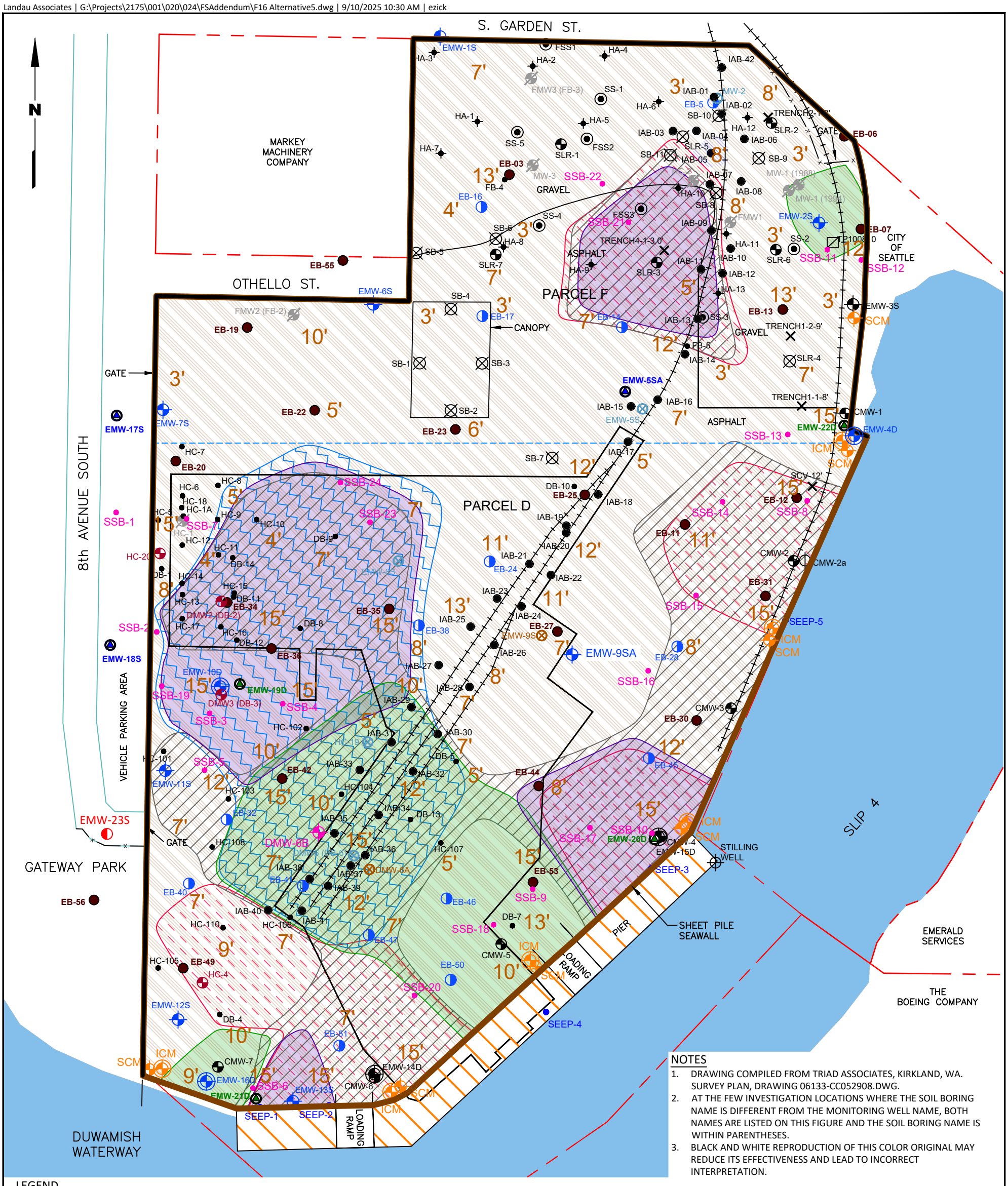
Source: SLR, 2022

LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Alternative 4 - ISS and MNA

Figure 15



LEGEND

- APPROXIMATE AREA OF ARSENIC-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF ACENAPHTHENE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF COPPER-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF BENZO(A)PYRENE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- APPROXIMATE AREA OF VINYL CHLORIDE-IMPACTED SHALLOW GROUNDWATER ON SUBJECT PROPERTY
- OPERATIONS CONTAINMENT AREA (OCA) 6" ASPHALT CONTAINMENT BERM)
- APPROXIMATE AREA OF SOIL EXCAVATION
- 6' APPROXIMATE DEPTH OF SOIL EXCAVATION
- CDF GRAVITY SHORING WALL
- PARCEL D/PARCEL F BOUNDARY
- PROPERTY BOUNDARIES
- RAIL LINE
- FENCE

- SCM PROPOSED SHALLOW GROUNDWATER COMPLIANCE WELL
- ICM PROPOSED INTERMEDIATE-DEPTH GROUNDWATER COMPLIANCE WELL
- 2020 SOIL BORING LOCATION AND DESIGNATION
- 2020 REPLACEMENT SHALLOW GROUNDWATER MONITORING WELL LOCATION
- 2013 SOIL BORING
- 2013 SHALLOW GROUNDWATER MONITORING WELL
- 2013 INTERMEDIATE-DEPTH GROUNDWATER MONITORING WELL
- 2012 TRENCH SAMPLE
- 2008 GROUNDWATER MONITORING WELL
- 1989 OR 1990 GROUNDWATER MONITORING WELL (ABANDONED OR DESTROYED)
- 1989 OR 1990 GROUNDWATER MONITORING WELL
- 1989 OR 1990 SOIL BORING (APPROX. LOCATION)
- 1989 OR 1990 SURFACE SOIL SAMPLE (APPROXIMATE LOCATION)
- 1994 SOIL BORING (APPROXIMATE LOCATION)
- 2008 SOIL BORING (APPROXIMATE LOCATION)
- 2009 SOIL BORING (APPROXIMATE LOCATION)
- 2010 TEST PIT (APPROXIMATE LOCATION)
- 2013 GROUNDWATER SEEP SAMPLE
- JULY 2014 SOIL BORING
- DECOMMISSIONED GROUNDWATER MONITORING WELL
- DECEMBER 2014 SOIL BORING
- 2014 SHALLOW GROUNDWATER MONITORING WELL
- 2014 DEEP GROUNDWATER MONITORING WELL
- 2018 DESTROYED GROUNDWATER MONITORING WELL
- 2024 SHALLOW GROUNDWATER MONITORING WELL

NOTES

1. DRAWING COMPILED FROM TRIAD ASSOCIATES, KIRKLAND, WA. SURVEY PLAN, DRAWING 06133-CC052908.DWG.
2. AT THE FEW INVESTIGATION LOCATIONS WHERE THE SOIL BORING NAME IS DIFFERENT FROM THE MONITORING WELL NAME, BOTH NAMES ARE LISTED ON THIS FIGURE AND THE SOIL BORING NAME IS WITHIN PARENTHESES.
3. BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

0 100 200
Scale in Feet

Source: SLR, 2022

LANDAU ASSOCIATES

8th Avenue Terminals, Inc Site
7400 8th Avenue South
Seattle, Washington

Alternative 5 - Soil Excavation, Groundwater Recovery, and MNA

Figure 16

Table 1
Proposed Soil Cleanup Levels
8th Avenue Terminals, Inc. Site
Seattle, Washington

Indicator Hazardous Substance (IHS)[a]	Soil, Method C, Industrial Land Use: Direct Contact	Protect Sediment via Groundwater, Saturated Zone (Eq. 747-1)	Protect Surface Water via Groundwater, Saturated Zone (Eq. 747-1)	Natural Background Concentrations (Ecology, 1994 and 2010)	Practical Quantitation Limit (PQL)	Soil Cleanup Level (CUL)
Antimony	1,400	--[b]	--[b]	NA	1.0	1,400
Arsenic[c]	4.10	6.50	0.15	7.30	1.0	7.30[f]
Copper[c]	140,000[f]	0.30	0.069	36	2.0	36
Lead	1,000	--[b]	--[b]	24	0.20	1,000
Acenaphthene[c]	210,000[f]	0.028	0.16	NA	0.0027	0.028
Benzo(a)pyrene[c]	130[f]	0.084	0.000016	NA	0.004	0.004
Total Semi-Volatile Petroleum Hydrocarbons[d]	2,000	--[b]	--[b]	NA	60	2,000
Vinyl chloride	88[f]	NA	0.000056	NA	0.010	0.010
Total Dioxins/Furans (TEQ)	0.0017	--[b]	--[b]	0.0000052	0.000005[e]	0.0017

Notes:

All units in milligrams per kilogram (mg/kg).

NA = Not available.

[a] IHSs were selected in accordance with WAC 173-340-703.

[b] Not applicable because the IHS is not also a groundwater HIS for the Site.

[c] IHS is also a groundwater IHS for the Site.

[d] CUL for diesel-range organics plus oil-range organics.

[e] PQL for OCCD/F

[f] Value is the remediation level (REL) for Alternative 3.

Table 2
Proposed Groundwater Cleanup Levels
8th Avenue Terminals, Inc. Site
Seattle, Washington

Indicator Hazardous Substance (IHS)[a]	Marine Surface Water and Sediment Criteria							Groundwater Criteria			Groundwater Cleanup Level (CUL)
	Aquatic Life - Marine Chronic - Ch. 173-201A WAC	Aquatic Life - Marine Chronic - Clean Water Act §304	Human Health, Consumption of Organisms Only – Marine – Clean Water Act §304	Human Health, Consumption of Organisms Only – National Toxics Rule, 40 CFR 131.45	Human Health, Consumption of Organisms Only - Marine - Ch. 173-201A WAC	Method B, Human Health, Fish Consumption, Standard Formula Value - Ch. 173-340-730 WAC	Protection of Sediment (Mod. Eq. 747-1)	Vapor Intrusion Method C, Industrial Land Use	Natural Background Concentration (Ecology, 2021a)	Practical Quantitation Limit (PQL)	
Arsenic	36	36	0.14	0.14	10	0.98	221	NA	8.0	0.04	8.0
Copper	3.10	3.10	NA	NA	NA	798	13.7	NA	NA	0.10	3.10
Acenaphthene	NA	NA	90	30	110	178	5.34	NA	NA	0.032	5.34
Benzo(a)pyrene	NA	NA	0.00013	0.000016	0.0021	0.0097	0.087	NA	NA	0.015	0.015
Vinyl chloride	NA	NA	1.60	0.18	0.26	1.0	NA	0.33	NA	0.02	0.18

Notes:

All units in micrograms per liter (µg/L)

NA - Not available.

[a] IHSs were selected in accordance with WAC 173-340-703.

Table 3
2024 Soil Sample Analytical Results - Soil Indicator Hazardous Substances
8th Avenue Terminals, Inc. Site
Seattle, Washington

Analyte	Proposed Soil Cleanup Level	Boring ID, Sample ID, Sample Depth, Lab SDG, Sample Date EMW-23S EMW-23S-7.5-8.0 7.5 to 8.0 ft bgs B9197 3/6/2024
Total Petroleum Hydrocarbons (mg/kg; NWTPH-Dx/calc.)		
Total Semivolatile Petroleum Hydrocarbons (a)	2,000	17.4 U
Metals (mg/kg; SW-846 6020B)		
Antimony	1,400	0.702 U
Arsenic	7.3	**1.77**
Copper	36	**14.6**
Lead	1,000	**2.01**
Volatiles (mg/kg; SW-846 8260D SIM)		
Vinyl Chloride	0.010	0.00630 U
Semivolatiles (mg/kg; SW-846 8270E SIM)		
Acenaphthene	0.028	0.00586 U
Benzo(a)pyrene	0.004	0.00586 U
Dioxins/Furans (mg/kg; EPA 8290A/calc.)		
Total Dioxins/Furans TEQ (b)	0.0017	**0.000000398**

Notes:

Bold text indicates detected analyte**.**

Orange shading indicates laboratory method detection limit exceeds applicable cleanup level.

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

(a) Total petroleum hydrocarbons calculated using a value of 1/2 MDL for nondetected analytes.

(b) Dioxin/Furans TEQ was calculated following WAC 173-340-708(1) and using a value of 1/2 MDL for nondetected analytes. Values that were qualified by the lab as "estimated maximum possible concentration" (EMPC) are used at the full reported value.

Abbreviations and Acronyms:

bgs = below ground surface
calc = calculated
EPA = US Environmental Protection Agency
ft = feet
ID = Identification
Lab = laboratory
MDL = method detection limit
mg/kg = milligrams per kilogram
NWTPH = Northwest total petroleum hydrocarbon
SDG = sample delivery group
SIM = selected ion monitoring
TEQ = toxicity equivalence

Table 4
2024 and 2025 Groundwater Monitoring Data
8th Avenue Terminals, Inc. Site
Seattle, Washington

Well Number	Casing Elevation[a] (feet)	Date Measured	Depth to Groundwater[b] (feet)	Groundwater Elevation (feet)	Depth to Surface Water[b] (feet)	Surface Water Elevation (feet)
Northeast Corner of Pier						
Pier	17.04	3/15/2024	--	--	17.58	-0.54
		6/6/2024	--	--	21.81	-4.77
		9/16/2024	--	--	20.49	-3.45
		8/6/2025	--	--	17.93	-0.89
Shallow Groundwater Monitoring Wells						
CMW-1	16.10	3/15/2024	8.91	7.19	-	-
		6/6/2024	9.06	7.04	-	-
		9/16/2024	9.67	6.43	-	-
		8/6/2025	9.89	6.21	-	-
CMW-2	16.30	3/15/2024	6.19	10.11	-	-
		6/6/2024	11.84	4.46	-	-
		9/16/2024	11.88	4.42	-	-
		8/6/2025	12.02	4.28	-	-
CMW-3	16.46	3/15/2024	12.00	4.46	-	-
		6/6/2024	13.34	3.12	-	-
		9/16/2024	14.30	2.16		
		8/6/2025	14.14	2.32		
CMW-4	16.01	3/15/2024	7.65	8.36	-	-
		6/6/2024	14.48	1.53	-	-
		9/16/2024	14.01	2.00	-	-
		8/6/2025	13.83	2.18	-	-
CMW-5	16.60	3/15/2024	8.91	7.69	-	-
		6/6/2024	15.43	1.17	-	-
		9/16/2024	14.85	1.75	-	-
		8/6/2025	14.68	1.92	-	-
CMW-6	16.42	3/15/2024	14.51	1.91	-	-
		6/6/2024	15.61	0.81	-	-
		9/16/2024	14.93	1.49	-	-
		8/6/2025	NM	-	-	-
CMW-7	16.44	3/15/2024	14.71	1.73	-	-
		6/6/2024	15.55	0.89	-	-
		9/16/2024	15.02	1.42	-	-
		8/6/2025	12.73	3.71	-	-
DMW2	16.46	3/15/2024	12.02	4.44	-	-
		6/6/2024	12.70	3.76	-	-
		9/16/2024	12.57	3.89	-	-
		8/6/2025	12.73	3.73	-	-

Table 4
2024 and 2025 Groundwater Monitoring Data
8th Avenue Terminals, Inc. Site
Seattle, Washington

Well Number	Casing Elevation[a] (feet)	Date Measured	Depth to Groundwater[b] (feet)	Groundwater Elevation (feet)	Depth to Surface Water[b] (feet)	Surface Water Elevation (feet)
Shallow Groundwater Monitoring Wells (continued)						
DMW3	16.47	3/15/2024	12.31	4.16	-	-
		6/6/2024	12.92	3.55	-	-
		9/16/2024	12.77	3.70	-	-
		8/6/2025	12.75	3.72	-	-
DMW-6B	16.30	3/15/2024	12.65	3.65	-	-
		6/6/2024	13.36	2.94	-	-
		9/16/2024	13.09	3.21	-	-
		8/6/2025	13.11	3.19	-	-
HC-4	16.45	3/15/2024	13.56	2.89	-	-
		6/6/2024	14.25	2.20	-	-
		9/16/2024	13.87	2.58	-	-
		8/6/2025	13.92	2.53	-	-
HC-20	16.66	3/15/2024	12.04	4.62	-	-
		6/6/2024	12.71	3.95	-	-
		9/16/2024	12.62	4.04	-	-
		8/6/2025	12.62	4.04	-	-
SLR-1	16.25	3/15/2024	10.16	6.09	-	-
		6/6/2024	11.04	5.21	-	-
		9/16/2024	11.26	4.99	-	-
		8/6/2025	11.25	5.00	-	-
SLR-2	15.10	3/15/2024	7.36	7.74	-	-
		6/6/2024	7.99	7.11	-	-
		9/16/2024	9.90	5.20	-	-
		8/6/2025	10.11	4.99	-	-
SLR-3	11.86	3/15/2024	6.66	5.20	-	-
		6/6/2024	7.50	4.36	-	-
		9/16/2024	7.59	4.27	-	-
		8/6/2025	7.58	4.28	-	-
SLR-6	12.37	3/15/2024	7.37	5.00	-	-
		6/6/2024	8.39	3.98	-	-
		9/16/2024	8.54	3.83	-	-
		8/6/2025	8.51	3.86	-	-
SLR-7	14.15	3/15/2024	5.21	8.94	-	-
		6/6/2024	9.16	4.99	-	-
		9/16/2024	9.29	4.86	-	-
		8/6/2025	9.32	4.83	-	-
EMW-1S	16.13	3/15/2024	6.08	10.05	-	-
		6/6/2024	9.79	6.34	-	-
		9/16/2024	10.19	5.94	-	-
		8/6/2025	10.24	5.89	-	-

Table 4
2024 and 2025 Groundwater Monitoring Data
8th Avenue Terminals, Inc. Site
Seattle, Washington

Well Number	Casing Elevation[a] (feet)	Date Measured	Depth to Groundwater[b] (feet)	Groundwater Elevation (feet)	Depth to Surface Water[b] (feet)	Surface Water Elevation (feet)
Shallow Groundwater Monitoring Wells (continued)						
EMW-2S	12.66	3/15/2024	6.88	5.78	-	-
		6/6/2024	7.79	4.87	-	-
		9/16/2024	8.34	4.32	-	-
		8/6/2025	7.96	4.70	-	-
EMW-3S	16.43	3/15/2024	11.34	5.09	-	-
		6/6/2024	12.21	4.22	-	-
		9/16/2024	13.27	3.16	-	-
		8/6/2025	12.38	4.05	-	-
EMW-5SA	16.34	3/15/2024	12.08	4.26	-	-
		6/6/2024	12.97	3.37	-	-
		9/16/2024	12.90	3.44	-	-
		8/6/2025	12.92	3.42	-	-
EMW-6S	16.17	3/15/2024	6.54	9.63	-	-
		6/6/2024	7.40	8.77	-	-
		9/16/2024	10.42	5.75	-	-
		8/6/2025	11.61	4.56	-	-
EMW-7S	16.71	3/15/2024	8.28	8.43	-	-
		6/6/2024	9.31	7.40	-	-
		9/16/2024	10.94	5.77	-	-
		8/6/2025	12.35	4.36	-	-
EMW-9SA	16.34	3/15/2024	12.99	3.35	-	-
		6/6/2024	14.00	2.34	-	-
		9/16/2024	13.68	2.66	-	-
		8/6/2025	13.48	2.86	-	-
EMW-11S	16.61	3/15/2024	12.44	4.17	-	-
		6/6/2024	13.05	3.56	-	-
		9/16/2024	12.83	3.78	-	-
		8/6/2025	12.80	3.81	-	-
EMW-12S	16.81	3/15/2024	12.52	4.29	-	-
		6/6/2024	14.84	1.97	-	-
		9/16/2024	14.76	2.05	-	-
		8/6/2025	14.81	2.00	-	-
EMW-13S	16.39	3/15/2024	11.29	5.10	-	-
		6/6/2024	11.87	4.52	-	-
		9/16/2024	12.01	4.38	-	-
		8/6/2025	12.39	4.00	-	-
EMW-17S	16.04	3/15/2024	11.22	4.82	-	-
		6/6/2024	12.21	3.83	-	-
		9/16/2024	11.90	4.14	-	-
		8/6/2025	10.00	6.04	-	-

Table 4
2024 and 2025 Groundwater Monitoring Data
8th Avenue Terminals, Inc. Site
Seattle, Washington

Well Number	Casing Elevation[a] (feet)	Date Measured	Depth to Groundwater[b] (feet)	Groundwater Elevation (feet)	Depth to Surface Water[b] (feet)	Surface Water Elevation (feet)
Shallow Groundwater Monitoring Wells (continued)						
EMW-18S	15.21	3/15/2024	10.88	4.33	-	-
		6/6/2024	11.55	3.66	-	-
		9/16/2024	11.41	3.80	-	-
		8/6/2025	11.45	3.76	-	-
EMW-23S	14.54	3/15/2024	10.48	4.06	-	-
		6/6/2024	11.18	3.36	-	-
		9/16/2024	10.99	3.55	-	-
		8/6/2025	11.02	3.52	-	-
Intermediate-Depth Groundwater Monitoring Wells						
EMW-4D	16.80	3/15/2024	15.05	1.75	-	-
		6/6/2024	16.03	0.77	-	-
		9/16/2024	14.74	2.06	-	-
		8/6/2025	15.78	1.02	-	-
EMW-10D	16.82	3/15/2024	12.52	4.30	-	-
		6/6/2024	13.03	3.79	-	-
		9/16/2024	12.99	3.83	-	-
		8/6/2025	13.01	3.81	-	-
EMW-14D	16.42	3/15/2024	14.59	1.83	-	-
		6/6/2024	15.59	0.83	-	-
		9/16/2024	15.00	1.42	-	-
		8/6/2025	NM	-	-	-
EMW-15D	16.07	3/15/2024	13.86	2.21	-	-
		6/6/2024	15.10	0.97	-	-
		9/16/2024	14.55	1.52	-	-
		8/6/2025	14.44	1.63	-	-
EMW-16D	16.52	3/15/2024	15.35	1.17	-	-
		6/6/2024	16.20	0.32	-	-
		9/16/2024	15.66	0.86	-	-
		8/6/2025	15.58	0.94	-	-
Deep Groundwater Monitoring Wells						
EMW-19D	16.50	3/15/2024	12.50	4.00	-	-
		6/6/2024	13.08	3.42	-	-
		9/16/2024	12.82	3.68	-	-
		8/6/2025	12.72	3.78	-	-
EMW-20D	15.97	3/15/2024	13.62	2.35	-	-
		6/6/2024	15.05	0.92	-	-
		9/16/2024	14.47	1.50	-	-
		8/6/2025	14.31	1.66	-	-

Table 4
2024 and 2025 Groundwater Monitoring Data
8th Avenue Terminals, Inc. Site
Seattle, Washington

Well Number	Casing Elevation[a] (feet)	Date Measured	Depth to Groundwater[b] (feet)	Groundwater Elevation (feet)	Depth to Surface Water[b] (feet)	Surface Water Elevation (feet)
Deep Groundwater Monitoring Wells (continued)						
EMW-21D	16.18	3/15/2024	15.77	0.41	-	-
		6/6/2024	17.10	-0.92	-	-
		9/16/2024	16.26	-0.08	-	-
		8/6/2025	15.68	0.50	-	-
EMW-22D	15.98	3/15/2024	12.99	2.99	-	-
		6/6/2024	13.98	2.00	-	-
		9/16/2024	12.78	3.20	-	-
		8/6/2025	13.75	2.23	-	-

Notes:

All the depths to groundwater and surface water were measured during low tide conditions in the Lower Duwamish Waterway.

NM = Not measured

[a] Top of casing elevations were surveyed relative to the NAVD 88 datum by Signature Surveying & Mapping.

[b] Measurements in feet below the top of the well casing or below a surveyed location at the northeast corner of the pier.

Table 5
2024 and 2025 Groundwater Sampling Field Parameter Measurements
8th Avenue Terminals, Inc. Site
Seattle, Washington

Well Number	Date Measured	Approximate Total Purge Volume (gallons)	Temperature (°C)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	pH	Redox Potential (mV)	Turbidity (NTU)
Shallow Groundwater Monitoring Wells								
CMW-1	03/12/24	1.25	9.2	8.87	7.02	7.02	69.6	NM
	06/05/24	1.50	13.0	12.47	6.15	6.69	141.0	0.02
	09/16/24	1.20	17.6	21.95	3.76	6.47	68.7	1.18
CMW-2	03/13/24	1.50	9.6	8.99	7.41	7.40	96.3	NM
	06/05/24	2.25	14.8	4.48	5.32	7.71	38.0	39.4
	09/18/24	0.75	18.5	18.94	4.56	7.54	44.4	18.40
CMW-3	03/13/24	1.75	9.9	3.85	6.31	7.36	103.3	NM
	06/04/24	1.25	12.6	5.80	4.29	7.30	155.1	1.28
	09/18/24	1.00	17.8	16.87	4.25	7.32	64.4	8.11
CMW-4	03/13/24	1.00	10.4	8.98	8.78	7.20	-96.7	NM
	06/05/24	1.00	14.4	1.19	5.85	7.51	-7.2	17.10
	09/16/24	1.75	17.7	12.65	4.36	7.31	72.5	8.78
	08/06/25	1.50	17.3	16.6	4.05	7.42	191.6	6.39
CMW-5	03/14/24	1.00	12.3	1.13	0.16	6.59	-91.6	NM
	06/05/24	1.00	14.4	1.22	1.70	6.58	-63.2	239.0
	09/17/24	2.00	16.3	1.43	0.32	6.67	-97.4	0.09
CMW-6	03/13/24	1.00	10.3	13.57	8.17	7.45	145.7	NM
	06/04/24	1.00	14.0	12.32	7.04	7.26	18.0	0.41
	09/16/24	0.80	18.0	21.1	2.95	7.46	187.7	0.02
	08/07/25	1.50	16.7	24.2	4.01	7.25	218.8	2.31
CMW-7	03/12/24	1.50	12.4	2.19	0.24	6.86	-4.9	NM
	06/06/24	1.50	15.8	1.26	1.03	6.64	74.8	70.50
	09/16/24	1.00	16.8	0.79	1.56	6.67	-22.8	17.30
DMW2	03/14/24	1.50	13.9	0.88	0.40	6.53	-89.4	NM
	06/04/24	1.00	14.6	0.63	0.60	6.51	-29.0	0.02
	09/17/24	2.00	16.4	0.73	0.18	6.57	-17.2	0.02
DMW3	03/14/24	1.00	12.6	0.20	0.18	6.10	153.3	NM
	06/04/24	2.50	13.6	0.29	0.07	6.24	17.8	1.59
	09/17/24	1.20	15.7	0.27	0.26	6.32	-2.7	0.02
DMW-6B	03/14/24	1.50	14.7	0.79	0.15	6.74	31.0	NM
	06/04/24	1.50	15.5	0.47	0.49	6.72	-47.6	2.16
	09/16/24	1.00	17.9	0.53	0.59	7.00	144.1	2.48
	08/06/25	1.50	17.0	0.47	0.11	6.83	-136.1	2.13
HC-4	03/14/24	1.00	15.7	0.81	1.98	6.50	110.4	NM
	06/05/24	1.00	16.5	0.71	1.60	6.44	-72.3	0.02
	09/18/24	2.00	17.7	0.80	0.86	6.45	83.7	0.02
HC-20	03/13/24	1.00	12.9	0.49	0.27	6.37	74.5	NM
	06/04/24	0.75	14.6	0.44	0.49	6.21	65.2	4.59
	09/17/24	0.60	17.7	0.33	0.91	6.32	162.2	19.00
SLR-1	03/12/24	1.75	12.1	0.28	0.17	7.08	-127.8	NM
	06/04/24	1.25	13.7	0.31	0.33	6.83	10.9	0.02
	09/16/24	1.50	17.1	0.30	0.38	6.81	-11.6	1.14
SLR-2	03/13/24	1.00	8.7	0.08	7.47	7.18	34.8	NM
	06/05/24	1.00	15.0	0.14	2.22	7.02	12.4	42.65
	09/17/24	1.20	15.3	0.18	0.74	6.60	40.5	11.90
	08/07/25	1.00	14.2	0.11	2.91	6.23	215.2	1.02
SLR-3	03/13/24	1.00	12.7	0.67	0.14	6.83	-118.1	NM
	06/05/24	1.00	14.9	0.73	0.25	6.81	31.6	13.14
	09/17/24	1.50	19.0	0.61	0.29	6.81	-116.3	9.20
SLR-6	03/13/24	1.00	7.3	0.16	5.95	6.77	45.1	NM
	06/05/24	1.00	13.0	0.28	4.84	6.26	45.2	188.30
	09/17/24	1.20	15.9	0.21	2.94	6.27	77.3	6.15

Table 5
2024 and 2025 Groundwater Sampling Field Parameter Measurements
8th Avenue Terminals, Inc. Site
Seattle, Washington

Well Number	Date Measured	Approximate Total Purge Volume (gallons)	Temperature (°C)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	pH	Redox Potential (mV)	Turbidity (NTU)
Shallow Groundwater Monitoring Wells (continued)								
SLR-7	03/14/24	1.00	12.2	0.57	3.67	6.82	127.7	NM
	06/04/24	1.00	14.2	0.69	2.00	6.70	61.8	16.20
	09/16/24	1.80	19.6	0.58	0.52	6.64	24.8	18.10
EMW-1S	03/13/24	1.00	9.6	0.48	5.39	7.23	116.8	NM
	06/04/24	1.50	13.3	0.43	0.29	6.63	-29.1	11.14
	09/16/24	1.50	15.9	0.45	0.53	6.73	-110.2	118.00
	08/06/25	2.00	14.9	0.39	0.31	6.17	-93.7	9.20
EMW-2S	03/13/24	1.00	12.3	0.49	0.24	6.38	33.3	NM
	06/05/24	1.00	12.4	0.40	0.93	6.52	51.4	93.62
	09/17/24	1.00	14.1	0.31	0.60	6.45	74.8	12.00
EMW-3S	03/13/24	1.00	9.1	13.61	6.91	6.72	132.6	NM
	06/06/24	1.50	14.0	6.13	4.58	6.19	76.9	6.93
	09/18/24	1.75	18.1	15.50	2.40	5.97	50.5	4.01
EMW-5SA	03/14/24	1.00	15.1	0.59	0.14	6.45	-71.7	NM
	06/05/24	1.50	15.7	0.50	0.05	6.43	-57.0	3.69
	09/17/24	1.50	16.5	0.40	0.23	6.61	-58.2	0.02
EMW-6S	03/13/24	1.25	9.0	0.34	2.31	6.84	99.8	NM
	06/04/24	1.25	13.1	0.29	1.63	6.39	78.2	3.47
	09/17/24	1.20	15.9	0.28	0.29	6.25	42.3	1.66
	08/06/25	1.50	15.5	0.21	0.31	5.66	86.7	5.41
EMW-7S	03/14/24	1.00	12.2	0.51	1.55	6.47	-14.3	NM
	06/04/24	1.00	15.8	0.28	1.58	6.51	-14.0	8.83
	09/16/24	1.00	17.6	0.26	1.26	6.52	1.1	3.30
	08/06/25	2.00	16.2	0.30	0.29	6.52	-48.3	4.07
EMW-9SA	03/13/24	1.50	14.1	0.58	0.36	6.66	-103.9	NM
	06/05/24	1.75	14.5	0.45	0.13	6.34	-34.0	3.91
	09/17/24	1.75	15.7	0.51	0.34	6.45	-53.5	0.32
	08/06/25	2.50	15.3	0.41	0.31	6.01	-65.6	44.2
EMW-11S	03/13/24	1.00	13.6	0.43	0.24	6.54	73.6	NM
	06/04/24	2.80	15.1	0.41	0.60	6.50	-20.7	7.51
	09/16/24	2.00	18.4	0.41	0.90	6.70	78.0	3.40
EMW-12S	03/14/24	1.00	13.2	0.19	0.99	6.63	25.2	NM
	06/04/24	1.50	14.0	0.24	1.64	6.54	-15.4	19.30
	09/17/24	2.00	14.1	0.19	1.26	6.84	142.2	60.10
EMW-13S	03/13/24	1.00	9.6	12.07	6.62	7.63	134.3	NM
	06/04/24	0.75	13.8	4.41	4.53	7.66	142.7	6.61
	09/16/24	1.00	18.4	17.98	3.46	7.81	187.9	10.00
EMW-17S	03/14/24	1.00	13.5	0.51	0.28	6.50	24.6	NM
	06/05/24	1.20	14.8	0.33	0.58	6.36	-112.2	5.34
	09/16/24	1.80	17.4	0.35	0.17	6.27	-24.3	0.02
EMW-18S	03/13/24	1.00	13.8	0.43	0.24	6.25	-13.3	NM
	06/04/24	1.50	14.2	0.40	1.07	6.34	-15.8	17.70
	09/16/24	2.00	17.4	0.41	0.39	6.28	-5.1	0.02
EMW-23S	03/14/24	1.75	13.3	0.47	4.51	6.23	-11.1	NM
	06/04/24	2.25	13.6	0.41	0.28	6.27	90.1	7.11
	09/17/24	1.20	15.7	0.35	0.24	6.39	29.0	9.90
Intermediate-Depth Groundwater Monitoring Wells								
EMW-4D	03/12/24	1.25	12.3	9.20	0.31	6.79	-135.5	NM
	06/04/24	2.00	13.5	8.16	0.41	6.72	90.7	19.70
	09/16/24	2.00	15.0	6.84	0.52	6.76	15.3	1.81
EMW-10D	03/14/24	1.00	13.5	8.01	0.14	6.76	145.5	NM
	06/06/24	3.00	16.6	6.80	2.53	6.66	24.4	0.02
	09/17/24	1.75	15.2	5.90	0.18	6.79	-7.8	0.02

Table 5
2024 and 2025 Groundwater Sampling Field Parameter Measurements
8th Avenue Terminals, Inc. Site
Seattle, Washington

Well Number	Date Measured	Approximate Total Purge Volume (gallons)	Temperature (°C)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	pH	Redox Potential (mV)	Turbidity (NTU)
Intermediate-Depth Groundwater Monitoring Wells (continued)								
EMW-14D	03/13/24	1.00	13.1	9.02	0.20	6.81	79.3	NM
	06/04/24	2.25	13.9	8.79	0.82	6.57	99.0	4.93
	09/16/24	1.00	16.9	11.73	0.88	7.05	185.7	0.02
EMW-15D	03/13/24	1.00	13.3	4.60	0.54	6.63	-40.2	NM
	06/05/24	1.50	14.2	7.66	4.60	6.83	-22.8	19.80
	09/16/24	1.50	15.3	11.01	0.78	6.81	-80.7	4.20
EMW-16D	03/12/24	2.00	12.6	21.00	0.29	6.77	48.5	NM
	06/05/24	1.20	17.2	8.04	1.45	6.74	3.8	12.30
	09/17/24	2.00	15.8	19.74	1.55	6.77	193.9	7.71
Deep Groundwater Monitoring Wells								
EMW-19D	03/14/24	0.75	13.2	38.44	0.12	6.86	-21.9	NM
EMW-20D	03/13/24	1.00	12.5	14.00	0.49	6.25	-15.1	NM
EMW-21D	03/12/24	1.50	10.9	20.09	0.70	6.99	149.8	NM
EMW-22D	03/12/24	2.50	12.2	36.27	0.39	7.06	-154.1	NM

Notes:

The field parameter measurements in this table were the final measurements prior to collecting each groundwater sample.
NM = Not measured
* = Dissolved Oxygen probe was malfunctioning.
°C = Degrees Celsius
mS/cm = Millisiemens per centimeter
mg/L = Milligrams per liter
mV = Millivolts
NTU = Nephelometric Turbidity Units

Table 6
Groundwater Sample Analytical Results – Per- and Polyfluoroalkyl Substances (PFAS)
8th Avenue Terminals, Inc. Site
Seattle, Washington

Sample Location	Field Sample ID	Sample Date	Sample Type	PFAS (µg/L; EPA 1633)	
				Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)
Proposed Groundwater Cleanup Levels [a]				550	7,000
CMW-4	CMW-4-250806	8/6/2025	N	**0.0830**	**0.0069**
CMW-6	CMW-6-250807	8/7/2025	N	**0.0061**	**0.0012**
DMW-6B	DMW-6B-250806	8/6/2025	N	**0.0114**	**0.0178**
EMW-1S	EMW-1S-250806	8/6/2025	N	**0.0045**	**0.0041**
EMW-1S	DUP-1-250806	8/6/2025	FD	**0.0057**	**0.0041**
EMW-6S	EMW-6S-250806	8/6/2025	N	**0.0287**	**0.0062**
EMW-7S	EMW-7S-250806	8/6/2025	N	**0.0054**	**0.0089**
EMW-9SA	EMW-9SA-250806	8/6/2025	N	**0.0066**	**0.0099**
SLR-2	SLR-2-250807	8/7/2025	N	**0.0033**	**0.0026**
EquipmentBlank	EQUIPMENT BLANK-250806	8/6/2025	EB	< 0.0020	< 0.0020

Notes:

This table includes only the PFAS analytes that have available groundwater cleanup levels based on protection of marine surface water or sediment.

Bold text indicates detected analyte**.**

[a] MTCA Surface Water Cleanup Levels for Aquatic Life- Marine/Acute; 173-201A WAC. Updated February 2025.

Table 6
Groundwater Sample Analytical Results – Per- and Polyfluoroalkyl Substances (PFAS)
8th Avenue Terminals, Inc. Site
Seattle, Washington

Abbreviations and Acronyms:

EB = Equipment Blank
EPA = US Environmental Protection Agency
FD = Field Duplicate
µg/L = micrograms per liter
MTCA = Model Toxics Control Act
N = Normal Environmental Sample
NL = not listed
PFAS = polyfluoroalkyl substances

Table 7
2013 - 2024 Groundwater Sample Analytical Results: Dissolved Arsenic and Dissolved Copper
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	Dissolved Metals (µg/L)	
			Arsenic	Copper
Proposed Groundwater Cleanup Levels (µg/L)			**8.00**	**3.10**
Shallow Groundwater Monitoring Wells				
CMW-1	CMW-1-0713	7/11/2013	**19.4**	**28.6**
	CMW-1-092513	9/25/2013	--	--
	CMW-1-100213	10/2/2013	**1.19**	**1.47**
	CMW-1-121514	12/15/2014	**1.10**	**2.00**
	CMW-1-0820	8/7/2020	**0.60**	**2.48**
	CMW-1-240312	3/12/2024	**1.23**	**2.11**
	CMW-1-240604	6/4/2024	**0.94**	**1.15**
	CMW-1-240916	9/16/2024	**0.92**	**1.46**
CMW-2	CMW-2-0713	7/12/2013	**48.2**	**21.5**
	CMW-2-092413	9/24/2013	-- R	12.5 U
	CMW-2-100113	10/1/2013	**61.3**	**1.84**
	CMW-2-121514	12/15/2014	**6.50**	**1.30**
	CMW-2-0820	8/6/2020	**17.0**	**1.82**
	CMW-2-240313	3/13/2024	**9.52**	**4.06 J**
	CMW-2-240605	6/5/2024	**78.5**	**0.81**
	CMW-2-240918	9/18/2024	**63 J**	**1.74**
CMW-3	CMW-3-0713	7/12/2013	**24.1**	**13.0**
	CMW-3-092413	9/24/2013	-- R	12.5 U
	CMW-3-093013	9/30/2013	**12.6**	**2.12**
	CMW-3-121814	12/18/2014	**12.6**	**1.00 J**
	CMW-3-0820	8/6/2020	**7.39**	**2.80**
	CMW-3-240313	3/13/2024	**8.01**	**0.625 J**
	CMW-3-240604	6/4/2024	**9.05**	**0.414 J**
	CMW-3-240918	9/18/2024	**10.2**	0.900 U
CMW-4	CMW-4-0713	7/11/2013	**211**	**15.2**
	CMW-4-092513	9/25/2013	**184**	**6.08**
	CMW-4-100313	10/3/2013	**206**	**3.64**
	CMW-4-121814	12/18/2014	**148**	**3.00**
	CMW-4-0820	8/7/2020	**84.5**	**2.15**
	CMW-4-240313	3/13/2024	**11.2**	**1.49**
	CMW-4-240605	6/5/2024	**43.5 J**	**3.70 J**
	CMW-4-240916	9/16/2024	**74.2**	**2.17**
CMW-5	CMW-5-0713	7/12/2013	**99.0**	**0.873**
	CMW-5-092413	9/24/2013	-- R	1.25 U
	CMW-5-093013	9/30/2013	**73.0**	**0.40**
	CMW-5-12222014	12/22/2014	**85.2**	0.36 U
	CMW-5-0820	8/6/2020	**43.9**	**1.72**
	CMW-5-240314	3/14/2024	**5.64**	0.400 U
	CMW-5-240605	6/5/2024	**6.07**	0.360 U
	CMW-5-240917	9/17/2024	**3.96**	0.900 U
CMW-6	CMW-6-0713	7/12/2013	**76.0**	**42.1**
	CMW-6-092513	9/25/2013	--	--
	CMW-6-100113	10/1/2013	**57.7**	**12.9**
	CMW-6-121614	12/16/2014	**70.6**	**12.0**
	CMW-6-0820	8/5/2020	**35.7**	**10.9**
	CMW-6-240313	3/13/2024	**48.5**	**23.0**
	CMW-6-240604	6/4/2024	**46.7**	**8.3**
	CMW-6-240916	9/16/2024	**42.2**	**9.8**
CMW-7	CMW-7-0713	7/12/2013	**2.16**	**5.12**
	CMW-7-092613	9/26/2013	-- R	**8.33**
	CMW-7-100213	10/2/2013	**0.714**	**2.77**
	CMW-7-121614	12/16/2014	**0.80**	**2.60**
	CMW-7-0820	8/5/2020	**0.29 J**	**4.37**
	CMW-7-240312	3/12/2024	**2.70**	0.40 U
	CMW-7-240606	6/6/2024	**0.47 J**	0.36 U
	CMW-7-240916	9/16/2024	**0.35 J**	0.900 U

Table 7
2013 - 2024 Groundwater Sample Analytical Results: Dissolved Arsenic and Dissolved Copper
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	Dissolved Metals (µg/L)	
			Arsenic	Copper
	Proposed Groundwater Cleanup Levels (µg/L)		**8.00**	**3.10**
Shallow Groundwater Monitoring Wells (continued)				
DMW2	DMW-2-0713	7/12/2013	**5.03**	**0.612**
	DMW-2-092313	9/23/2013	-- R	2 U
	DMW-2-093013	9/30/2013	**5.38**	**0.45**
	DMW-2-121614	12/16/2014	**8.40**	**0.26 J**
	DMW-52-121614 (dup)	12/16/2014	**8.40**	0.5 U
	DMW-2-0820	8/6/2020	**25.7**	**0.72**
	MW-63-0820 (Dup)	8/6/2020	**25.5**	**1.09**
	DMW2-240314	3/14/2024	**9.27 J**	0.400 U
	DMW-2-240604	6/4/2024	**6.44 J**	0.360 U
	DMW-12-240604 (Dup)	6/4/2024	**8.26 J**	0.360 U
	DMW-2-240917	9/17/2024	**13.4 J**	0.900 U
	DMW-12-240917 (Dup)	9/17/2024	**17.1 J**	0.900 U
DMW3	DMW-3-0713	7/12/2013	**4.73**	0.9 U
	DMW-3-092313	9/23/2013	-- R	0.9 U
	DMW-3-093013	9/30/2013	**5.44**	0.9 U
	DMW-3-121814	12/18/2014	**4.60**	0.9 U
	DMW-3-0820	8/3/2020	**3.06**	0.90 U
	DMW3-240314	3/14/2024	**2.35**	0.900 U
	DMW-3-240604	6/4/2024	**0.37 J**	0.900 U
	DMW-3-240917	9/17/2024	**0.81**	0.900 U
DMW6	DMW-6-0713	7/11/2013	**56.4**	3.4 U
	DMW-6-092313	9/23/2013	-- R	2 U
	DMW-6-100213	10/2/2013	**59.4**	**0.48**
	DMW-6-070314	7/3/2014	**34.4**	**0.28 J**
DMW-6A	DMW-6A-121714	12/17/2014	**29.1**	0.44 U
DMW-6B	DMW-6B-0820	8/6/2020	**29.2**	**1.41**
	DMW-6B-240314	3/14/2024	**27.9**	0.400 U
	DMW-6B-240604	6/4/2024	**1.21**	0.360 U
	DMW-6B-240916	9/16/2024	**1.10**	0.900 U
EMW-1S	EMW-1S-0713	7/11/2013	**12.5**	0.34 U
	EMW-1S-092313	9/23/2013	-- R	2 U
	EMW-1S-093013	9/30/2013	**12.5**	**0.47**
	EMW-1S-121514	12/15/2014	**1.00**	**1.60**
	EMW-1S-0820	8/6/2020	**7.84**	**1.49**
	EMW-1S-240313	3/13/2024	**1.83**	**2.59**
	EMW-1S-240604	6/4/2024	**0.81**	**0.88**
	EMW-1S-240916	9/16/2024	**0.46**	**1.15**
EMW-2S	EMW-2S-0713	7/12/2013	**1.47**	**0.692**
	EMW-57S-0713 (dup)	7/12/2013	**1.43**	0.34 U
	EMW-2S-092313	9/23/2013	-- R	2 U
	EMW-2S-100313	10/3/2013	**1.29**	**0.419**
	EMW-57S-100313 (dup)	10/3/2013	**1.48**	**0.411**
	EMW-2S-121714	12/17/2014	**0.80**	0.34 U
	EMW-2S-0820	8/4/2020	**0.32 J**	**1.53**
	EMW-2S-240313	3/13/2024	0.400 U	**1.79**
	EMW-2S-240605	6/5/2024	0.360 U	0.360 U
	EMW-2S-240917	9/17/2024	0.180 U	0.900 U
EMW-3S	EMW-3S-0713	7/11/2013	**11.2**	**19.4**
	EMW-3S-092513	9/25/2013	--	--
	EMW-3S-100113	10/1/2013	**0.955**	**0.61**
	EMW-3S-121514	12/15/2014	**2.20**	**0.70 J**
	EMW-3S-0820	8/6/2020	**2.52**	**3.82**
	EMW-3S-240313	3/13/2024	**4.74**	**1.98**
	EMW-3S-240606	6/6/2024	**4.78**	**1.77**
	EMW-3S-240918	9/18/2024	**3.36**	**2.86**

Table 7
2013 - 2024 Groundwater Sample Analytical Results: Dissolved Arsenic and Dissolved Copper
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	Dissolved Metals (µg/L)	
			Arsenic	Copper
	Proposed Groundwater Cleanup Levels (µg/L)		**8.00**	**3.10**
Shallow Groundwater Monitoring Wells (continued)				
EMW-5S	EMW-5S-0713	7/12/2013	**2.68**	**0.584**
	EMW-89S-092413 (Dup)	9/24/2013	-- R	1.25 U
	EMW-5S-092413	9/24/2013	-- R	1.25 U
	EMW-5S-100213	10/2/2013	**2.05**	**0.65**
	EMW-5S-070314	7/3/2014	**1.36**	**0.35 J**
EMW-5SA	EMW-5SA-121514	12/15/2014	**2.20**	0.5 U
	EMW-5SA-0820	8/4/2020	**1.13**	**0.51**
	EMW-5SA-240314	3/14/2024	**1.43**	0.400 U
	EMW-5SA-240605	6/5/2024	**0.62 J**	0.360 U
	EMW-5SA-240917	9/17/2024	**0.30 J**	0.900 U
EMW-6S	EMW-6S-0713	7/10/2013	**2.76**	0.34 U
	EMW-6S-092313	9/23/2013	-- R	2 U
	EMW-6S-100213	10/2/2013	**0.651**	**0.83**
	EMW-6S-121514	12/15/2014	**0.30**	**1.00**
	EMW-6S-0820	8/6/2020	**1.39**	**0.44**
	EMW-6S-240313	3/13/2024	**0.566 J**	**0.522 J**
	EMW-6S-240604	6/4/2024	**0.426 J**	**0.398 J**
	EMW-26S-240604 (Dup)	6/4/2024	**0.466 J**	**0.418 J**
	EMW-6S-240917	9/17/2024	**0.336 J**	**1.200**
	EMW-26S-240917 (Dup)	9/17/2024	**0.284 J**	0.90 U
EMW-7S	EMW-7S-0713	7/11/2013	**1.77**	0.34 U
	EMW-7S-092313	9/23/2013	-- R	2 U
	EMW-7S-100213	10/2/2013	**1.97**	**0.18 J**
	EMW-7S-121614	12/16/2014	**1.60**	**0.33 J**
	EMW-7S-0820	8/5/2020	**0.51**	**1.11**
	EMW-7S-240314	3/14/2024	**0.770 J**	**1.32**
	EMW-7S-240604	6/4/2024	**0.732**	0.360 U
	EMW-7S-240916	9/16/2024	0.180 U	**0.93**
EMW-8S	EMW-8S-0713	7/12/2013	**7.10**	**1.09**
	EMW-8S-092413	9/24/2013	-- R	1.25 U
	EMW-8S-100313	10/3/2013	**40.7**	0.361 U
	EMW-8S-121714	12/17/2014	**9.80**	0.46 U
	EMW-8S-0820	8/4/2020	**24.9**	**1.57**
EMW-9S	EMW-9S-0713	7/12/2013	**16.1**	**1.65**
	EMW-9S-092313	9/23/2013	-- R	2 U
	EMW-9S-093013	9/30/2013	**21.4**	**0.26**
	EMW-9S-121714	12/17/2014	**29.4**	0.5 U
EMW-9SA	EMW-9SA-0820	8/4/2020	**3.95**	**0.95**
	EMW-9SA-240313	3/13/2024	**2.59**	0.400 U
	EMW-9SA-240605	6/5/2024	**0.53 J**	0.360 U
	EMW-9SA-240917	9/17/2024	0.18 U	**1.19**
EMW-11S	EMW-11S-0713	7/11/2013	**1.32**	**2.32**
	EMW-11S-092313	9/23/2013	-- R	2 U
	EMW-11S-093013	9/30/2013	**3.44**	**2.55**
	EMW-11S-121614	12/16/2014	**14.0**	0.5 U
	EMW-11S-0820	8/5/2020	**11.1**	**0.83**
	EMW-11S-240313	3/13/2024	**9.45**	0.400 U
	EMW-31S-240313 (Dup)	3/13/2024	**8.78**	0.400 U
	EMW-11S-240604	6/4/2024	**0.73**	0.360 U
	EMW-11S-240916	9/16/2024	**0.72**	1.80 U
EMW-12S	EMW-12S-0713	7/12/2013	**0.315**	**1.54**
	EMW-12S-092413	9/24/2013	-- R	1.25 U
	EMW-12S-100313	10/3/2013	**0.318**	**1.84**
	EMW-12S-20141219	12/19/2014	**0.30**	**1.60**
	EMW-12S-0820	8/6/2020	0.5 U	**3.11**
	EMW-12S-240314	3/14/2024	**1.10**	**1.70**
	EMW-12S-240604	6/4/2024	0.360 U	**0.69 J**
	EMW-12S-240917	9/17/2024	**0.193 J**	**1.01 J**

Table 7
2013 - 2024 Groundwater Sample Analytical Results: Dissolved Arsenic and Dissolved Copper
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	Dissolved Metals (µg/L)	
			Arsenic	Copper
		Proposed Groundwater Cleanup Levels (µg/L)	**8.00**	**3.10**
Shallow Groundwater Monitoring Wells (continued)				
EMW-13S	EMW-13S-0713	7/11/2013	**159**	**26**
	EMW-13S-092513	9/25/2013	**16.9**	**6.77**
	EMW-13S-100113	10/1/2013	**283**	**3.79**
	EMW-13S-121614	12/16/2014	**132**	**2.00**
	EMW-63S-121614 (dup)	12/16/2014	**128**	**2.00**
	EMW-13S-0820	8/5/2020	**79.5**	**4.31**
	EMW-13S-240313	3/13/2024	**82.1**	**3.52**
	EMW-13S-240604	6/4/2024	**114**	**1.87**
	EMW-13S-240916	9/16/2024	**222**	**3.6**
EMW-17S	EMW-17S-121814	12/18/2014	**2.40**	0.6 U
	EMW-17S-0820	8/5/2020	**0.15 J**	**1.1**
	EMW-17S-240314	3/14/2024	**0.421 J**	**2.08**
	EMW-17S-240605	6/5/2024	0.360 U	0.360 U
	EMW-17S-240916	9/16/2024	**0.288 J**	0.900 U
EMW-18S	EMW-18S-121714	12/17/2014	**0.5**	0.37 U
	EMW-18S-0820	8/5/2020	**0.07 J**	**0.83**
	MW-62-0820 (Dup)	8/5/2020	**0.13 J**	**0.1**
	EMW-18S-240313	3/13/2024	0.400 U	0.400 U
	EMW-18S-240604	6/4/2024	0.360 U	0.360 U
	EMW-18S-240916	9/16/2024	0.180 U	0.900 U
EMW-23S	EMW-23S-240314	3/14/2024	**5.07**	**2.04**
	EMW-23S-240604	6/4/2024	**5.14**	0.360 U
	EMW-23S-240917	9/17/2024	**4.59**	0.900 U
HC-4	HC4-092413	9/24/2013	-- R	**2.19**
	HC-4-0820	8/5/2020	**0.69**	**6.24**
	HC-4-240314	3/14/2024	**2.64**	**4.21 J**
	HC-4-240605	6/5/2024	**2.17**	**3.07**
	HC-4-240918	9/18/2024	**1.76**	**3.78**
HC-20	HC20-0713	7/11/2013	**11.0**	0.34 U
	HC20-092313	9/23/2013	-- R	2 U
	HC20-100113	10/1/2013	**19.7**	**0.415**
	HC-20-121614	12/16/2014	**18.4**	0.5 U
	HC-20-0820	8/4/2020	**3.52**	**0.56**
	HC-20-240313	3/13/2024	**4.55**	0.400 U
	HC-20-240604	6/4/2024	**1.77**	0.360 U
	HC-20-240917	9/17/2024	**2.28**	0.900 U
MW-2	MW2-072914	7/29/2014	**23.1**	**1.27 J**
SLR-1	SLR1-0713	7/11/2013	**1.92**	0.34 U
	SLR1-092313	9/23/2013	-- R	2 U
	SLR1-100313	10/3/2013	**2.61**	**0.482**
	SLR-1-121814	12/18/2014	**1.40**	0.5 U
	MW-61-0820 (Dup)	8/4/2020	**1.65**	**1.0**
	SLR-1-08250	8/4/2020	**1.76**	**0.96**
	SLR-1-240312	3/12/2024	**1.44**	**0.101 J**
	SLR-1-240604	6/4/2024	**0.86**	0.360 U
	SLR-1-240916	9/16/2024	**1.75**	0.900 U
SLR-2	SLR2-0713	7/11/2013	**0.509**	**1.91**
	SLR2-092313	9/23/2013	-- R	**2.35**
	SLR2-100213	10/2/2013	**0.477**	**2.36**
	SLR-2-121714	12/17/2014	**0.50**	**1.4**
	SLR-2-0820	8/4/2020	**0.57**	**4.3**
	SLR-2-240313	3/13/2024	**0.549 J**	**2.70**
	SLR-2-240605	6/5/2024	**0.386 J**	**1.84**
	SLR-2-240917	9/17/2024	**0.652**	**1.90**

Table 7
2013 - 2024 Groundwater Sample Analytical Results: Dissolved Arsenic and Dissolved Copper
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	Dissolved Metals (µg/L)	
			Arsenic	Copper
		Proposed Groundwater Cleanup Levels (µg/L)	**8.00**	**3.10**
Shallow Groundwater Monitoring Wells (continued)				
SLR-3	SLR3-0713	7/12/2013	**24.3**	**7.86**
	SLR3-092313	9/23/2013	-- R	20 U
	SLR3-100313	10/3/2013	**28.8**	**5.9**
	SLR-3-121514	12/15/2014	**30.3**	**2.4**
	SLR-3-0820	8/4/2020	**0.39 J**	**0.06 J**
	SLR-3-240313	3/13/2024	**26.4**	**4.13**
	SLR-3-240605	6/5/2024	**36.2 J**	**18.4 J**
	SLR-3-240917	9/17/2024	**41.5**	**19.8**
SLR-6	SLR6-0713	7/12/2013	**0.232**	**2.53**
	SLR6-092313	9/23/2013	-- R	**3.2**
	SLR6-100113	10/1/2013	**0.499**	**2.85**
	SLR-6-121714	12/17/2014	**0.20 J**	**2**
	SLR-6-0820	8/4/2020	**0.17 J**	**2.8**
	SLR-6-240313	3/13/2024	0.400 U	**1.99**
	SLR-6-240605	6/5/2024	0.360 U	**1.16**
	SLR-6-240917	9/17/2024	0.180 U	**1.04**
SLR-7	SLR7-0713	7/11/2013	**1.68**	**0.407**
	SLR7-092313	9/23/2013	-- R	2 U
	SLR7-100113	10/1/2013	**2.32**	**0.74**
	SLR-7-121514	12/15/2014	**1.2**	**1.3**
	SLR-7-0820	8/4/2020	**0.35 J**	**3.8**
	SLR-7-240314	3/14/2024	**0.661 J**	**2.11**
	SLR-17-240314 (Dup)	3/14/2024	**0.584 J**	**2.04**
	SLR-7-240604	6/4/2024	**0.486 J**	**1.90**
	SLR-7-240916	9/16/2024	**0.486**	**2.58**
Intermediate-Depth Groundwater Monitoring Wells				
EMW-4D	EMW-4D-0713	7/11/2013	**10.8**	**15.2**
	EMW-4D-092513	9/25/2013	--	--
	EMW-4D-100113	10/1/2013	**1.36**	**0.41**
	EMW-4D-121514	12/15/2014	**0.45 J**	1 U
	EMW-4D-0820	8/7/2020	0.5 U	**1.4**
	MW-64-0820 (Dup)	8/7/2020	0.5 U	**0.74**
	EMW-4D-240312	3/12/2024	0.400 U	**1.30**
	EMW-4D-240604	6/4/2024	0.360 U	0.360 U
	EMW-4D-240916	9/16/2024	0.180 U	1.80 U
EMW-10D	EMW-10D-0713	7/10/2013	**8.91**	**12.4**
	EMW-56D-0713 (dup)	7/10/2013	**10.8**	**15.7**
	EMW-10D-092513	9/25/2013	**0.579**	**0.443**
	EMW-56D-092513 (dup)	9/25/2013	--	--
	EMW-10D-100113	10/1/2013	**0.52**	**0.442**
	EMW-56D-100113 (dup)	10/1/2013	**0.634**	**0.44**
	EMW-10D-121714	12/17/2014	**0.45 J**	1 U
	EMW-10D-0820	8/3/2020	0.06 U	**1.1**
	MW-60-0820 (Dup)	8/3/2020	**0.07 J**	**1.4**
	EMW-10D-240314	3/14/2024	0.400 U	**0.761 J**
	EMW-10D-240606	6/6/2024	0.360 UJ	0.360 UJ
	EMW-10D-240917	9/17/2024	0.180 U	0.900 U
EMW-14D	EMW-14D-0713	7/11/2013	**8.60**	**7.51**
	EMW-14D-092513	9/25/2013	--	--
	EMW-14D-093013	9/30/2013	**1.25**	**0.5**
	EMW-14D-121614	12/16/2014	**1.00**	1 U
	EMW-14D-0820	8/5/2020	**0.41 J**	**0.79**
	EMW-14D-240313	3/13/2024	**0.615 J**	0.400 U
	EMW-14D-240604	6/4/2024	0.360 U	0.360 U
	EMW-14D-240916	9/16/2024	0.180 U	0.900 U

Table 7
2013 - 2024 Groundwater Sample Analytical Results: Dissolved Arsenic and Dissolved Copper
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	Dissolved Metals (µg/L)	
			Arsenic	Copper
		Proposed Groundwater Cleanup Levels (µg/L)	**8.00**	**3.10**
Intermediate-Depth Groundwater Monitoring Wells (continued)				
EMW-15D	EMW-15D-0713	7/11/2013	**11.5**	**13.6**
	EMW-15D-092513	9/25/2013	**0.711**	**0.461**
	EMW-15D-100113	10/1/2013	**1.02**	**0.41**
	EMW-15D-121814	12/18/2014	**0.80**	1 U
	EMW-15D-0820	8/7/2020	0.5 U	**0.62**
	EMW-15D-240313	3/13/2024	**0.679 J**	**1.09**
	EMW-15D-240604	6/4/2024	**0.373 J**	0.360 U
	EMW-15D-240916	9/16/2024	**0.217 J**	0.900 U
EMW-16D	EMW-16D-0713	7/11/2013	**35.4**	**49**
	EMW-16D-092413	9/24/2013	-- R	12.5 U
	EMW-16D-100213	10/2/2013	**1.56**	**1.53**
	EMW-16D-121614	12/16/2014	**1.50 J**	5 U
	EMW-16D-0820	8/5/2020	**0.14 J**	**0.84**
	EMW-16D-240312	3/12/2024	0.400 U	**0.696 J**
	EMW-16D-240605	6/5/2024	0.360 U	0.360 U
	EMW-16D-240917	9/17/2024	0.180 U	0.900 U
Deep Groundwater Monitoring Wells				
EMW-19D	EMW-19D-121814	12/18/2014	**2.00**	5 U
	EMW-19D-0820	8/4/2020	0.06 U	**1.9**
	EMW-19D-240314	3/14/2024	0.400 U	0.400 U
EMW-20D	EMW-20D-121614	12/16/2014	**5.00**	5 U
	EMW-20D-0820	8/7/2020	**2.11**	**0.16**
	EMW-20D-240313	3/13/2024	**1.50**	**1.37**
EMW-21D	EMW-21D-121614	12/16/2014	**3.00**	5 U
	EMW-21D-0820	8/6/2020	0.5 U	**1.2**
	EMW-21D-240312	3/12/2024	**3.17 J**	**1.47**
EMW-22D	EMW-22D-121714	12/17/2014	**4.00**	**4.6 J**
	EMW-22D-0820	8/7/2020	0.5 U	**0.64**
	EMW-22D-240312	3/12/2024	0.400 U	**0.423 J**

Notes:

Detected concentration is greater than the groundwater cleanup level

Non-detected concentration (shown at reporting limit) is above the groundwater cleanup level

Bold text indicates detected analyte.

µg/L = micrograms per liter

mg/L = Milligrams per liter

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

R = The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.

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

Table 8
2013 - 2024 Groundwater Sample Analytical Results:
Acenaphthene and Benzo(a)pyrene
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	SVOCs (µg/L)	
			Acenaphthene	Benzo(a)pyrene
		Proposed Groundwater Cleanup Level (µg/L)	5.34	0.015
Shallow Groundwater Monitoring Wells				
CMW-1	CMW-1-0713	7/11/2013	0.0038 U	0.0078 U
	CMW-1-100213	10/2/2013	0.0038 U	0.0078 U
	CMW-1-121514	12/15/2014	0.01 U	0.01 U
	CMW-1-0820	8/7/2020	0.01 U	0.015 U
	CMW-1-240312	3/12/2024	0.0157 U	0.00785 U
	CMW-1-240604	6/4/2024	0.0165 U	0.00825 U
	CMW-1-240916	9/16/2024	0.0201 U	0.01000 U
CMW-2	CMW-2-0713	7/12/2013	**0.0058**	0.0078 U
	CMW-2-100113	10/1/2013	**0.013**	0.0078 U
	CMW-2-121514	12/15/2014	0.01 U	0.01 U
	CMW-2-0820	8/6/2020	**0.01 J**	**0.017 J**
	CMW-2-240313	3/13/2024	0.0172 U	0.00859 U
	CMW-2-240605	6/5/2024	0.0203 U	0.01020 U
	CMW-2-240918	9/18/2024	0.0195 U	0.00976 U
CMW-3	CMW-3-0713	7/12/2013	**0.0085**	0.0078 U
	CMW-3-093013	9/30/2013	0.0038 U	0.0078 U
	CMW-3-121814	12/18/2014	**0.0054 J**	0.01 U
	CMW-3-0820	8/6/2020	0.01 U	**0.029 J**
	CMW-3-240313	3/13/2024	0.0183 U	0.00917 U
	CMW-3-240604	6/4/2024	0.0166 U	0.00828 U
	CMW-3-240918	9/18/2024	0.0164 U	0.00821 U
CMW-4	CMW-4-0713	7/11/2013	**0.01**	**0.14**
	CMW-4-100313	10/3/2013	**0.013**	0.0078 U
	CMW-4-121814	12/18/2014	**0.0058 J**	**0.022**
	CMW-4-0820	8/7/2020	0.01 U	**0.033**
	CMW-4-240313	3/13/2024	0.0161 U	**0.0274**
	CMW-4-240605	6/5/2024	0.0176 U	**0.0330**
	CMW-4-240916	9/16/2024	0.0196 U	0.0098 U
CMW-5	CMW-5-0713	7/12/2013	**0.029**	0.0078 U
	CMW-5-093013	9/30/2013	**0.033**	0.0078 U
	CMW-5-12222014	12/22/2014	**0.023**	1 U
	CMW-5-0820	8/6/2020	**0.02 J**	0.032 U
	CMW-5-240314	3/14/2024	0.0179 U	0.00893 U
	CMW-5-240605	6/5/2024	0.0213 U	0.01070 U
	CMW-5-240917	9/17/2024	0.0204 U	0.01020 U
CMW-6	CMW-6-0713	7/12/2013	0.0038 U	0.0078 UJ
	CMW-6-100113	10/1/2013	0.0038 U	0.0078 U
	CMW-6-121614	12/16/2014	0.01 U	0.01 U
	CMW-6-0820	8/5/2020	0.01 U	0.014 U
	CMW-6-240313	3/13/2024	0.0158 U	0.00792 U
	CMW-6-240604	6/4/2024	0.0196 U	0.00978 U
	CMW-6-240916	9/16/2024	0.0160 U	0.00799 U
CMW-7	CMW-7-0713	7/12/2013	0.0038 U	0.0078 U
	CMW-7-100213	10/2/2013	0.0038 U	0.0078 U
	CMW-7-121614	12/16/2014	0.01 U	0.01 U
	CMW-7-0820	8/5/2020	**0.01 J**	0.015 U
	CMW-7-240312	3/12/2024	0.0205 U	0.0103 U
	CMW-7-240606	6/6/2024	0.0191 U	0.0095 U
	CMW-7-240916	9/16/2024	0.0182 U	0.0091 U
DMW2	DMW-2-0713	7/12/2013	**33**	0.78 U
	DMW-2-093013	9/30/2013	**17**	0.0078 U
	DMW-2-121614	12/16/2014	**11**	0.01 U
	DMW-52-121614 (dup)	12/16/2014	**9.2**	0.01 U
	DMW-2-0820	8/6/2020	**24.4**	0.061 U
	MW-63-0820 (Dup)	8/6/2020	**24.8**	0.063 U
	DMW2-240314	3/14/2024	**54.5**	0.00965 U
	DMW-2-240604	6/4/2024	**73.4**	0.01050 U
	DMW-12-240604 (Dup)	6/4/2024	**77.3**	0.00949 U

Table 8
2013 - 2024 Groundwater Sample Analytical Results:
Acenaphthene and Benzo(a)pyrene
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	SVOCs (µg/L)	
			Acenaphthene	Benzo(a)pyrene
		Proposed Groundwater Cleanup Level (µg/L)	5.34	0.015
Shallow Groundwater Monitoring Wells (continued)				
DMW2	DMW-2-240917	9/17/2024	**77.4**	0.09490 U
continued	DMW-12-240917 (Dup)	9/17/2024	**84.7**	0.09220 U
DMW3	DMW-3-0713	7/12/2013	**250**	0.78 U
	DMW-3-093013	9/30/2013	**250**	0.78 U
	DMW-3-121814	12/18/2014	**300**	0.5 U
	DMW-3-0820	8/3/2020	**170**	0.59 U
	DMW3-240314	3/14/2024	**99.4**	0.00934 U
	DMW-3-240604	6/4/2024	**161**	0.166 U
	DMW-3-240917	9/17/2024	**185**	0.159 U
DMW6	DMW-6-0713	7/11/2013	**2.9**	0.0078 U
	DMW-6-100213	10/2/2013	**3.1**	0.0078 U
DMW-6A	DMW-6A-121714	12/17/2014	**0.74**	**0.0036 J**
DMW-6B	DMW-6B-0820	8/6/2020	**10.0**	0.058 U
	DMW-6B-240314	3/14/2024	**7.07**	0.0105 U
	DMW-6B-240604	6/4/2024	**8.79**	0.0093 U
	DMW-6B-240916	9/16/2024	**9.50**	0.0104 U
EMW-1S	EMW-1S-0713	7/11/2013	**0.0065**	0.0078 U
	EMW-1S-093013	9/30/2013	0.0038 U	0.0078 U
	EMW-1S-121514	12/15/2014	0.01 U	0.01 U
	EMW-1S-0820	8/6/2020	0.01 U	0.015 U
	EMW-1S-240313	3/13/2024	0.0166 U	0.00829 U
	EMW-1S-240604	6/4/2024	0.0195 U	0.00976 U
	EMW-1S-240916	9/16/2024	0.0205 U	0.01020 U
EMW-2S	EMW-2S-0713	7/12/2013	0.0038 U	0.0078 U
	EMW-57S-0713 (dup)	7/12/2013	0.0038 U	0.0078 U
	EMW-2S-100313	10/3/2013	0.0038 U	0.0078 U
	EMW-57S-100313 (dup)	10/3/2013	0.0038 U	0.0078 U
	EMW-2S-121714	12/17/2014	0.01 U	0.01 U
	EMW-2S-0820	8/4/2020	0.01 U	0.015 U
	EMW-2S-240313	3/13/2024	0.0192 U	0.00962 U
	EMW-2S-240605	6/5/2024	0.0180 U	0.0090 U
	EMW-2S-240917	9/17/2024	0.0180 U	0.0090 U
EMW-3S	EMW-3S-0713	7/11/2013	0.0038 U	0.0078 U
	EMW-3S-100113	10/1/2013	0.0038 U	0.0078 U
	EMW-3S-121514	12/15/2014	0.01 U	0.01 U
	EMW-3S-0820	8/6/2020	0.04 U	0.059 U
	EMW-3S-240313	3/13/2024	0.0183 U	0.00916 U
	EMW-3S-240606	6/6/2024	0.0178 U	0.0089 U
	EMW-3S-240918	9/18/2024	0.0168 U	0.0084 U
EMW-5S	EMW-5S-0713	7/12/2013	0.0038 U	0.0078 U
	EMW-5S-100213	10/2/2013	**0.0046**	0.0078 U
EMW-5SA	EMW-5SA-121514	12/15/2014	0.01 U	0.01 U
	EMW-5SA-0820	8/4/2020	0.04 U	0.058 U
	EMW-5SA-240314	3/14/2024	0.0159 U	0.00797 U
	EMW-5SA-240605	6/5/2024	0.0167 U	0.00835 U
	EMW-5SA-240917	9/17/2024	0.0165 U	0.00823 U
EMW-6S	EMW-6S-0713	7/10/2013	0.0038 U	0.0078 U
	EMW-6S-100213	10/2/2013	0.0038 U	0.0078 U
	EMW-6S-121514	12/15/2014	0.01 U	0.01 U
	EMW-6S-0820	8/6/2020	0.04 U	0.062 U
	EMW-6S-240313	3/13/2024	0.0164 U	0.00821 U
	EMW-6S-240604	6/4/2024	0.0177 U	0.00883 U
	EMW-26S-240604 (Dup)	6/4/2024	0.0182 U	0.00908 U
	EMW-6S-240917	9/17/2024	0.0195 U	0.00975 U
	EMW-26S-240917 (Dup)	9/17/2024	0.0191 U	0.00955 U
EMW-7S	EMW-7S-0713	7/11/2013	0.0038 U	0.0078 U
	EMW-7S-100213	10/2/2013	0.0038 U	0.0078 U
	EMW-7S-121614	12/16/2014	0.01 U	0.01 U
	EMW-7S-0820	8/5/2020	0.01 U	0.016 U

Table 8
2013 - 2024 Groundwater Sample Analytical Results:
Acenaphthene and Benzo(a)pyrene
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	SVOCs (µg/L)	
			Acenaphthene	Benzo(a)pyrene
		Proposed Groundwater Cleanup Level (µg/L)	5.34	0.015
Shallow Groundwater Monitoring Wells (continued)				
EMW-7S continued	EMW-7S-240314	3/14/2024	0.0171 U	0.00853 U
	EMW-7S-240604	6/4/2024	0.0181 U	0.00905 U
	EMW-7S-240916	9/16/2024	0.0196 U	0.00978 U
EMW-8S	EMW-8S-0713	7/12/2013	**0.059**	0.0078 U
	EMW-8S-100313	10/3/2013	0.0038 U	0.0078 U
	EMW-8S-121714	12/17/2014	0.01 U	0.01 U
	EMW-8S-0820	8/4/2020	0.04 U	0.06 U
EMW-9S	EMW-9S-0713	7/12/2013	**0.099**	0.0078 U
	EMW-9S-093013	9/30/2013	**0.03**	0.0078 U
	EMW-9S-121714	12/17/2014	**0.017**	**0.0061 J**
EMW-9SA	EMW-9SA-0820	8/4/2020	**0.13**	0.058 U
	EMW-9SA-240313	3/13/2024	0.0215 U	0.0108 U
	EMW-9SA-240605	6/5/2024	0.0177 U	0.0089 U
	EMW-9SA-240917	9/17/2024	0.0184 U	0.0092 U
EMW-11S	EMW-11S-0713	7/11/2013	**0.13**	0.0078 U
	EMW-11S-093013	9/30/2013	**0.068**	0.0078 U
	EMW-11S-121614	12/16/2014	**0.29**	0.01 U
	EMW-11S-0820	8/5/2020	**0.64**	0.061 U
	EMW-11S-240313	3/13/2024	**0.578**	0.0101 U
	EMW-31S-240313 (Dup)	3/13/2024	**0.644**	0.00987 U
	EMW-11S-240604	6/4/2024	**1.23**	0.00981 U
	EMW-11S-240916	9/16/2024	**0.73**	0.01040 U
EMW-12S	EMW-12S-0713	7/12/2013	0.0038 U	0.0078 U
	EMW-12S-100313	10/3/2013	0.0038 U	0.0078 U
	EMW-12S-20141219	12/19/2014	0.01 U	1 U
	EMW-12S-0820	8/6/2020	0.01 U	0.015 U
	EMW-12S-240314	3/14/2024	0.0201 U	0.0100 U
	EMW-12S-240604	6/4/2024	0.0184 U	0.0092 U
	EMW-12S-240917	9/17/2024	0.0189 U	0.0095 U
EMW-13S	EMW-13S-0713	7/11/2013	**0.64**	**0.038**
	EMW-13S-100113	10/1/2013	**0.82**	**0.012**
	EMW-13S-121614	12/16/2014	**0.2**	**0.013**
	EMW-63S-121614 (dup)	12/16/2014	**0.17**	**0.0086 J**
	EMW-13S-0820	8/5/2020	**0.03**	0.015 U
	EMW-13S-240313	3/13/2024	0.0331 U	**0.0178**
	EMW-13S-240604	6/4/2024	**0.0203 J**	0.0090 U
	EMW-13S-240916	9/16/2024	**0.238**	0.0083 U
EMW-17S	EMW-17S-121814	12/18/2014	**0.025**	**0.0046 J**
	EMW-17S-0820	8/5/2020	0.01 U	0.015 U
	EMW-17S-240314	3/14/2024	0.0172 U	0.00858 U
	EMW-17S-240605	6/5/2024	0.0177 U	0.00887 U
	EMW-17S-240916	9/16/2024	0.0177 U	0.00886 U
EMW-18S	EMW-18S-121714	12/17/2014	**0.0034 J**	0.01 U
	EMW-18S-0820	8/5/2020	0.01 U	0.015 U
	MW-62-0820 (Dup)	8/5/2020	0.01 U	0.015 U
	EMW-18S-240313	3/13/2024	0.0207 U	0.0104 U
	EMW-18S-240604	6/4/2024	0.0185 U	0.0092 U
	EMW-18S-240916	9/16/2024	0.0185 U	0.0092 U
EMW-23S	EMW-23S-240314	3/14/2024	0.0191 U	0.00955 U
	EMW-23S-240604	6/4/2024	0.0178 U	0.00891 U
	EMW-23S-240917	9/17/2024	0.0180 U	0.00898 U
HC-4	HC-4-0820	8/5/2020	0.01 U	0.014 U
	HC-4-240314	3/14/2024	0.0163 U	0.00813 U
	HC-4-240605	6/5/2024	0.0168 U	0.00841 U
	HC-4-240918	9/18/2024	0.0163 U	0.00814 U
HC-20	HC20-0713	7/11/2013	0.0038 U	0.0078 U
	HC20-100113	10/1/2013	0.0038 U	0.0078 U
	HC-20-121614	12/16/2014	0.01 U	0.01 U
	HC-20-0820	8/4/2020	**0.04**	0.015 U

Table 8
2013 - 2024 Groundwater Sample Analytical Results:
Acenaphthene and Benzo(a)pyrene
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	SVOCs (µg/L)	
			Acenaphthene	Benzo(a)pyrene
		Proposed Groundwater Cleanup Level (µg/L)	5.34	0.015
Shallow Groundwater Monitoring Wells (continued)				
HC-20 continued	HC-20-240313	3/13/2024	0.0221 U	0.0111 U
	HC-20-240604	6/4/2024	0.0186 U	0.00932 U
	HC-20-240917	9/17/2024	0.0179 U	0.00896 U
SLR-1	SLR1-0713	7/11/2013	**0.0093**	0.0078 U
	SLR1-100313	10/3/2013	0.0038 U	0.0078 U
	SLR-1-121814	12/18/2014	**0.0033 J**	0.01 U
	MW-61-0820 (Dup)	8/4/2020	0.04 U	0.058 U
	SLR-1-0820	8/4/2020	0.04 U	0.061 U
	SLR-1-240312	3/12/2024	0.0169 U	0.00843 U
	SLR-1-240604	6/4/2024	0.0160 U	0.00801 U
	SLR-1-240916	9/16/2024	0.0162 U	0.00808 U
SLR-2	SLR2-0713	7/11/2013	0.0038 U	0.0078 U
	SLR2-100213	10/2/2013	0.0038 U	0.0078 U
	SLR-2-121714	12/17/2014	0.01 U	0.01 U
	SLR-2-0820	8/4/2020	0.01 U	0.014 U
	SLR-2-240313	3/13/2024	0.0189 U	0.00944 U
	SLR-2-240605	6/5/2024	0.0160 U	0.00801 U
	SLR-2-240917	9/17/2024	0.0161 U	0.00805 U
SLR-3	SLR3-0713	7/12/2013	0.038 U	0.078 U
	SLR3-100313	10/3/2013	**0.013**	0.0078 U
	SLR-3-121514	12/15/2014	**0.0072 J**	1 U
	SLR-3-0820	8/4/2020	0.04 U	0.058 U
	SLR-3-240313	3/13/2024	0.0779 UJ	0.0390 UJ
	SLR-3-240605	6/5/2024	0.0328 U	0.0082 U
	SLR-3-240917	9/17/2024	0.0569 U	0.0091 U
SLR-6	SLR6-0713	7/12/2013	**0.0095**	0.0078 U
	SLR6-100113	10/1/2013	0.0038 U	0.0078 U
	SLR-6-121714	12/17/2014	**0.01**	0.01 U
	SLR-6-0820	8/4/2020	0.01 U	0.015 U
	SLR-6-240313	3/13/2024	0.0181 U	0.00905 U
	SLR-6-240605	6/5/2024	0.0196 U	0.00980 U
	SLR-6-240917	9/17/2024	0.0187 U	0.00933 U
SLR-7	SLR7-0713	7/11/2013	0.0038 U	0.0078 U
	SLR7-100113	10/1/2013	0.0038 U	0.0078 U
	SLR-7-121514	12/15/2014	0.01 U	0.01 U
	SLR-7-0820	8/4/2020	0.04 U	0.058 U
	SLR-7-240314	3/14/2024	0.0165 U	0.00826 U
	SLR-17-240314 (Dup)	3/14/2024	0.0163 U	0.00815 U
	SLR-7-240604	6/4/2024	0.0181 U	0.00907 U
	SLR-7-240916	9/16/2024	0.0186 U	0.00928 U
Intermediate-Depth Groundwater Monitoring Wells				
EMW-4D	EMW-4D-0713	7/11/2013	0.0038 U	0.0078 U
	EMW-4D-100113	10/1/2013	0.0038 U	0.0078 U
	EMW-4D-121514	12/15/2014	0.01 U	0.01 U
	EMW-4D-0820	8/7/2020	0.01 U	0.014 U
	MW-64-0820 (Dup)	8/7/2020	0.01 U	0.015 U
	EMW-4D-240312	3/12/2024	0.0213 U	0.0107 U
	EMW-4D-240604	6/4/2024	0.0198 U	0.0099 U
	EMW-4D-240916	9/16/2024	0.0222 U	0.0111 U
EMW-10D	EMW-10D-0713	7/10/2013	**1.8**	0.0078 U
	EMW-56D-0713 (dup)	7/10/2013	**1.7**	0.0078 U
	EMW-10D-100113	10/1/2013	**1.8**	0.0078 U
	EMW-56D-100113 (dup)	10/1/2013	**1.9**	0.0078 U
	EMW-10D-121714	12/17/2014	**1.7**	0.01 U
	EMW-10D-0820	8/3/2020	**1.4 J**	0.015 UJ
	MW-60-0820 (Dup)	8/3/2020	**1.4 J**	0.015 UJ
	EMW-10D-240314	3/14/2024	**3.49**	0.00961 U
	EMW-10D-240606	6/6/2024	**3.27**	0.00932 U
	EMW-10D-240917	9/17/2024	**3.79**	0.00909 U

Table 8
2013 - 2024 Groundwater Sample Analytical Results:
Acenaphthene and Benzo(a)pyrene
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	SVOCs (µg/L)	
			Acenaphthene	Benzo(a)pyrene
		Proposed Groundwater Cleanup Level (µg/L)	**5.34**	**0.015**
Intermediate-Depth Groundwater Monitoring Wells (continued)				
EMW-14D	EMW-14D-0713	7/11/2013	**0.092**	0.0078 U
	EMW-14D-093013	9/30/2013	**0.0096**	0.0078 U
	EMW-14D-121614	12/16/2014	**0.0041 J**	0.01 U
	EMW-14D-0820	8/5/2020	0.01 U	0.016 U
	EMW-14D-240313	3/13/2024	0.0222 U	0.0111 U
	EMW-14D-240604	6/4/2024	0.0186 U	0.0093 U
	EMW-14D-240916	9/16/2024	0.0200 U	0.0100 U
EMW-15D	EMW-15D-0713	7/11/2013	0.0038 U	0.0078 U
	EMW-15D-100113	10/1/2013	0.0038 U	0.0078 U
	EMW-15D-121814	12/18/2014	0.01 U	0.01 U
	EMW-15D-0820	8/7/2020	0.01 U	0.014 U
	EMW-15D-240313	3/13/2024	0.0160 U	0.00801 U
	EMW-15D-240604	6/4/2024	0.0191 U	0.00957 U
	EMW-15D-240916	9/16/2024	0.0208 U	0.01040 U
EMW-16D	EMW-16D-0713	7/11/2013	0.0038 U	0.0078 U
	EMW-16D-100213	10/2/2013	0.0038 U	0.0078 U
	EMW-16D-121614	12/16/2014	0.01 U	0.01 U
	EMW-16D-0820	8/5/2020	0.01 U	0.0152 U
	EMW-16D-240312	3/12/2024	0.0199 U	0.00994 U
	EMW-16D-240605	6/5/2024	0.0179 U	0.00894 U
	EMW-16D-240917	9/17/2024	0.0171 U	0.00855 U
Deep Groundwater Monitoring Wells				
EMW-19D	EMW-19D-121814	12/18/2014	**0.38**	**0.0056 J**
	EMW-19D-0820	8/4/2020	0.04 U	0.059 U
	EMW-19D-240314	3/14/2024	0.0200 U	0.00998 U
EMW-20D	EMW-20D-121614	12/16/2014	**0.0072 J**	0.01 U
	EMW-20D-0820	8/7/2020	0.01 U	**0.020 J**
	EMW-20D-240313	3/13/2024	0.0177 U	0.00884 U
EMW-21D	EMW-21D-121614	12/16/2014	**0.005 J**	0.01 U
	EMW-21D-0820	8/6/2020	0.04 U	0.061 U
	EMW-21D-240312	3/12/2024	0.0209 U	0.0105 U
EMW-22D	EMW-22D-121714	12/17/2014	0.01 U	0.01 U
	EMW-22D-0820	8/7/2020	0.04 U	0.062 U
	EMW-22D-240312	3/12/2024	0.0185 U	0.00926 U

Notes:

Detected concentration is greater than the groundwater cleanup level

Non-detected concentration (shown at reporting limit) is above the groundwater cleanup level

Bold text indicates detected analyte.

µg/L = micrograms per liter

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

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

UJ = The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Table 9
2013 - 2024 Groundwater Sample Analytical Results: Vinyl Chloride
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	VOCs (µg/L)
			Vinyl chloride
		Proposed Groundwater Cleanup Level (µg/L)	0.18
Shallow Groundwater Monitoring Wells			
CMW-1	CMW-1-0713	7/11/2013	0.13 U
	CMW-1-100213	10/2/2013	0.13 U
	CMW-1-121514	12/15/2014	0.2 U
	CMW-1-0820	8/7/2020	0.01 U
	CMW-1-240312	3/12/2024	0.0100 U
	CMW-1-240604	6/4/2024	0.0100 U
	CMW-1-240916	9/16/2024	0.0100 U
CMW-2	CMW-2-0713	7/12/2013	0.13 U
	CMW-2-100113	10/1/2013	0.13 U
	CMW-2-121514	12/15/2014	0.2 U
	CMW-2-0820	8/6/2020	0.01 U
	CMW-2-240313	3/13/2024	0.0100 U
	CMW-2-240605	6/5/2024	0.0100 U
	CMW-2-240918	9/18/2024	0.0100 U
CMW-3	CMW-3-0713	7/12/2013	0.13 U
	CMW-3-093013	9/30/2013	0.13 U
	CMW-3-121814	12/18/2014	0.2 U
	CMW-3-0820	8/6/2020	0.01 U
	CMW-3-240313	3/13/2024	0.0100 U
	CMW-3-240604	6/4/2024	0.0100 U
	CMW-3-240918	9/18/2024	0.0100 U
CMW-4	CMW-4-0713	7/11/2013	0.13 U
	CMW-4-100313	10/3/2013	0.13 U
	CMW-4-121814	12/18/2014	0.2 U
	CMW-4-0820	8/7/2020	0.01 U
	CMW-4-240313	3/13/2024	0.0100 U
	CMW-4-240605	6/5/2024	0.0100 U
	CMW-4-240916	9/16/2024	0.0100 U
CMW-5	CMW-5-0713	7/12/2013	**0.24**
	CMW-5-093013	9/30/2013	**0.57**
	CMW-5-12222014	12/22/2014	**0.36**
	CMW-5-0820	8/6/2020	**0.16**
	CMW-5-240314	3/14/2024	**0.393**
	CMW-5-240605	6/5/2024	**0.243**
	CMW-5-240917	9/17/2024	**0.200**
CMW-6	CMW-6-0713	7/12/2013	0.13 U
	CMW-6-100113	10/1/2013	0.13 U
	CMW-6-121614	12/16/2014	0.2 U
	CMW-6-0820	8/5/2020	0.01 U
	CMW-6-240313	3/13/2024	0.0100 U
	CMW-6-240604	6/4/2024	0.0100 U
	CMW-6-240916	9/16/2024	0.0100 U
CMW-7	CMW-7-0713	7/12/2013	0.13 U
	CMW-7-100213	10/2/2013	0.13 U
	CMW-7-121614	12/16/2014	0.2 U
	CMW-7-0820	8/5/2020	0.01 U
	CMW-7-240312	3/12/2024	**0.0940**

Table 9
2013 - 2024 Groundwater Sample Analytical Results: Vinyl Chloride
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	VOCs (µg/L)
			Vinyl chloride
		Proposed Groundwater Cleanup Level (µg/L)	**0.18**
Shallow Groundwater Monitoring Wells (continued)			
CMW-7	CMW-7-240606	6/6/2024	**0.0484**
continued	CMW-7-240916	9/16/2024	**0.2690**
DMW2	DMW-2-0713	7/12/2013	0.13 U
	DMW-2-093013	9/30/2013	0.13 U
	DMW-2-121614	12/16/2014	0.2 U
	DMW-52-121614 (dup)	12/16/2014	0.2 U
	DMW-2-0820	8/6/2020	0.01 U
	MW-63-0820 (Dup)	8/6/2020	0.01 U
	DMW2-240314	3/14/2024	0.0100 U
	DMW-2-240604	6/4/2024	0.0100 U
	DMW-12-240604 (Dup)	6/4/2024	0.0100 U
	DMW-2-240917	9/17/2024	0.0100 U
	DMW-12-240917 (Dup)	9/17/2024	0.0100 U
DMW3	DMW-3-0713	7/12/2013	0.13 U
	DMW-3-093013	9/30/2013	0.13 U
	DMW-3-121814	12/18/2014	0.2 U
	DMW-3-0820	8/3/2020	0.01 U
	DMW3-240314	3/14/2024	0.0200 U
	DMW-3-240604	6/4/2024	0.0100 U
	DMW-3-240917	9/17/2024	0.0100 U
DMW6	DMW-6-0713	7/11/2013	0.13 U
	DMW-6-100213	10/2/2013	0.13 U
DMW-6A	DMW-6A-121714	12/17/2014	0.2 U
DMW-6B	DMW-6B-0820	8/6/2020	**0.45**
	DMW-6B-240314	3/14/2024	**0.300**
	DMW-6B-240604	6/4/2024	**0.418**
	DMW-6B-240916	9/16/2024	**0.268**
EMW-1S	EMW-1S-0713	7/11/2013	0.13 U
	EMW-1S-093013	9/30/2013	0.13 U
	EMW-1S-121514	12/15/2014	0.2 U
	EMW-1S-0820	8/6/2020	0.01 U
	EMW-1S-240313	3/13/2024	0.0100 U
	EMW-1S-240604	6/4/2024	0.0100 U
	EMW-1S-240916	9/16/2024	0.0100 U
EMW-2S	EMW-2S-0713	7/12/2013	**0.67**
	EMW-57S-0713 (dup)	7/12/2013	**0.62**
	EMW-2S-100313	10/3/2013	**1.5**
	EMW-57S-100313 (dup)	10/3/2013	**1.5**
	EMW-2S-121714	12/17/2014	0.2 U
	EMW-2S-0820	8/4/2020	**0.30**
	EMW-2S-240313	3/13/2024	0.0100 U
	EMW-2S-240605	6/5/2024	**0.0562**
	EMW-2S-240917	9/17/2024	**0.1860**
EMW-3S	EMW-3S-0713	7/11/2013	0.13 U
	EMW-3S-100113	10/1/2013	0.13 U
	EMW-3S-121514	12/15/2014	0.2 U
	EMW-3S-0820	8/6/2020	0.01 U
	EMW-3S-240313	3/13/2024	0.0100 U

Table 9
2013 - 2024 Groundwater Sample Analytical Results: Vinyl Chloride
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	VOCs (µg/L)
			Vinyl chloride
		Proposed Groundwater Cleanup Level (µg/L)	0.18
Shallow Groundwater Monitoring Wells (continued)			
EMW-3S	EMW-3S-240606	6/6/2024	0.0100 U
continued	EMW-3S-240918	9/18/2024	0.0100 U
EMW-5S	EMW-5S-0713	7/12/2013	0.13 U
	EMW-5S-100213	10/2/2013	0.13 U
EMW-5SA	EMW-5SA-121514	12/15/2014	0.2 U
	EMW-5SA-0820	8/4/2020	0.01 U
	EMW-5SA-240314	3/14/2024	0.0100 U
	EMW-5SA-240605	6/5/2024	0.0100 U
	EMW-5SA-240917	9/17/2024	0.0100 U
EMW-6S	EMW-6S-0713	7/10/2013	0.13 U
	EMW-6S-100213	10/2/2013	0.13 U
	EMW-6S-121514	12/15/2014	0.2 U
	EMW-6S-0820	8/6/2020	0.01 U
	EMW-6S-240313	3/13/2024	0.0100 U
	EMW-6S-240604	6/4/2024	0.0100 U
	EMW-26S-240604 (Dup)	6/4/2024	0.0100 U
	EMW-6S-240917	9/17/2024	0.0100 U
	EMW-26S-240917 (Dup)	9/17/2024	0.0100 U
EMW-7S	EMW-7S-0713	7/11/2013	0.13 U
	EMW-7S-100213	10/2/2013	0.13 U
	EMW-7S-121614	12/16/2014	0.2 U
	EMW-7S-0820	8/5/2020	0.01 U
	EMW-7S-240314	3/14/2024	0.0100 U
	EMW-7S-240604	6/4/2024	0.0100 U
	EMW-7S-240916	9/16/2024	0.0100 U
EMW-8S	EMW-8S-0713	7/12/2013	0.13 U
	EMW-8S-100313	10/3/2013	0.13 U
	EMW-8S-121714	12/17/2014	0.2 U
	EMW-8S-0820	8/4/2020	0.01 U
EMW-9S	EMW-9S-0713	7/12/2013	0.13 U
	EMW-9S-093013	9/30/2013	0.13 U
	EMW-9S-121714	12/17/2014	0.2 U
EMW-9SA	EMW-9SA-0820	8/4/2020	0.01 U
	EMW-9SA-240313	3/13/2024	0.0100 U
	EMW-9SA-240605	6/5/2024	0.0100 U
	EMW-9SA-240917	9/17/2024	0.0100 U
EMW-11S	EMW-11S-0713	7/11/2013	0.13 U
	EMW-11S-093013	9/30/2013	0.13 U
	EMW-11S-121614	12/16/2014	0.2 U
	EMW-11S-0820	8/5/2020	0.01 U
	EMW-11S-240313	3/13/2024	**0.0179 J**
	EMW-31S-240313 (Dup)	3/13/2024	**0.0142 J**
	EMW-11S-240604	6/4/2024	0.0100 U
	EMW-11S-240916	9/16/2024	0.0100 U
EMW-12S	EMW-12S-0713	7/12/2013	0.13 U
	EMW-12S-100313	10/3/2013	0.13 U
	EMW-12S-20141219	12/19/2014	0.2 U
	EMW-12S-0820	8/6/2020	0.01 U

Table 9
2013 - 2024 Groundwater Sample Analytical Results: Vinyl Chloride
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	VOCs (µg/L)
			Vinyl chloride
		Proposed Groundwater Cleanup Level (µg/L)	0.18
Shallow Groundwater Monitoring Wells (continued)			
EMW-12S continued	EMW-12S-240314	3/14/2024	0.0100 U
	EMW-12S-240604	6/4/2024	0.0100 U
	EMW-12S-240917	9/17/2024	0.0100 U
EMW-13S	EMW-13S-0713	7/11/2013	0.13 U
	EMW-13S-100113	10/1/2013	0.13 U
	EMW-13S-121614	12/16/2014	0.2 U
	EMW-63S-121614 (Dup)	12/16/2014	0.2 U
	EMW-13S-0820	8/5/2020	0.01 U
	EMW-13S-240313	3/13/2024	0.0100 U
	EMW-13S-240604	6/4/2024	0.0100 U
	EMW-13S-240916	9/16/2024	0.0100 U
EMW-17S	EMW-17S-121814	12/18/2014	0.2 U
	EMW-17S-0820	8/5/2020	0.01 U
	EMW-17S-240314	3/14/2024	0.0100 U
	EMW-17S-240605	6/5/2024	0.0100 U
	EMW-17S-240916	9/16/2024	0.0100 U
EMW-18S	EMW-18S-121714	12/17/2014	0.2 U
	EMW-18S-0820	8/5/2020	0.01 U
	MW-62-0820 (Dup)	8/5/2020	0.01 U
	EMW-18S-240313	3/13/2024	0.0100 U
	EMW-18S-240604	6/4/2024	0.0100 U
	EMW-18S-240916	9/16/2024	0.0100 U
EMW-23S	EMW-23S-240314	3/14/2024	0.0100 U
	EMW-23S-240604	6/4/2024	0.0100 U
	EMW-23S-240917	9/17/2024	**0.0155 J**
HC-4	HC-4-0820	8/5/2020	0.01 U
	HC-4-240314	3/14/2024	0.0100 U
	HC-4-240605	6/5/2024	0.0100 U
	HC-4-240918	9/18/2024	0.0100 U
HC-20	HC20-0713	7/11/2013	0.13 U
	HC20-100113	10/1/2013	0.13 U
	HC-20-121614	12/16/2014	0.2 U
	HC-20-0820	8/4/2020	0.01 U
	HC-20-240313	3/13/2024	0.0100 U
	HC-20-240604	6/4/2024	0.0100 U
	HC-20-240917	9/17/2024	0.0100 U
SLR-1	SLR1-0713	7/11/2013	0.13 U
	SLR1-100313	10/3/2013	0.13 U
	SLR-1-121814	12/18/2014	0.2 U
	MW-61-0820 (Dup)	8/4/2020	0.01 U
	SLR-1-0820	8/4/2020	0.01 U
	SLR-1-240312	3/12/2024	0.0100 U
	SLR-1-240604	6/4/2024	0.0100 U
	SLR-1-240916	9/16/2024	0.0100 U
SLR-2	SLR2-0713	7/11/2013	0.13 U
	SLR2-100213	10/2/2013	0.13 U
	SLR-2-121714	12/17/2014	0.2 U

Table 9
2013 - 2024 Groundwater Sample Analytical Results: Vinyl Chloride
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	VOCs (µg/L)
			Vinyl chloride
		Proposed Groundwater Cleanup Level (µg/L)	**0.18**
Shallow Groundwater Monitoring Wells (continued)			
SLR-2 continued	SLR-2-0820	8/4/2020	0.01 U
	SLR-2-240313	3/13/2024	0.0100 U
	SLR-2-240605	6/5/2024	0.0100 U
	SLR-2-240917	9/17/2024	0.0100 U
SLR-3	SLR3-0713	7/12/2013	0.13 U
	SLR3-100313	10/3/2013	0.13 U
	SLR-3-121514	12/15/2014	2 U
	SLR-3-0820	8/4/2020	0.01 U
	SLR-3-240313	3/13/2024	0.0100 U
	SLR-3-240605	6/5/2024	0.0100 U
	SLR-3-240917	9/17/2024	0.0100 U
SLR-6	SLR6-0713	7/12/2013	0.13 U
	SLR6-100113	10/1/2013	0.13 U
	SLR-6-121714	12/17/2014	0.2 U
	SLR-6-0820	8/4/2020	0.01 U
	SLR-6-240313	3/13/2024	0.0100 U
	SLR-6-240605	6/5/2024	0.0100 U
	SLR-6-240917	9/17/2024	0.0100 U
SLR-7	SLR7-0713	7/11/2013	0.13 U
	SLR7-100113	10/1/2013	0.13 U
	SLR-7-121514	12/15/2014	0.2 U
	SLR-7-0820	8/4/2020	0.01 U
	SLR-7-240314	3/14/2024	0.0100 U
	SLR-17-240314 (Dup)	3/14/2024	0.0100 U
	SLR-7-240604	6/4/2024	0.0100 U
	SLR-7-240916	9/16/2024	0.0100 U
Intermediate-Depth Groundwater Monitoring Wells			
EMW-4D	EMW-4D-0713	7/11/2013	0.13 U
	EMW-4D-100113	10/1/2013	0.13 U
	EMW-4D-121514	12/15/2014	**0.26**
	EMW-4D-0820	8/7/2020	**0.30**
	MW-64-0820 (Dup)	8/7/2020	**0.29**
	EMW-4D-240312	3/12/2024	**0.435**
	EMW-4D-240604	6/4/2024	**0.342**
	EMW-4D-240916	9/16/2024	**0.352**
EMW-10D	EMW-10D-0713	7/10/2013	0.13 U
	EMW-56D-0713 (dup)	7/10/2013	0.13 U
	EMW-10D-100113	10/1/2013	0.13 U
	EMW-56D-100113 (dup)	10/1/2013	0.13 U
	EMW-10D-121714	12/17/2014	0.2 U
	EMW-10D-0820	8/3/2020	0.01 U
	MW-60-0820 (Dup)	8/3/2020	0.01 U
	EMW-10D-240314	3/14/2024	0.0100 U
	EMW-10D-240606	6/6/2024	0.0100 U
	EMW-10D-240917	9/17/2024	0.0100 U
EMW-14D	EMW-14D-0713	7/11/2013	0.13 U
	EMW-14D-093013	9/30/2013	0.13 U
	EMW-14D-121614	12/16/2014	0.2 U
	EMW-14D-0820	8/5/2020	0.01 U

Table 9
2013 - 2024 Groundwater Sample Analytical Results: Vinyl Chloride
8th Avenue Terminals, Inc. Site

Location Name	Sample ID	Sample Date	VOCs (µg/L)
			Vinyl chloride
		Proposed Groundwater Cleanup Level (µg/L)	**0.18**
Intermediate-Depth Groundwater Monitoring Wells (continued)			
EMW-14D continued	EMW-14D-240313	3/13/2024	**0.0361**
	EMW-14D-240604	6/4/2024	**0.0291**
	EMW-14D-240916	9/16/2024	**0.0167 J**
EMW-15D	EMW-15D-0713	7/11/2013	0.13 U
	EMW-15D-100113	10/1/2013	0.13 U
	EMW-15D-121814	12/18/2014	0.2 U
	EMW-15D-0820	8/7/2020	0.01 U
	EMW-15D-240313	3/13/2024	0.0100 U
	EMW-15D-240604	6/4/2024	0.0100 U
	EMW-15D-240916	9/16/2024	0.0100 U
EMW-16D	EMW-16D-0713	7/11/2013	0.13 U
	EMW-16D-100213	10/2/2013	0.13 U
	EMW-16D-121614	12/16/2014	0.2 U
	EMW-16D-0820	8/5/2020	0.01 U
	EMW-16D-240312	3/12/2024	0.0100 U
	EMW-16D-240605	6/5/2024	0.0100 U
	EMW-16D-240917	9/17/2024	0.0100 U
Deep Groundwater Monitoring Wells			
EMW-19D	EMW-19D-121814	12/18/2014	0.2 U
	EMW-19D-0820	8/4/2020	0.01 U
	EMW-19D-240314	3/14/2024	0.0100 U
EMW-20D	EMW-20D-121614	12/16/2014	0.2 U
	EMW-20D-0820	8/7/2020	0.01 U
	EMW-20D-240313	3/13/2024	0.0100 U
EMW-21D	EMW-21D-121614	12/16/2014	0.2 U
	EMW-21D-0820	8/6/2020	0.01 U
	EMW-21D-240312	3/12/2024	0.0100 U
EMW-22D	EMW-22D-121714	12/17/2014	0.2 U
	EMW-22D-0820	8/7/2020	0.01 U
	EMW-22D-240312	3/12/2024	0.0100 U

Notes:

Detected concentration is greater than the groundwater cleanup level

Non-detected concentration (shown at reporting limit) is above the groundwater cleanup level

Bold text indicates detected analyte.

µg/L = micrograms per liter

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

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

UJ = The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Table 10
Cost Estimate for Remedial Alternative 2
Surface Capping, Groundwater Treatment, MNA, and Institutional Controls
8th Avenue Terminals, Inc. Site

Remedy Components:

Capping - Soil that contains indicator hazardous substance (IHS) concentrations greater than the cleanup levels based on direct contact risks will be capped with asphalt pavement. Three asphalt caps will be constructed and the existing paved area will also serve as an asphalt cap.

PRB - A zero-valent iron (ZVI) permeable reactive barrier (PRB) totaling approximately 1,200 feet (ft) in length will be constructed at depths of 6 to 25 ft below ground surface (bgs). The PRB would installed by injecting micro-scale ZVI (Ferox Target) in direct-push borings spaced approximately 10 ft apart to remediate the impacted groundwater. After 10 years, it is assumed that half the PRB materials would be replaced.

MNA - Quarterly to semiannual groundwater monitoring of 24 monitoring wells for 15 years.

Remedial Action Component	Units	No. of Units	Units Cost	Cost	Total Cost
Pre-Remediation Activities					
Permitting	LS	1	$30,000	$30,000	
PRB pilot testing	LS	1	$350,000	$350,000	
					$380,000
Surface Capping					
Install pavement	sq ft	11,800	$6	$66,080	
Implement institutional controls	LS	1	$20,000	$20,000	
					$86,080
PRB					
Mobilization, direct-push drilling, and injection of ZVI	ea	120	$15,000	$1,800,000	
Reactive backfill material	pounds	573,500	$0.90	$516,150	
Load, haul, and disposal of soil	ton	150	$110	$16,500	
Monitoring well installation	ea	5	$5,000	$25,000	
					$2,357,650
Replacement of PRB					
Mobilization, direct-push drilling, and injection of ZVI	ea	60	$19,500	$1,170,000	
Reactive backfill material	pounds	286,750	$1.17	$335,498	
Load, haul, and disposal of soil	ton	75	$158	$11,880	
					$1,517,378
Subtotal					$4,341,108
Contingency	20%				$868,222
Project Management and Design	2%				$86,822
Construction Oversight and Reporting	5%				$217,055
Remedial Action Subtotal (Rounded to Nearest $10,000)					**$5,510,000**
Cap Inspection and Groundwater Monitoring					
Inspection and quarterly groundwater sampling and reporting		1		$105,000	
Inspection and semi-annual groundwater sampling and reporting		2		$52,500	
Inspection and semi-annual groundwater sampling and reporting		3		$52,500	
Inspection and semi-annual groundwater sampling and reporting		4		$52,500	
Inspection and semi-annual groundwater sampling and reporting		5		$52,500	
Inspection and semi-annual groundwater sampling and reporting		6		$52,500	
Inspection and semi-annual groundwater sampling and reporting		7		$52,500	
Inspection and semi-annual groundwater sampling and reporting		8		$52,500	
Inspection and semi-annual groundwater sampling and reporting		9		$52,500	
Inspection and semi-annual groundwater sampling and reporting		10		$52,500	
Inspection and semi-annual groundwater sampling and reporting		11		$52,500	
Inspection and semi-annual groundwater sampling and reporting		12		$52,500	
Inspection and semi-annual groundwater sampling and reporting		13		$52,500	
Inspection and semi-annual groundwater sampling and reporting		14		$52,500	
Inspection and quarterly groundwater sampling and reporting		15		$105,000	
NPV[1] of Cap Inspection and Groundwater Monitoring Subtotal (Rounded to Nearest $10,000)					**$650,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to Nearest $10,000)					**$6,160,000**

Footnote:

[1]Net present value (NPV) is based on a 4.4 percent discount rate for a 20-year period, as per 2025 Discount Rates for OMB Circular No. A-94 memorandum (Executive Office of the President, Office of Management and Budget), dated January 16, 2025.

Abbreviations and Acronyms:

ea = each
LS = lump sum
MNA = monitored natural attenuation
sq ft = square feet

Table 11
Cost Estimate for Remedial Alternative 3
In Situ Solidification/Stabilization, Groundwater Treatment, and MNA
8th Avenue Terminals, Inc. Site

Remedy Components:

ISS - *In situ* solidification/stabilization (ISS) will be installed at the areas that contain arsenic and benzo(a)pyrene concentrations greater than soil RELs and antimony, lead, and total semivolatile petroleum hydrocarbons concentrations greater than the soil CULs (approx. 107,800 bcy) to prevent direct contact with the soil and further leaching of contaminants into the groundwater.

PRB - A zero-valent iron (ZVI) permeable reactive barrier (PRB) totaling approximately 1,200 feet (ft) in length will be constructed at depths of approximately 12 to 25 ft below ground surface (bgs). The PRB would installed by injecting micro-scale ZVI (Ferox Target) in direct-push borings spaced approximately 10 ft apart to remediate the impacted groundwater. After 10 years, it is assumed that half the PRB materials would be replaced.

MNA - Quarterly to semiannual groundwater monitoring of 21 monitoring wells for 6 years.

Remedial Action Component	Units	No. of Units	Units Cost	Total Cost
Pre-Remediation Activities				
Permitting	LS	1	$70,000	$70,000	
Geotech borings and ISS bench testing	LS	1	$40,000	$40,000	
PRB pilot testing	LS	1	$350,000	$350,000	
Abandon Monitoring Wells	LS	1	$20,000	$20,000	
					$480,000
In-Situ Solidification				
Mob/Demob	LS	1	$1,000,000	$1,000,000	
Install ISS	bcy	107,800	$63	$6,818,350	
Load, haul, and disposal of soil	ton	39,300	$110	$4,323,000	
Resurfacing with asphalt	sq ft	331,200	$5	$1,656,000	
Mobile laboratory	day	165	$3,300	$543,492	
					$14,340,842
PRB				
Mobilization, direct-push drilling, and injection of ZVI	ea	120	$15,000	$1,800,000	
Reactive backfill material	pounds	392,400	$0.90	$353,160	
Load, haul, and disposal of soil	ton	150	$110	$16,500	
Monitoring well installation	ea	9	$5,000	$45,000	
					$2,214,660
Replacement of PRB				
Mobilization, direct-push drilling, and injection of ZVI	ea	60	$19,500	$1,170,000	
Reactive backfill material	pounds	196,200	$1.17	$229,554	
Load, haul, and disposal of soil	ton	75	$132	$9,900	
					$1,409,454
Subtotal					$18,444,956
Contingency	20%				$3,688,991
Project Management and Design	1%				$184,450
Construction Oversight and Reporting	2%				$368,899
Remedial Action Subtotal (Rounded to Nearest $10,000)					**$22,690,000**
Groundwater Monitoring				
Quarterly groundwater sampling and reporting		1	$92,000	
Semi-annual groundwater sampling and reporting		2	$46,000	
Semi-annual groundwater sampling and reporting		3	$46,000	
Semi-annual groundwater sampling and reporting		4	$46,000	
Semi-annual groundwater sampling and reporting		5	$46,000	
Quarterly groundwater sampling and reporting		6	$92,000	
Total NPV[1] of Groundwater Monitoring Subtotal (Rounded to Nearest $10,000)				**$320,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to Nearest $10,000)				**$23,010,000**

Footnote:

[1]Net present value (NPV) is based on a 4.4 percent discount rate for a 20-year period, per 2025 Discount Rates for OMB Circular No. A-94 memorandum (Executive Office of the President, Office of Management and Budget), dated January 16, 2025.

Abbreviations and Acronyms:

bcy = bank cubic yards
CUL = cleanup level
ea = each
LS = lump sum
MNA = monitored natural attenuation
REL = remediation level
sq ft = square feet

Table 12
Cost Estimate for Remedial Alternative 4
In Situ Solidification/Stabilization and MNA
8th Avenue Terminals, Inc. Site

Remedy Components:

ISS - *In situ* solidification/stabilization (ISS) will be installed at the areas that contain soil indicator hazardous substance (IHS) concentrations greater than soil CULs (approx. 198,400 bcy) to prevent direct contact with the soil and further leaching of contaminants into the groundwater.

MNA - Quarterly to semiannual groundwater monitoring of 13 monitoring wells for 3 years.

Remedial Action Component	Units	No. of Units	Units	Cost	Total Cost
Pre-Remediation Activities					
Permitting	LS	1	$70,000	$70,000	
Geotech borings and ISS bench testing	LS	1	$40,000	$40,000	
Abandon Monitoring Wells	LS	1	$70,000	$70,000	
					$180,000
In-Situ Solidification					
Mob/Demob	LS	1	$1,000,000	$1,000,000	
Install ISS	bcy	198,400	$63	$12,548,800	
Load, haul, and disposal of soil	ton	77,600	$110	$8,536,000	
Resurfacing with asphalt	sq ft	631,000	$5	$3,155,000	
Mobile laboratory	day	305	$3,300	$1,006,500	
Monitoring well installation	ea	13	$5,000	$65,000	
					$26,246,300
Subtotal					$26,426,300
Contingency	20%				$5,285,260
Project Management and Design	0.6%				$158,558
Construction Oversight and Reporting	2%				$528,526
Remedial Action Subtotal (Rounded to Nearest $10,000)					**$32,400,000**
Groundwater Monitoring					
Quarterly groundwater sampling and reporting		1	$57,000		
Semi-annual groundwater sampling and reporting		2	$23,500		
Quarterly groundwater sampling and reporting		3	$57,000		
Total NPV[1] of Groundwater Monitoring Subtotal (Rounded to Nearest $10,000)					**$130,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to Nearest $10,000)					**$32,530,000**

Footnote:

[1]Net present value (NPV) is based on a 4.4 percent discount rate for a 20-year period, as per 2025 Discount Rates for OMB Circular No. A-94 memorandum (Executive Office of the President, Office of Management and Budget), dated January 16, 2025.

Abbreviations and Acronyms:

bcy = bank cubic yards
CUL = cleanup level
ea = each
LS = lump sum
MNA = monitored natural attenuation
sq ft = square feet

Table 13
Cost Estimate for Remedial Alternative 5
Soil Excavation, Groundwater Recovery, and MNA
8th Avenue Terminals, Inc. Site

Remedy Components:

Soil Excavation - The soil that contains indicator hazardous substance (IHS) concentrations above the CULs will be excavated to a maximum depth of 15 feet (ft) and transported off-site for disposal. Approximately 194,600 bcy of soil would be excavated.

Groundwater Recovery - Shallow groundwater that enters the excavations will be pumped into a treatment system and discharged to the sanitary sewer system.

MNA - Quarterly groundwater monitoring of 13 monitoring wells for 2 years.

Remedial Action Component	Units	No. of Units	Units	Cost	Total Cost
Pre-Remediation Activities					
Permitting	LS	1	$80,000	$80,000	
Abandon Monitoring Wells	LS	1	$70,000	$70,000	
					$150,000
Soil Excavation					
Mob/Demob	LS	1	$15,500	$15,500	
Install shoring	sq ft	12,900	$135	$1,741,500	
Excavate soil	bcy	194,600	$15	$2,919,000	
Load, haul, and disposal of soil	ton	345,200	$110	$37,972,000	
Import, place, and compact clean fill	ton	345,200	$45	$15,534,000	
Resurfacing with asphalt	sq ft	630,000	$5	$3,150,000	
Mobile laboratory	day	208	$3,300	$686,400	
Install monitoring wells	ea	13	$5,000	$65,000	
					$57,342,400
Groundwater Recovery and Treatment					
Groundwater extraction and treatment	Month	5	$45,000	$225,000	
					$225,000
Subtotal					$57,717,400
Contingency	20%				$11,543,480
Project Management and Design	0.25%				$144,294
Construction Oversight and Reporting	0.8%				$461,739
Remedial Action Subtotal (Rounded to Nearest $10,000)					**$69,870,000**
Groundwater Monitoring					
Quarterly groundwater sampling and reporting		1		$57,000	
Quarterly groundwater sampling and reporting		2		$57,000	
Total NPV[1] of Groundwater Monitoring Subtotal (Rounded to Nearest $10,000)					**$110,000**
REMEDIAL ACTION ESTIMATED TOTAL (Rounded to Nearest $10,000)					**$69,980,000**

Footnote:

[1]Net present value (NPV) is based on a 4.4 percent discount rate for a 20-year period, as per 2025 Discount Rates for OMB Circular No. A-94 memorandum (Executive Office of the President, Office of Management and Budget), dated January 16, 2025.

Abbreviations and Acronyms:

bcy = bank cubic yards
CUL = cleanup level
ea = each
LS = lump sum
MNA = monitored natural attenuation
sq ft = square feet

Table 14
Evaluation of Remedial Alternatives Relative to MTCA Requirements
8th Avenue Terminals, Inc. Site
Seattle, Washington

Alternative Number:	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Description:	Surface Capping, Groundwater Treatment, MNA, and IC	ISS, Groundwater Treatment, and MNA	ISS and MNA	Soil Excavation, Groundwater Recovery and MNA
Compliance with MTCA General Requirements (WAC 173-340-360[3][a])				
Protect human health and the environment, including likely vulnerable populations and overburdened communities.	**Yes** - Alternative will protect human health and the environment through *in situ* treatment and MNA of contaminated groundwater, capping of contaminated soil, and ICs.	**Yes** - Alternative will protect human health and the environment through *in situ* stabilization of contaminated soil and *in situ* treatment and MNA of contaminated groundwater.	**Yes** - Alternative will protect human health and the environment through *in situ* stabilization of contaminated soil and MNA of contaminated groundwater.	**Yes** - Alternative will protect human health and the environment through excavation of contaminated soil and recovery and MNA of contaminated groundwater.
Comply with cleanup standards (WAC 173-340, Part 7).	**Yes** - The alternative will comply with MTCA cleanup standards using active remedy components and ICs.	**Yes** - The alternative will comply with MTCA cleanup standards using active remedy components and possible ICs.	**Yes** - The alternative will comply with MTCA cleanup standards using active remedy components.	**Yes** - The alternative will comply with MTCA cleanup standards using active remedy components.
Comply with applicable state and federal laws (WAC 173-340-710).	**Yes** - Alternative complies with applicable laws (see report Section 6.1.3).	**Yes** - Alternative complies with applicable laws (see report Section 6.1.3).	**Yes** - Alternative complies with applicable laws (see report Section 6.1.3).	**Yes** - Alternative complies with applicable laws (see report Section 6.1.3).
Prevent or minimize releases and migration of hazardous substances in the environment.	**Yes** - Alternative will prevent release and migration through *in situ* treatment and MNA of contaminated groundwater and capping of contaminated soil.	**Yes** - Alternative will prevent release and migration through *in situ* stabilization of contaminated soil and *in situ* treatment and MNA of contaminated groundwater.	**Yes** - Alternative will prevent release and migration through stabilization of contaminated soil and MNA of contaminated groundwater.	**Yes** - Alternative will prevent release and migration through removal of contaminated soil and recovery and MNA of contaminated groundwater.
Provide resilience to climate change impacts that have a high likelihood of occurring and severely compromising its long-term effectiveness.	**Yes** - The remedy components of this alternative would not be significantly affected by the anticipated impacts of climate change.	**Yes** - The remedy components of this alternative would not be significantly affected by the anticipated impacts of climate change.	**Yes** - The remedy components of this alternative would not be significantly affected by the anticipated impacts of climate change.	**Yes** - The remedy components of this alternative would not be significantly affected by the anticipated impacts of climate change.
Provide for compliance monitoring (WAC 173-340-410, and Part 7).	**Yes** - Alternative includes provisions for compliance monitoring (health and safety monitoring during construction and groundwater compliance monitoring).	**Yes** - Alternative includes provisions for compliance monitoring (health and safety monitoring during construction and groundwater compliance monitoring).	**Yes** - Alternative includes provisions for compliance monitoring (health and safety monitoring during construction and groundwater compliance monitoring).	**Yes** - Alternative includes provisions for compliance monitoring (health and safety monitoring during construction and groundwater compliance monitoring).
Not rely primarily on ICs and monitoring.	**Yes** - Primary remedy components include surface capping over contaminated soil, and *in situ* treatment and MNA of contaminated groundwater.	**Yes** - Primary remedy components include ISS of contaminated soil and *in situ* treatment and MNA of contaminated groundwater.	**Yes** - Primary remedy components include ISS of contaminated soil and MNA of contaminated groundwater.	**Yes** - Primary remedy components include soil excavation, groundwater recovery, and MNA.
Not rely primarily on dilution and dispersion.	**Yes** - Neither dilution nor dispersion are part of the primary remedy components of this alternative.	**Yes** - Neither dilution nor dispersion are part of the primary remedy component of this alternative.	**Yes** - Neither dilution nor dispersion are part of the primary remedy component of this alternative.	**Yes** - Neither dilution nor dispersion are part of the primary remedy components of this alternative.
Compliance with Action-Specific Requirements (WAC 173-340-360[3][b])				
Use remediation levels, ICs, financial assurances, and periodic reviews per MTCA	**Yes** - Alternative includes provisions for ICs, financial assurance, and periodic reviews per MTCA.	**Yes** - Alternative includes provisions for remediation levels, potential ICs, financial assurance, and periodic reviews per MTCA.	**Yes** - Alternative includes provisions for financial assurance and periodic reviews per MTCA.	**Yes** - Alternative includes provisions for financial assurance and periodic reviews per MTCA.
Compliance with Media-Specific Requirements (WAC 173-340-360[3][c])				
Treat, remove, or contain contaminated soil and groundwater at sensitive sites and to limit migration.	**Yes** - Alternative meets the MTCA requirements for contaminated media treatment, removal, and containment.	**Yes** - Alternative meets the MTCA requirements for contaminated media treatment, removal, and containment.	**Yes** - Alternative meets the MTCA requirements for contaminated media treatment, removal, and containment.	**Yes** - Alternative meets the MTCA requirements for contaminated media treatment and removal.

Table 14
Evaluation of Remedial Alternatives Relative to MTCA Requirements
8th Avenue Terminals, Inc. Site
Seattle, Washington

Alternative Number:	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Description:	Surface Capping, Groundwater Treatment, MNA, and IC	ISS, Groundwater Treatment, and MNA	ISS and MNA	Soil Excavation, Groundwater Recovery and MNA
Consider Public Concerns (WAC 173-340-360[3][d])				
Consider public concerns, including the concerns of likely vulnerable populations and overburdened communities.	Public concerns, including by likely vulnerable populations and overburdened communities, will be considered through public notice and participation during the cleanup process.	Public concerns, including by likely vulnerable populations and overburdened communities, will be considered through public notice and participation during the cleanup process.	Public concerns, including by likely vulnerable populations and overburdened communities, will be considered through public notice and participation during the cleanup process.	Public concerns, including by likely vulnerable populations and overburdened communities, will be considered through public notice and participation during the cleanup process.
Indian tribes' rights and interests (WAC 173-340-620)	Ecology will develop a Site tribal engagement plan and seek meaningful tribal engagement during the cleanup process.	Ecology will develop a Site tribal engagement plan and seek meaningful tribal engagement during the cleanup process.	Ecology will develop a Site tribal engagement plan and seek meaningful tribal engagement during the cleanup process.	Ecology will develop a Site tribal engagement plan and seek meaningful tribal engagement during the cleanup process.
Reasonable Restoration Time Frame (WAC 173-340-360[4][c])				
Provide for a reasonable restoration time frame.	**Yes** - For this alternative, the estimated restoration time frame is **16 years** for pilot testing, design, construction, implementation, and demonstration that CULs are being met at the POCs.	**Yes** - Estimated restoration time frame is **7 years** for pilot testing, design, construction, implementation, and demonstration that CULs are being met at the POCs.	**Yes** - Estimated restoration time frame is **5 years** for bench testing, design, construction, implementation, and demonstration that CULs are being met at the POCs.	**Yes** - Estimated restoration time frame for xylenes-impacted area is **4 years** for design, construction, implementation, and demonstration that CULs are being met at the POCs.
Potential risk to human health and environment.[a]	**Low** - *In situ* treatment of contaminated groundwater, surface capping, and MNA protect human health and the environment.	**Low** - *In situ* stabilization of contaminated soil, *in situ* treatment of contaminated groundwater, and MNA protect human health and the environment.	**Low** - *In situ* stabilization of contaminated soil and MNA of contaminated groundwater protect human health and the environment.	**Low** - Contaminated soil and groundwater removal and MNA protect human health and the environment.
Practicability of achieving shorter restoration time.	See Disproportionate Cost Analysis (Table 14).	See Disproportionate Cost Analysis (Table 14).	See Disproportionate Cost Analysis (Table 14).	See Disproportionate Cost Analysis (Table 14).
Long-term effectiveness of the alternative.	**Yes** - Alternative is robust, reliable, resilient to climate-change impacts, low risk, and well controlled.	**Yes** - Alternative is robust, reliable, resilient to climate-change impacts, low risk, and well controlled.	**Yes** - Alternative is robust, reliable, resilient to climate-change impacts, low risk, and well controlled.	**Yes** - Alternative is robust, reliable, resilient to climate-change impacts, low risk, and well controlled.
Current use of Site, surrounding area, and associated resources that are, or may be affected by releases from the Site.	**Onsite:** Soil/sediment reload facility **Surrounding areas:** Industrial and commercial businesses, city park, and Lower Duwamish Waterway **Resources:** Surface water, sediment	**Onsite:** Soil/sediment reload facility **Surrounding areas:** Industrial and commercial businesses, city park, and Lower Duwamish Waterway **Resources:** Surface water, sediment	**Onsite:** Soil/sediment reload facility **Surrounding areas:** Industrial and commercial businesses, city park, and Lower Duwamish Waterway **Resources:** Surface water, sediment	**Onsite:** Soil/sediment reload facility **Surrounding areas:** Industrial and commercial businesses, city park, and Lower Duwamish Waterway **Resources:** Surface water, sediment
Potential future use of Site, surrounding area, and resources that are, or may be, affected by releases from the Site.	**Onsite:** Industrial/commercial maritime zoning **Surrounding areas:** Industrial/commercial maritime zone west of and adjacent to E Marginal Way, residential zones further east of E Marginal Way **Resources:** Surface water, sediment	**Onsite:** Industrial/commercial maritime zoning **Surrounding areas:** Industrial/commercial maritime zone west of and adjacent to E Marginal Way, residential zones further east of E Marginal Way **Resources:** Surface water, sediment	**Onsite:** Industrial/commercial maritime zoning **Surrounding areas:** Industrial/commercial maritime zone west of and adjacent to E Marginal Way, residential zones further east of E Marginal Way **Resources:** Surface water, sediment	**Onsite:** Industrial/commercial maritime zoning **Surrounding areas:** Industrial/commercial maritime zone west of and adjacent to E Marginal Way, residential zones further east of E Marginal Way **Resources:** Surface water, sediment
Availability of alternative water supplies.	**Yes** - The Site is located in the City of Seattle, which provides potable water.	**Yes** - The Site is located in the City of Seattle, which provides potable water.	**Yes** - The Site is located in the City of Seattle, which provides potable water.	**Yes** - The Site is located in the City of Seattle, which provides potable water.
Likely effectiveness/ reliability of ICs.[a]	**High** - Site will be capped with subsurface access restrictions.	**Medium** - ICs would only be implemented if there are areas of impacted groundwater that are not migrating to the PRBs and are slowly naturally attenuating to below the CULs.	Not applicable; ICs not required for this alternative.	Not applicable; ICs not required for this alternative.

Table 14
Evaluation of Remedial Alternatives Relative to MTCA Requirements
8th Avenue Terminals, Inc. Site
Seattle, Washington

Alternative Number:	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Description:	Surface Capping, Groundwater Treatment, MNA, and IC	ISS, Groundwater Treatment, and MNA	ISS and MNA	Soil Excavation, Groundwater Recovery and MNA
Ability to monitor migration of hazardous substances.[a]	**High -** Monitoring wells will be available and used to monitor applicable parameters.	**High -** Monitoring wells will be available and used to monitor applicable parameters.	**High -** Monitoring wells will be available and used to monitor applicable parameters.	**High -** Monitoring wells will be available and used to monitor applicable parameters.
Toxicity of hazardous substances at the site.[a]	Metals and organics in soil: direct contact = low; protection of sediment = low; metals and organics in groundwater: protection of aquatic life = low; protection of humans consuming aquatic life = low.	Metals and organics in soil: direct contact = low; protection of sediment = low; metals and organics in groundwater: protection of aquatic life = low; protection of humans consuming aquatic life = low.	Metals and organics in soil: direct contact = low; protection of sediment = low; metals and organics in groundwater: protection of aquatic life = low; protection of humans consuming aquatic life = low.	Metals and organics in soil: direct contact = low; protection of sediment = low; metals and organics in groundwater: protection of aquatic life = low; protection of humans consuming aquatic life = low.
Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the Site or under similar conditions.	Natural attenuation of contaminants in groundwater, redox changes affecting metals precipitation, geochemical conditions affecting organics biodegradation, and nearshore tide fluctuation affecting dilution and dispersion.	Natural attenuation of contaminants in groundwater, redox changes affecting metals precipitation, geochemical conditions affecting organics biodegradation, and nearshore tide fluctuation affecting dilution and dispersion.	Natural attenuation of contaminants in groundwater, redox changes affecting metals precipitation, geochemical conditions affecting organics biodegradation, and nearshore tide fluctuation affecting dilution and dispersion.	Natural attenuation of contaminants in groundwater, redox changes affecting metals precipitation, geochemical conditions affecting organics biodegradation, and nearshore tide fluctuation affecting dilution and dispersion.
Permanent Solutions to the Maximum Extent Practicable (WAC 173-340-360[5])				
Permanent to the Maximum Extent Practicable.	**Yes** - See Disproportionate Cost Analysis (Table 14).	**No** - See Disproportionate Cost Analysis (Table 14).	**No** - See Disproportionate Cost Analysis (Table 14).	**No** - See Disproportionate Cost Analysis (Table 14).

Notes:

[a] = Ratings used: Low, Moderate, or High.

Abbreviations and Acronyms:

CUL = cleanup level
IC = institutional controls
ISS = *in situ* solidification/stabilization
MNA = monitored natural attenuation
MTCA = Model Toxics Control Act
POC = point of compliance
PRB = permeable reactive barrier
WAC = Washington Administrative Code

Table 15
Results of Disproportionate Cost Analysis
8th Avenue Terminals Site
Seattle, Washington

Alternative Number and Name	Alternative 2 Surface Capping, Groundwater Treatment, Monitored Natural Attenuation, and Institutional Controls			Alternative 3 *In Situ* Solidification/ Stabilization, Groundwater Treatment, and Monitored Natural Attenuation			Alternative 4 *In Situ* Solidification/ Stabilization and Monitored Natural Attenuation			Alternative 5 Soil Excavation, Groundwater Recovery, and Monitored Natural Attenuation		
Relative Benefits Ranking for Disproportionate Cost Analysis WAC 173-340-360(2)(b)(i) and 173-340-360(3)(f)												
Comparative Overall Benefit	Score	Weighting Factor	Weighted Score	Score	Weighting Factor	Weighted Score	Score	Weighting Factor	Weighted Score	Score	Weighting Factor	Weighted Score
Protectiveness	4	0.3	1.2	7	0.3	2.1	8	0.3	2.4	9	0.3	2.7
Permanence	4	0.25	1	7	0.25	1.75	8	0.25	2	9	0.25	2.25
Long-Term Effectiveness	5	0.25	1	8	0.25	2	9	0.25	2.25	6	0.25	1.5
Manageability of Implementation Risk	9	0.1	0.9	4	0.1	0.4	1	0.1	0.1	1	0.1	0.1
Technical and Administrative Implementability	9	0.1	0.9	4	0.1	0.4	1	0.1	0.1	2	0.1	0.2
Overall Weighted Benefit Score			**5.0**			**6.7**			**6.9**			**6.8**
Estimated Restoration Time Frame (Years)			**16**			**7**			**5**			**4**
Disproportionate Cost Analysis - Quantitative Evaluation												
Overall Weighted Benefit Score	5.0			6.7			6.9			6.8		
Estimated Remedy Cost	$6,160,000			$23,010,000			$32,530,000			$69,980,000		
Estimated Cost/Benefit[a]	$1,232,000			$3,460,150			$4,748,905			$10,367,407		
Most Permanent Solution	No			No			No			Yes		
Lowest Cost Alternative	Yes			No			No			No		
Costs Disproportionate to Incremental Benefits	No			Yes			Yes			Yes		
Remedy Permanent to the Maximum Extent Practicable?	Yes			No			No			No		
Preferred Alternative	**Yes**			No			No			No		

Notes:

[a] = Cost/Benefit value is the estimated cost/overall weighted benefit score

APPENDIX A

EJ Screening Tool Reports and EHD Map for Census Tract 53033010900

EJScreen ACS Summary Report

Location: Tract: 53033010900
Description: Census Tract 53033010900

Summary of ACS Estimates	2018 - 2022
Population	1,317
Population Density (per sq. mile)	633
People of Color Population	436
% People of Color Population	33%
Households	662
Housing Units	736
Housing Units Built Before 1950	436
Per Capita Income	65,607
Land Area (sq. miles) (Source: SF1)	2.08
% Land Area	93%
Water Area (sq. miles) (Source: SF1)	0.16
% Water Area	7%

	2018 - 2022 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	1,317	100%	190
Population Reporting One Race	1,148	87%	332
White	959	73%	161
Black	79	6%	72
American Indian	2	0%	4
Asian	102	8%	74
Pacific Islander	0	0%	13
Some Other Race	6	0%	8
Population Reporting Two or More Races	169	13%	104
Total Hispanic Population	166	13%	112
Total Non-Hispanic Population	1,151		
White Alone	881	67%	166
Black Alone	79	6%	72
American Indian Alone	2	0%	4
Non-Hispanic Asian Alone	78	6%	65
Pacific Islander Alone	0	0%	13
Other Race Alone	0	0%	13
Two or More Races Alone	111	8%	63
Population by Sex			
Male	699	53%	117
Females	618	47%	169
Population by Age			
Age 0-4	80	6%	40
Age 0-17	169	13%	70
Age 18+	1,148	87%	199
Age 65+	196	15%	85

Data Note: Detail may not sum to totals due to rounding.Hispanic population can be any race.
N/A means not available. **Source:** U.S. Census Bureau, American Community (ACS) 2018 - 2022.

EJScreen ACS Summary Report

Location: Tract: 53033010900
Description: Census Tract 53033010900

	2018 - 2022 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	1,136	100%	163
Less than 9th Grade	25	2%	44
9th - 12th Grade, No Diploma	63	6%	62
High School Graduate	226	20%	120
Some College, No Degree	221	19%	68
Associate Degree	52	5%	39
Bachelor's Degree or more	549	48%	148
Population Age 5+ by Ability to Speak English			
Total	1,237	100%	180
Speak only English	1,076	87%	187
Non-English at Home[1+2+3+4]	161	13%	88
[1]Speak English "very well"	76	6%	59
[2]Speak English "well"	37	3%	49
[3]Speak English "not well"	25	2%	49
[4]Speak English "not at all"	23	2%	58
[3+4]Speak English "less than well"	48	4%	76
[2+3+4]Speak English "less than very well"	85	7%	91
Limited English Speaking Households*			
Total	16	100%	34
Speak Spanish	0	0%	13
Speak Other Indo-European Languages	0	0%	13
Speak Asian-Pacific Island Languages	16	100%	25
Speak Other Languages	0	0%	13
Households by Household Income			
Household Income Base	662	100%	106
< $15,000	65	10%	87
$15,000 - $25,000	65	10%	46
$25,000 - $50,000	97	15%	51
$50,000 - $75,000	86	13%	43
$75,000	349	53%	87
Occupied Housing Units by Tenure			
Total	662	100%	106
Owner Occupied	396	60%	103
Renter Occupied	266	40%	68
Employed Population Age 16+ Years			
Total	1,148	100%	164
In Labor Force	861	75%	162
Civilian Unemployed in Labor Force	7	1%	10
Not In Labor Force	287	25%	108

Data Note: Detail may not sum to totals due to rounding.Hispanic population can be any race.
N/A means not available. **Source:** U.S. Census Bureau, American Community (ACS) 2018 - 2022.
*Households in which no one 14 and over speaks English "very well" or speaks English only.

EJScreen ACS Summary Report

Location: Tract: 53033010900
Description: Census Tract 53033010900

	2018 - 2022 ACS Estimates	Percent	MOE (±)
Population by Languages Spoken at Home*			
Total (persons age 5 and above)	1,237	100%	180
English	1,076	87%	202
Spanish	59	5%	38
French, Haitian, or Cajun	0	0%	13
German, or other Western Germanic	0	0%	13
Russian, Polish, or Other Slavic	23	2%	39
Other Indo-European	8	1%	11
Korean	0	0%	13
Chinese (including Mandarin, Cantonese)	58	5%	56
Vietnamese	0	0%	13
Tagalog (including Filipino)	5	0%	8
Other Asian and Pacific Island	8	1%	9
Arabic	0	0%	13
Other and Unspecified	0	0%	13
Total Non-English	161	13%	271

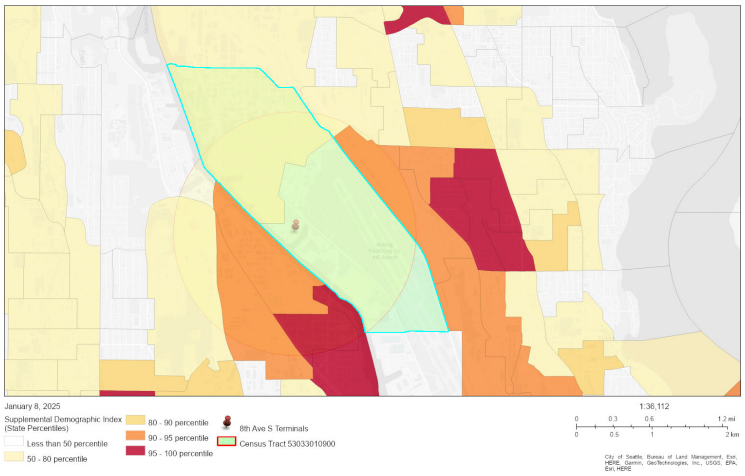
Data Note: Detail may not sum to totals due to rounding.Hispanic population can be any race.
N/A means not available. **Source:** U.S. Census Bureau, American Community (ACS) 2018 - 2022.
*Population by Language Spoken at Home is available at the census tract summary level and up.

EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Census Tract 53033010900

Tract: 53033010900
Population: 1,317
Area in square miles: 2.24



COMMUNITY INFORMATION

- Low income: 30 percent
- People of color: 33 percent
- Less than high school education: 8 percent
- Limited English households: 2 percent
- Unemployment: 1 percent
- Persons with disabilities: 6 percent
- Male: 53 percent
- Female: 47 percent
- 79 years — Average life expectancy
- $65,607 — Per capita income
- Number of households: 662
- Owner occupied: 60 percent

BREAKDOWN BY RACE

- White: 67%
- Black: 6%
- American Indian: 0%
- Asian: 6%
- Hawaiian/Pacific Islander: 0%
- Other race: 0%
- Two or more races: 8%
- Hispanic: 13%

BREAKDOWN BY AGE

From Ages 1 to 4	6%
From Ages 1 to 18	13%
From Ages 18 and up	87%
From Ages 65 and up	15%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	0%
Speak Other Indo-European Languages	0%
Speak Asian-Pacific Island Languages	100%
Speak Other Languages	0%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2018-2022. Life expectancy data comes from the Centers for Disease Control.

LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	87%
Spanish	5%
Russian, Polish, or Other Slavic	2%
Other Indo-European	1%
Chinese (including Mandarin, Cantonese)	5%
Other Asian and Pacific Island	1%
Total Non-English	13%

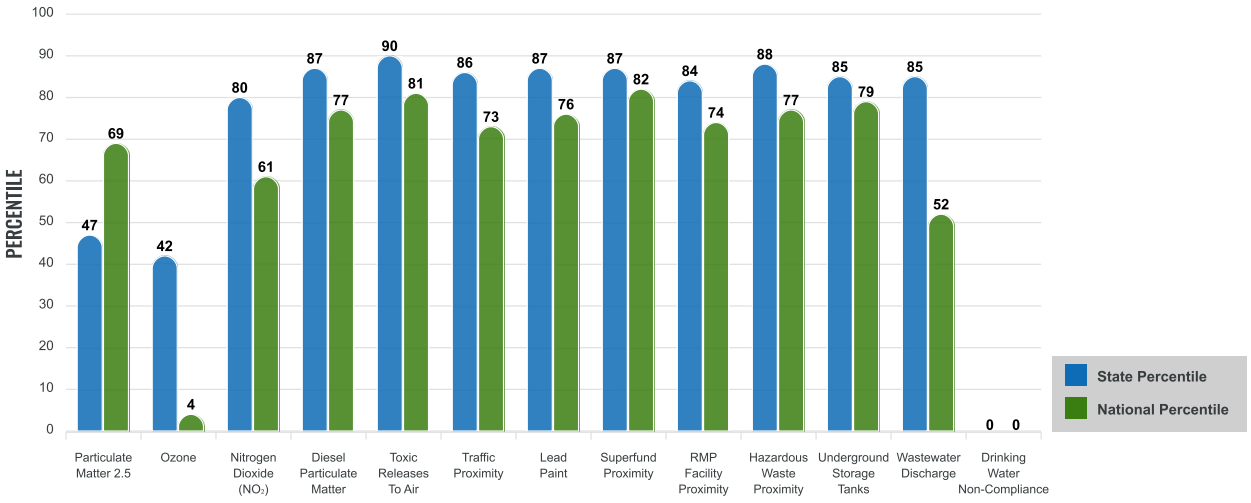
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

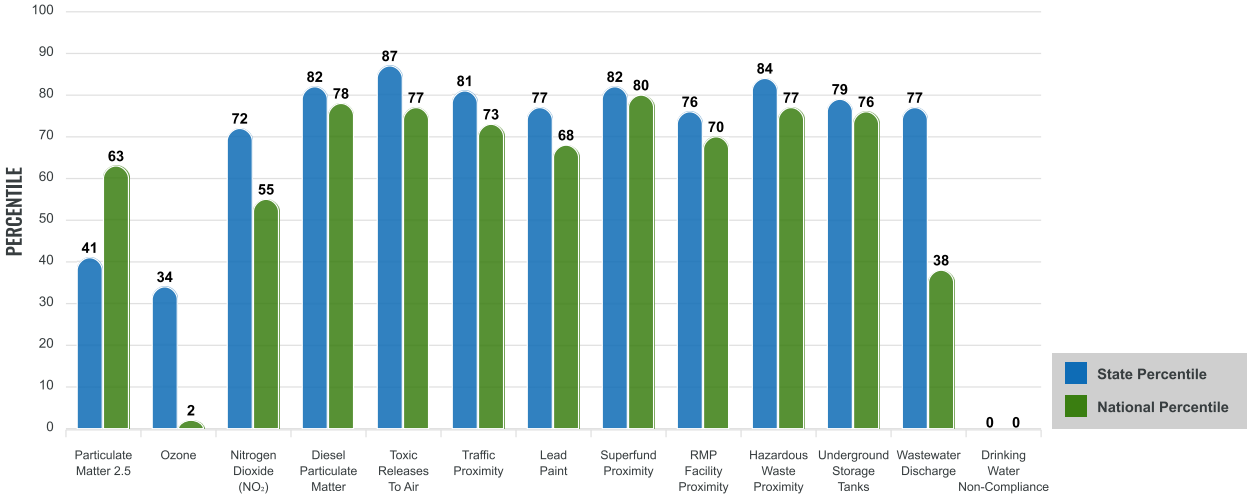
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low income, percent persons with disabilities, percent less than high school education, percent limited English speaking, and percent low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



Report for Tract: 53033010900

Report produced January 8, 2025 using EJScreen Version 2.3

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
ENVIRONMENTAL BURDEN INDICATORS					
Particulate Matter 2.5 ($\mu g/m^3$)	8.91	9.51	35	8.45	72
Ozone (ppb)	50.6	51.8	29	61.8	2
Nitrogen Dioxide (NO_2) (ppbv)	8.4	6.3	81	7.8	59
Diesel Particulate Matter ($\mu g/m^3$)	0.525	0.256	94	0.191	96
Toxic Releases to Air (toxicity-weighted concentration)	22,000	1,800	99	4,600	96
Traffic Proximity (daily traffic count/distance to road)	3,800,000	1,200,000	96	1,700,000	87
Lead Paint (% Pre-1960 Housing)	0.66	0.23	92	0.3	84
Superfund Proximity (site count/km distance)	5.7	0.53	98	0.39	98
RMP Facility Proximity (facility count/km distance)	1.1	0.51	88	0.57	84
Hazardous Waste Proximity (facility count/km distance)	17	2.9	99	3.5	95
Underground Storage Tanks (count/km^2)	50	6.1	98	3.6	99
Wastewater Discharge (toxicity-weighted concentration/m distance)	23	300	88	700000	43
Drinking Water Non-Compliance (points)	0	1	0	2.2	0
SOCIOECONOMIC INDICATORS					
Demographic Index USA	1.23	N/A	N/A	1.34	53
Supplemental Demographic Index USA	1.27	N/A	N/A	1.64	33
Demographic Index State	1.66	1.47	66	N/A	N/A
Supplemental Demographic Index State	1.21	1.37	45	N/A	N/A
People of Color	33%	33%	57	40%	51
Low Income	30%	23%	70	30%	55
Unemployment Rate	1%	5%	21	6%	24
Limited English Speaking Households	2%	4%	62	5%	66
Less Than High School Education	8%	8%	62	11%	50
Under Age 5	6%	5%	62	5%	63
Over Age 64	15%	17%	48	18%	45

*Diesel particulate matter index is from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund	2
Hazardous Waste, Treatment, Storage, and Disposal Facilities	6
Water Dischargers	67
Air Pollution	19
Brownfields	6
Toxic Release Inventory	21

Other community features within defined area:

Schools	0
Hospitals	0
Places of Worship	3

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	Yes
Selected location contains a "Justice40 (CEJST)" disadvantaged community	No
Selected location contains an EPA IRA disadvantaged community	Yes

Report for Tract: 53033010900

Report produced January 8, 2025 using EJScreen Version 2.3

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	19%	18%	63	20%	48
Heart Disease	3.4	4.8	16	5.8	7
Asthma	10	10.9	17	10.3	43
Cancer	4.5	6.5	8	6.4	14
Persons with Disabilities	6.2%	13.4%	7	13.7%	7

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	21%	11%	86	12%	86
Wildfire Risk	0%	12%	0	14%	0

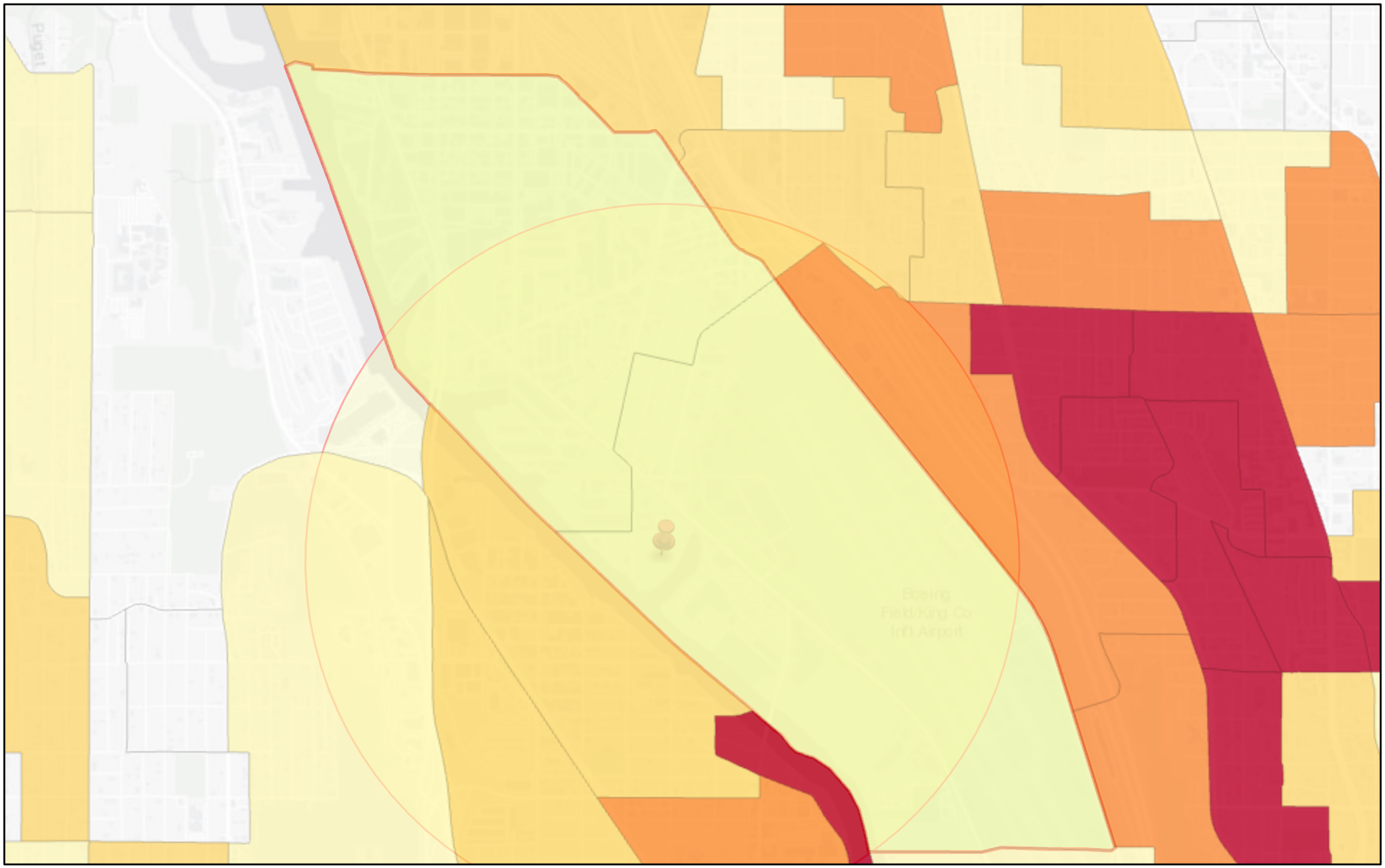
CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	16%	8%	85	13%	70
Lack of Health Insurance	11%	6%	85	9%	71
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access Burden	Yes	N/A	N/A	N/A	N/A
Food Desert	No	N/A	N/A	N/A	N/A

Report for Tract: 53033010900

Report produced January 8, 2025 using EJScreen Version 2.3

Census Track 53033010900 DI



1/8/2025

Demographic Index
(State Percentiles)

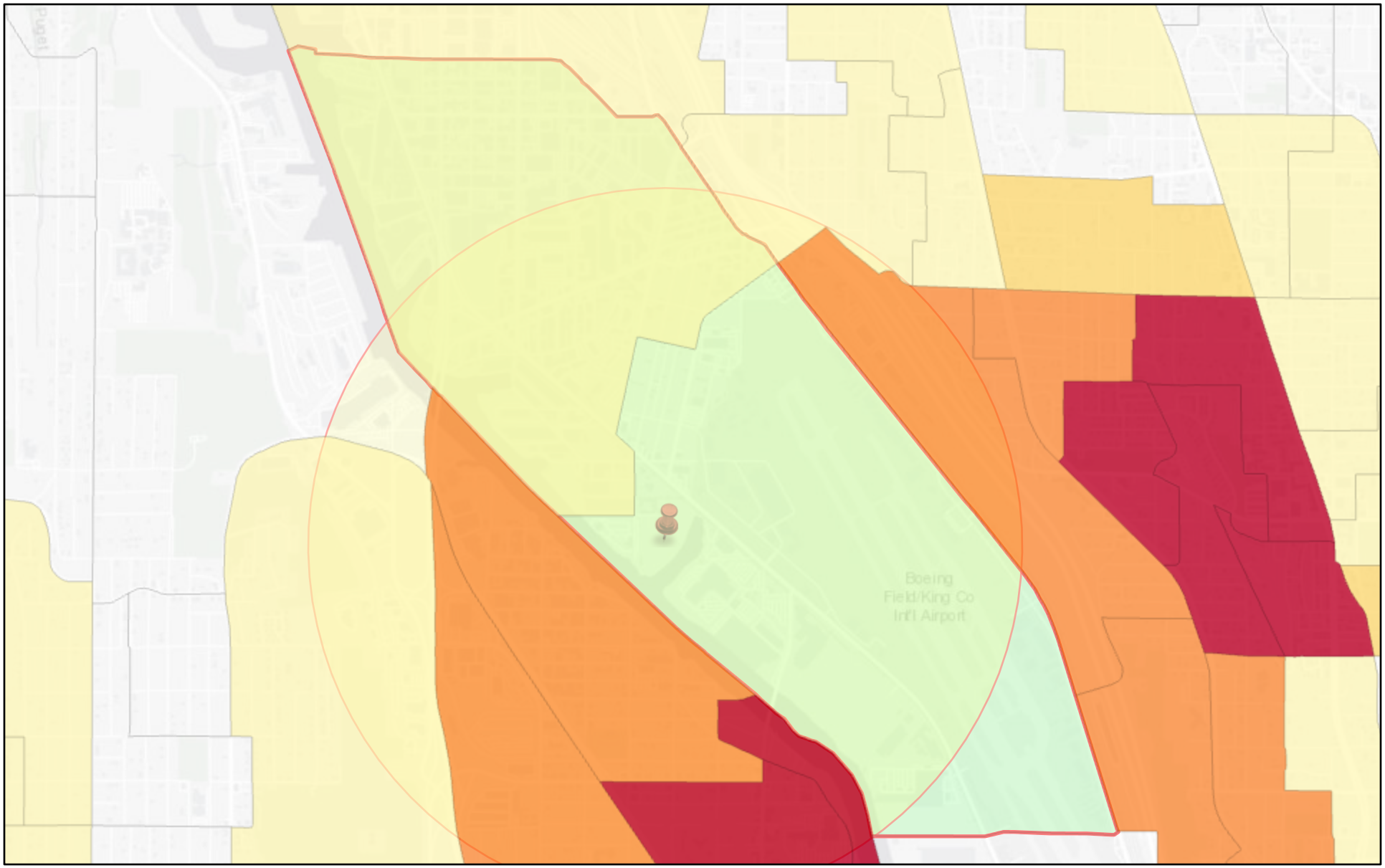
- Less than 50 percentile
- 50 - 80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile
- 8th Ave S Terminals
- Census Tract 53033010900

1:36,112

0 0.2 0.4 0.8 mi

0 0.33 0.65 1.3 km

Census Track 53033010900 SDI



1/8/2025

Supplemental Demographic Index
(State Percentiles)

- Less than 50 percentile
- 50 - 80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile
- 8th Ave S Terminals
- Census Tract 53033010900

1:36,112

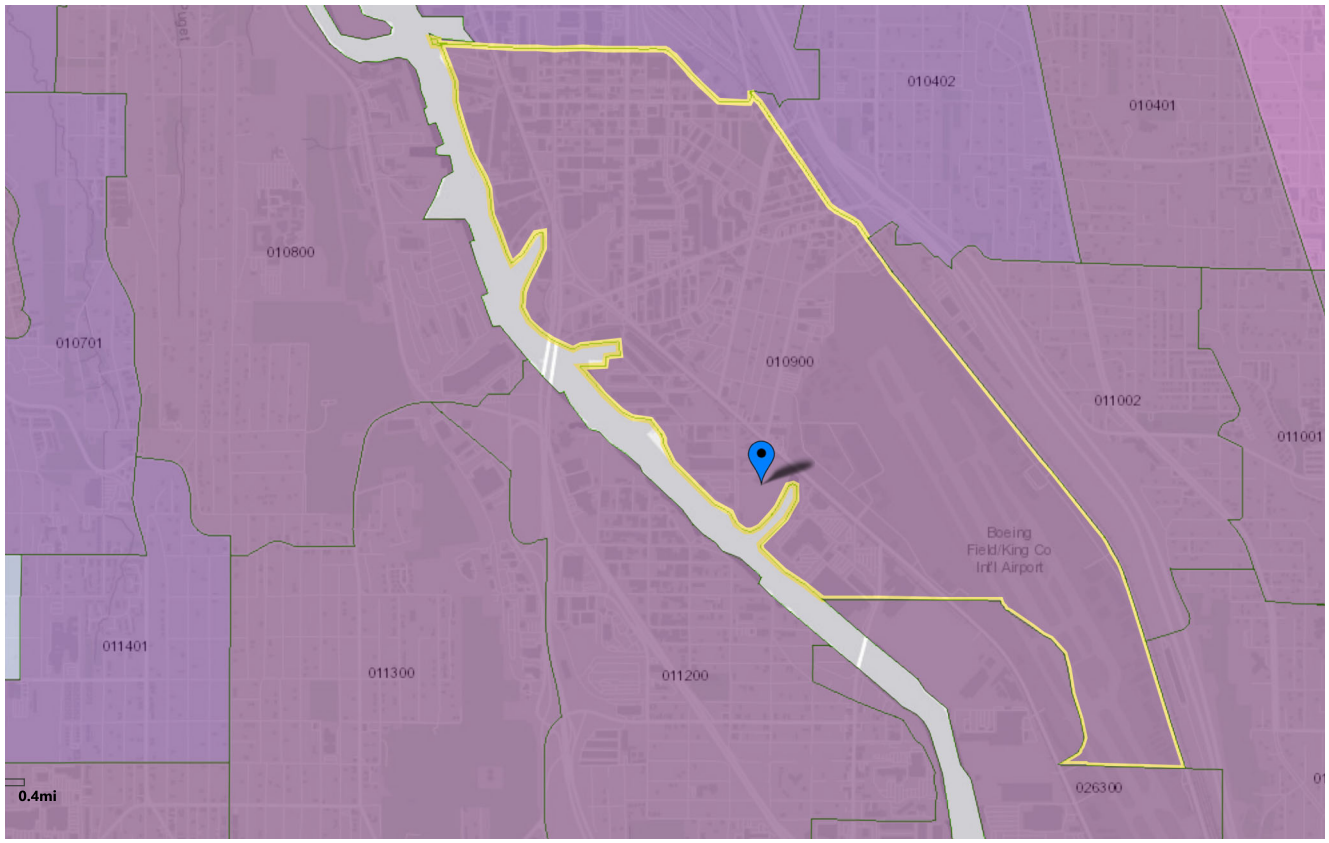
0 0.2 0.4 0.8 mi

0 0.33 0.65 1.3 km

Selection:

Date: 01/08/2025 at 1:59 PM

Legend: (High) 10 9 8 7 6 5 4 3 2 1 **(Low)**



Legend

- Airport Runways
- Care Facilities - Adult Family Homes
- Care Facilities - Nursing Homes
- City Limits
- Climate Projections ~2050
- County Boundaries
- DCYF Licensed Childcare Centers
- Dry Cleaners (Current and Former)
- Electric Utilities - Investor
- Electric Utilities - Public
- Farmworkers Housing


Former Orchard Lands
Hazardous Waste Facilities
Historical Redlining (HOLC)
Hospitals
Legislative Districts
Mortgage Discrimination
National Flood Hazard Layer
Prisons
Railroads
Rural-Urban Classification
Superfund Sites
Arsenic
Tacoma Smelter Plume
Top Student Home Languages
Tribal Boundaries
Tribal Health Services
WA Ecology Cleanup Sites
Wastewater Dischargers (EPA)
Watershed Boundaries
Smoke score
Wildfire Smoke Cumulative Score (2016-2022)

APPENDIX B

Figures Showing Recent Sediment Sample Locations and Results

0 75 150
APPROXIMATE SCALE IN FEET

0 250 500
APPROXIMATE SCALE IN FEET

SLIP 4

DUWAMISH WATERWAY

SLIP No.4

02-124

BUILDING 2-122

OUTFALL A

KING COUNTY OUTFALL

16TH AVE S.

NORTH BASIN OUTFALL

CENTRAL BASIN OUTFALL

SOUTH BASIN OUTFALL

OUTFALL Z

NORTH SITE

SOUTH SITE

+4 FT MLLW CONTOUR (POST CONSTRUCTION)

-5 FT MLLW CONTOUR (POST CONSTRUCTION)

EDGE OF DUWAMISH WATERWAY NAVIGATION CHANNEL

SD-PCM010

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
Benzyl alcohol	19 UJ	20 U	65.6	50.9	100
2-Methylphenol	4.9 UJ	5 UJ	1.1 U	3.8 J	75
PCBs	3.8 U	46	112.9	188.5 J	131.2 J

SD-PCM025

Analyte	2015	2016	2018	2020	2022
Metals					
Mercury	0.03 U	0.02 U	0.58 J	0.08	
SVOCs					
PCBs					

SD-PCM020

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
2,4-Dimethylphenol	25 U	24 U	2.1 U	30.2 U	20 U
Benzoic acid	1,300 J	260	343 J	302 UJ	62.3 J
PCBs					

SD-PCM032

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
Phenol	570	73	13.2 J	14.6 U	12.2 UJ
Benzoic acid	2,600 J	530	398 U	146 UJ	43 J
Benzyl alcohol	360	100	14.9 U	14.6 U	20 UJ
PCBs					

SD-PCM012

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
Benzyl alcohol	19 UJ	200	14.5 U	16.2 U	20 U
PCBs					

SD-PCM212

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM003

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
Benzyl alcohol	20 UJ	72	14 U	13.7 U	20 U
PCBs					

SD-PCM004

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM005

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM014

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM031

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
Benzoic acid	680 J	270	382 U	161 UJ	43 J
PCBs					

SD-PCM011

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM002

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM013

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM015

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM026

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM027

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM022

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM034

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM023

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM223

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM035

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM008

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM024

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM036

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM019

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM006

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM206

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM007

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM009

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM016

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM017

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM018

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM218

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM028

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM029

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
PCBs					

SD-PCM030

Analyte	2015	2016	2018	2020	2022
Metals					
SVOCs					
Benzoic acid	200 U	710	108 J	271 U	128 J
PCBs	3.9 U	27.8 UY	75.2	136.1	105.7 J

LEGEND

- SHORELINE AREA SAMPLES (AT APPROXIMATELY +7 FT MLLW)
- SHORELINE AREA SAMPLES (AT APPROXIMATELY +4 FT MLLW)
- SAMPLING LOCATIONS (ABOVE -5 FT MLLW AND BELOW +4 FT MLLW)
- SAMPLING LOCATION (BELOW -5 FT MLLW)
- OUTFALL SAMPLE LOCATIONS
- NORTH SHORELINE AREA
- SOUTH SHORELINE AREA
- SLIP 4 APPROXIMATE DREDGE AREA
- DSOA LIMITS OF DREDGING
- GRAVEL PLACEMENT 2016 (APPROXIMATE)

Elevation Datum: 0=MLLW

Notes:
Sediment concentrations for Sediment Management Standards (SMS) chemicals of concern (COC) are compared to the SMS dry weight equivalent sediment criteria (Sediment Quality Standard [SQS] and Cleanup Screening Level [CSL] criteria). If all of the SMS COCs within a group are below the SQS then the cell is colored green. If one or more analytes exceed the SQS (or CSL) then the analyte is listed with the results from each year and the cells are color coded gray to indicate the value exceeds one or more of the SMS criteria.

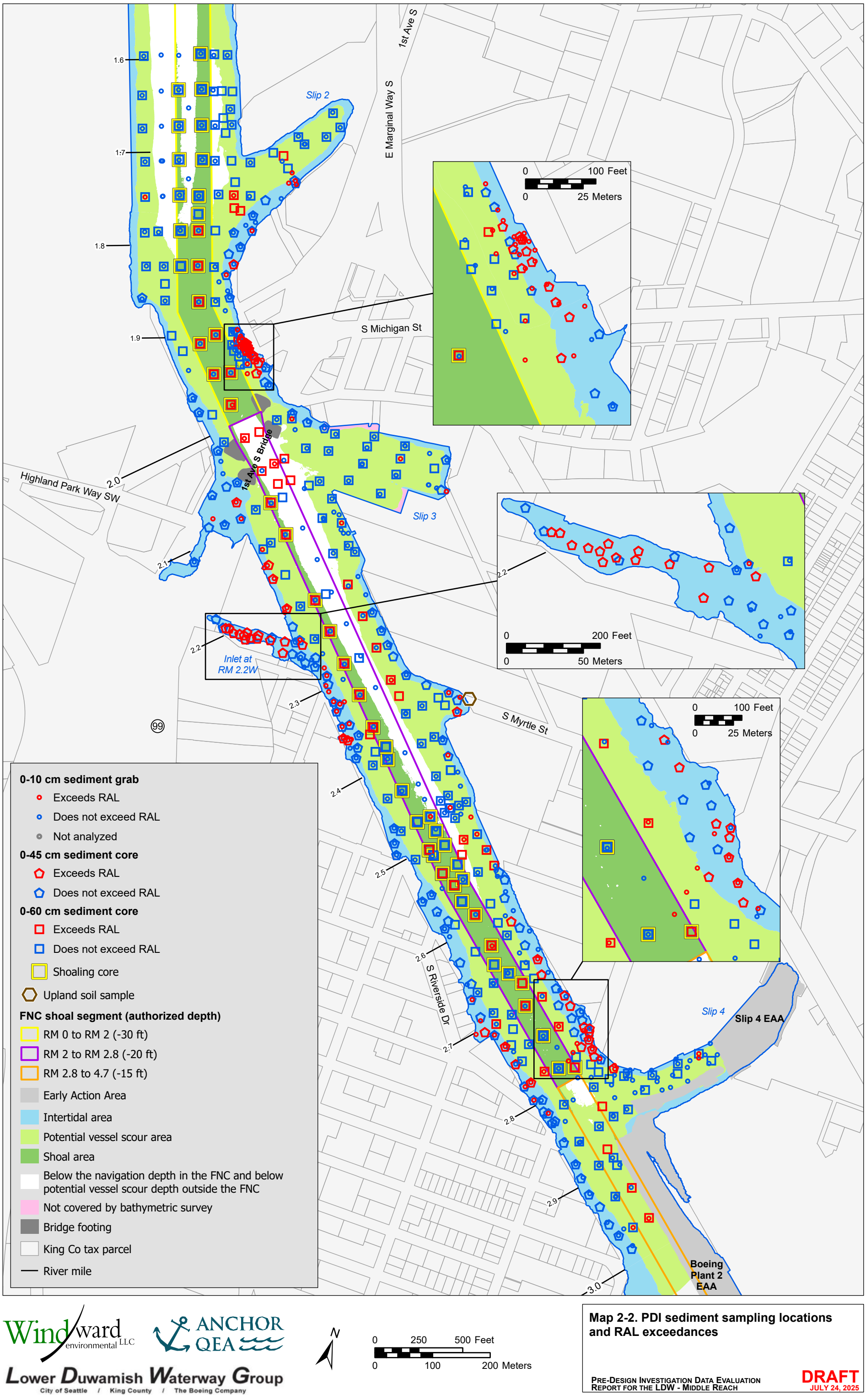
BOEING

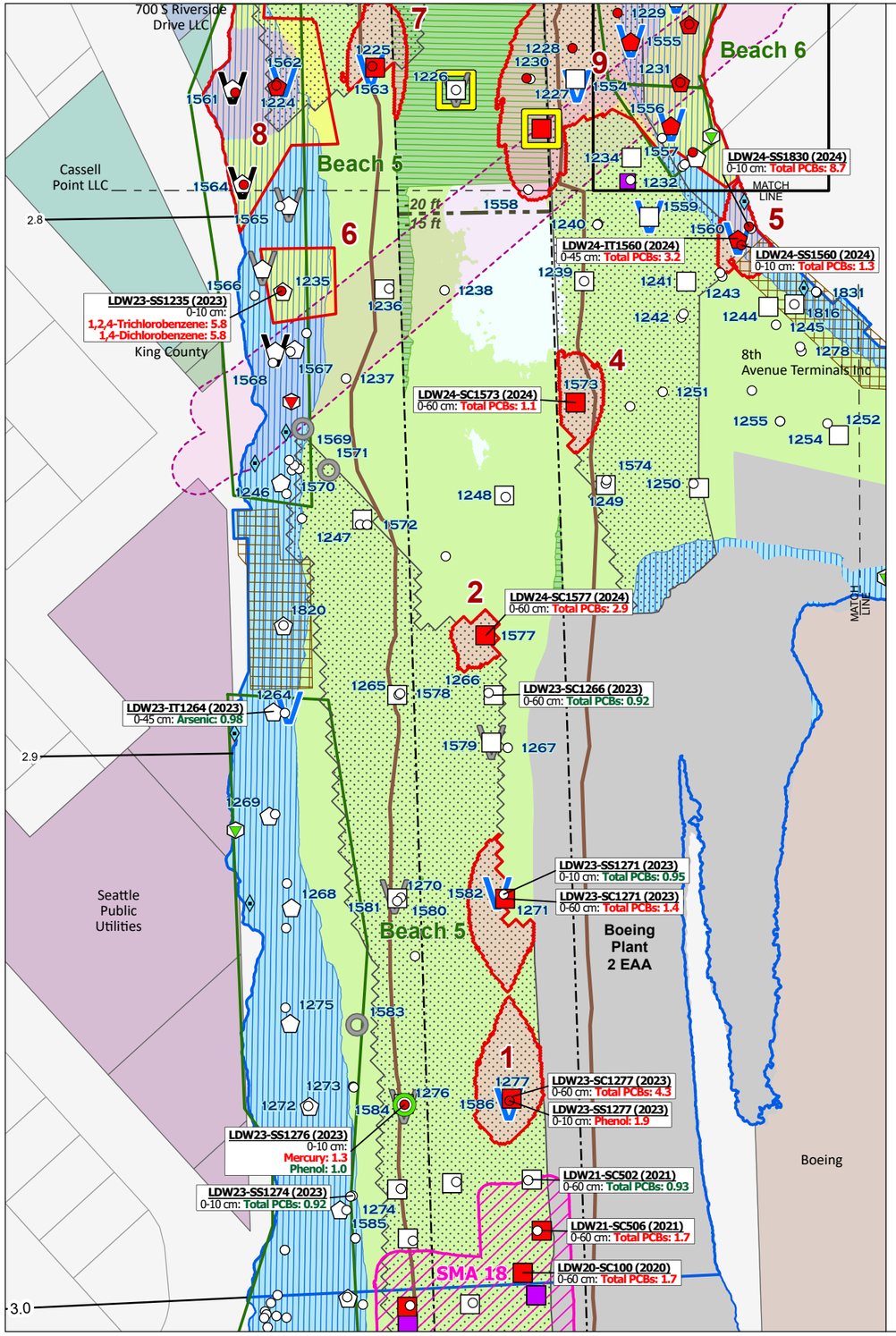
POST-CONSTRUCTION SURFACE MONITORING SAMPLING RESULTS 2015, 2016, 2018, 2020, AND 2022

Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project,
Boeing Plant 2, Seattle/Tukwila, Washington

By: APS	Date: 7-19-2022	Project No. PS22205180
wood.		Figure 2

Plot Date: 07/28/22 - 11:49am, Plotted by: adam.stenberg
Drawing Path: C:\Users\adam.stenberg\OneDrive - Wood PLC\Wood\BoeingPlant2\LTM Report Year 7\, Drawing Name: Figure 1 PCM Stations YR 7.dwg


1st Ave S
E Marginal Way S
Slip 2
1.6
1.7
1.8
1.9
S Michigan St
0
100 Feet
0
25 Meters
1st Ave S Bridge
Highland Park Way SW
2.0
Slip 3
2.1
2.2
0
200 Feet
0
50 Meters
Inlet at
RM 2.2W
2.2
2.3
99
S Myrtle St
0
100 Feet
0
25 Meters
2.4
2.5
2.6
S Riverside Dr
Slip 4
Slip 4 EAA
2.7
2.8
2.9
Boeing
Plant 2
EAA
3.0
0-10 cm sediment grab
Exceeds RAL
Does not exceed RAL
Not analyzed
0-45 cm sediment core
Exceeds RAL
Does not exceed RAL
0-60 cm sediment core
Exceeds RAL
Does not exceed RAL
Shoaling core
Upland soil sample
FNC shoal segment (authorized depth)
RM 0 to RM 2 (-30 ft)
RM 2 to RM 2.8 (-20 ft)
RM 2.8 to 4.7 (-15 ft)
Early Action Area
Intertidal area
Potential vessel scour area
Shoal area
Below the navigation depth in the FNC and below potential vessel scour depth outside the FNC
Not covered by bathymetric survey
Bridge footing
King Co tax parcel
River mile
Prepared by ClaireC, 7/23/2025; W:\Projects\Duwamish AOC5\GIS\Maps and Analyses\Phase 2\Data Evaluation Report\DER aprx\Map 2-2 7558 Phase I and II PDI locations
Windward environmental LLC
ANCHOR QEA
Lower Duwamish Waterway Group
City of Seattle / King County / The Boeing Company
N
0
250
500 Feet
0
100
200 Meters
Map 2-2. PDI sediment sampling locations and RAL exceedances
Pre-Design Investigation Data Evaluation Report for the LDW - Middle Reach
DRAFT
JULY 24, 2025



Areas 6 & 8 S			
Location	1565	1566	1568
Mudline	1.3	2.8	nd
Core Target	7.5 ft	7.5 ft	7.5 ft
Older Loc.	-	1235	-
			est.
3 to 2 ft		0-45 A	0-45 A
2 to 1 ft		B	
1 to 0 ft	0-45 A	geo C	ref.
0 to -1 ft	B	D	
-1 to -2 ft	geo C	E	
-2 to -3 ft	D	ref.	
-10 to -11 ft	E		
-11 to -12 ft	F		
-12 to -13 ft	G		
-13 to -14 ft			

Area 5		
Location	1559	1560
Mudline	-11.5	-3.9
Core Target	10 ft	7.5 ft
Older Loc.	-	-
-4 to -5 ft		0-45 A
-5 to -6 ft		B
-6 to -7 ft		C
-7 to -8 ft		geo D
-8 to -9 ft		E
-9 to -10 ft		ref.
-10 to -11 ft		
-11 to -12 ft	0-60 A *	
-12 to -13 ft	B	
-13 to -14 ft	C	
-14 to -15 ft	D	
-15 to -16 ft	E	
-16 to -17 ft	F	
-17 to -18 ft	geo G	
-18 to -19 ft	H	
-19 to -20 ft	I	
-20 to -21 ft	J	
-21 to -22 ft	K	

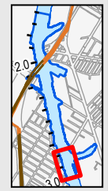
Areas 1 & 2 - FNC and Sideslopes					
Location	1579	1581	1582	1584	1586
Mudline	-18.1	-14.5	-17.4	-14.5	-18.2
Core Target	-26 ft	10 ft	-26 ft	10 ft	-26 ft
Older Loc.	-	1270	1271	1276	1277
-14 to -15 ft		0-60 A		0-60 A	
-15 to -16 ft		B		B	
-16 to -17 ft		C	0-60 A	C	0-60 A
-17 to -18 ft	0-60 A	D	D	D	B
-18 to -19 ft	B	E	B	E	C
-19 to -20 ft	C	F	C	F	D
-20 to -21 ft	D	G	D	G	geo E
-21 to -22 ft	E	H	E	geo H	F
-22 to -23 ft	F	I	F		G
-23 to -24 ft	G	J	G		H
-24 to -25 ft	H	K	H		
-25 to -26 ft	I		I		

Surface (0-10 cm) sampling location
- Exceeds RAL
- Does not exceed RAL

Intertidal (0-45 cm) core location
- Exceeds RAL
- Does not exceed RAL

Subtidal (0-60 cm) core location
- Exceeds RAL
- Does not exceed RAL

Other sampling locations
- Vertical extent (non-RAL interval)
- Surface (0-10 cm), archive
- Vertical extent (non-RAL interval) archive
- Vertical extent (non-RAL interval) not collected because of core refusal
- Surface (0-10cm) bioassay passed
- Shoaling core
- Core without appropriate RAL interval
- Upland soil sample
- 1 RAL exceedance area boundary
- Combined surface and subsurface sediment PCB indicator kriging RAL exceedance area
- Additional Thiessen polygon RAL exceedance area for other COCs
- Utility corridor
- Federal Navigation Channel authorized depth boundary



Legend for Vertical Extent Cores

Area / Loc No.
- -5.6 ← actual mudline elevation (ft MLLW)
- Core Intervals:
  - 0-60 A ← RAL interval(s); **red** if > RAL, **green** if < RAL (PCBs unless noted)
  - 0-60 A ← bold outline: RAL interval(s) of non-Phase II core collected within 30 ft; **red** if > RAL, **green** if < RAL (PCBs unless noted)
  - B ← sample below RAL interval (**purple** if > surface sediment RAL; **green** if < surface sediment RAL)
  - C ← light yellow indicates samples that were not analyzed
  - D ← hashing indicates native material
  - E ← asterisk indicates PCB EF ≥0.9 and ≤1.0
  - F *

- Abbreviations: ref. indicates refusal at or above target depth, sh. indicates shoaling material, o.d. indicates overdredge, est. indicates estimated mudline, and geo indicates geological break.
- Light grey shading indicates FNC authorized depth.
- Alternating light blue and white backgrounds indicate transects.
- Vertical extent core intervals B and deeper are 30 cm in length. PDI shoaling cores identified the intervals alphabetically (i.e., B, C, or D depending on the number of shoaling intervals).

0 100 200 Feet
0 25 50 Meters

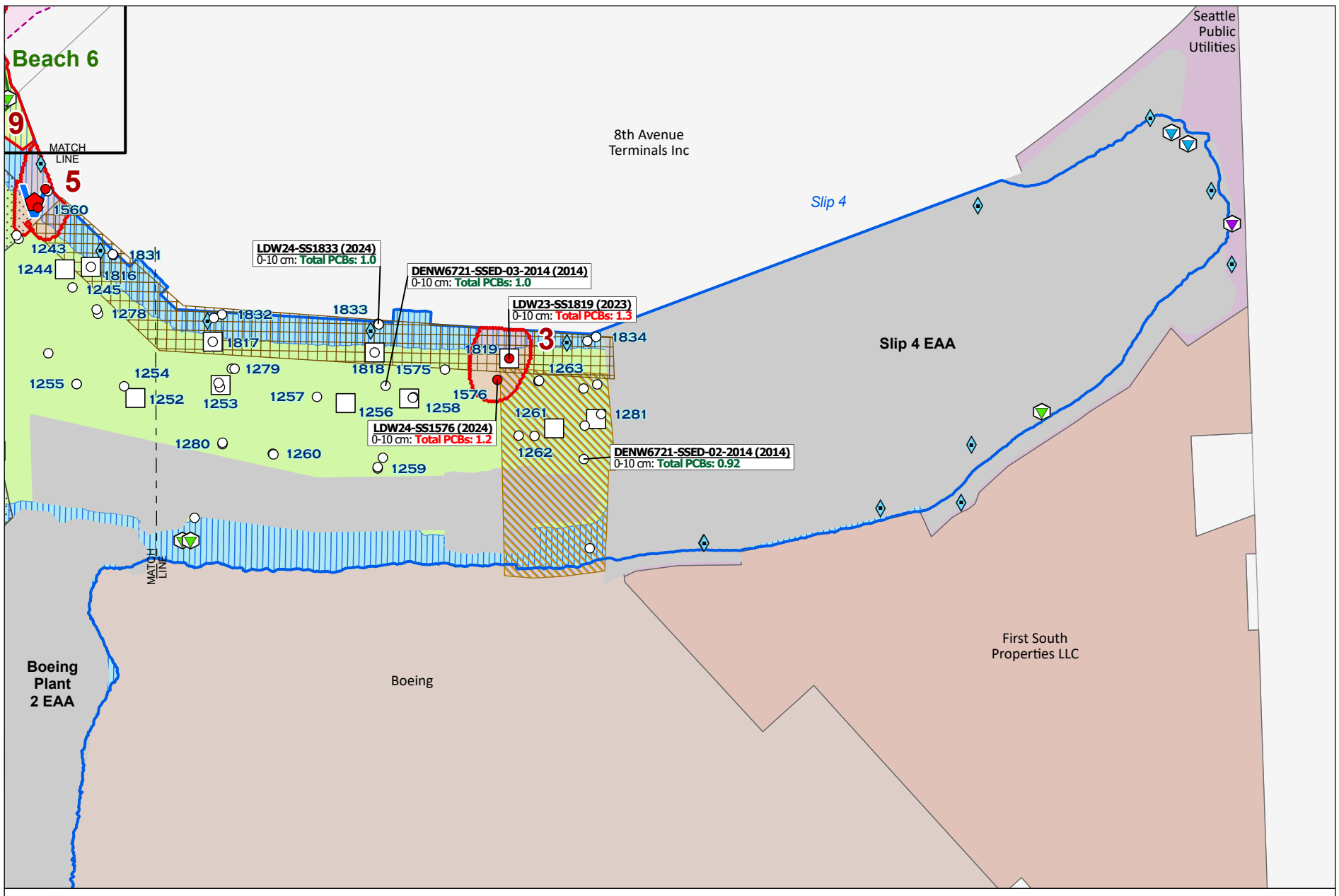
Map 3-1i. Design dataset with the results of PCB indicator kriging and Thiessen polygons for other COCs, RM 2.8 to RM 3.0

PRE-DESIGN INVESTIGATION DATA EVALUATION REPORT FOR THE LDW - MIDDLE REACH

DRAFT
JULY 24, 2025

Windward environmental LLC
ANCHOR QEA
Lower Duwamish Waterway Group
City of Seattle / King County / The Boeing Company

Prepared by craigh, 7/23/2025. W:\Projects\Duwamish AOCS\GIS\Maps and Analyses\Phase 2\Data Evaluation Report\DER.aprx\Map 3-1 7652 Phase II design data series - landscape



Surface (0-10 cm) sampling location

- Exceeds RAL
- Does not exceed RAL

Intertidal (0-45 cm) core location

- Exceeds RAL

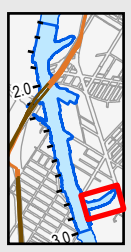
Subtidal (0-60 cm) core location

- Does not exceed RAL

Other sampling locations

- V — Vertical extent (non-RAL interval)
- Core without appropriate RAL interval

- 1 — RAL exceedance area boundary
- Combined surface and subsurface sediment PCB indicator kriging RAL exceedance area
- Additional Thiessen polygon RAL exceedance area for other COCs



Legend for Vertical Extent Cores

Core Intervals

Area / Loc No.	
-5.6	actual mudline elevation (ft MLLW)
0-60 A	RAL interval(s); **red** if > RAL, **green** if < RAL (PCBs unless noted)
0-60 A	bold outline: RAL interval(s) of non-Phase II core collected within 30 ft; **red** if > RAL, **green** if < RAL (PCBs unless noted)
B	sample below RAL interval (**purple** if > surface sediment RAL; **green** if < surface sediment RAL)
C	
D	light yellow indicates samples that were not analyzed
	hashing indicates native material
F *	asterisk indicates PCB EF ≥0.9 and ≤1.0

- Abbreviations: ref. indicates refusal at or above target depth, sh. indicates shoaling material, o.d. indicates overdredge, est. indicates estimated mudline, and geo indicates geological break.
- Light grey shading indicates FNC authorized depth.
- Alternating light blue and white backgrounds indicate transects.
- Vertical extent core intervals B and deeper are 30 cm in length. PDI shoaling cores identified the intervals alphabetically (i.e., B, C, or D depending on the number of shoaling intervals).

Windward environmental LLC

ANCHOR QEA

Lower Duwamish Waterway Group
City of Seattle / King County / The Boeing Company

0 100 200 Feet
0 25 50 Meters

Map 3-1j. Design dataset with the results of PCB indicator kriging and Thiessen polygons for other COCs, Slip 4

Pre-Design Investigation Data Evaluation Report for the LDW - Middle Reach

DRAFT
JULY 24, 2025

Prepared by craigh, 7/23/2025; W:\Projects\Duwamish AOC5\GIS\Maps and Analyses\Phase 2\Data Evaluation Report\DER.aprx\Map 3-1 7652 Phase II design data series - portrait

APPENDIX C

Field Logs and Sampling Details for 2024 and 2025 Additional Sampling

Table C-1
Monitoring Well Location, Elevation, and Construction Details
8th Avenue Terminals, Inc. Site

Well ID	Zone [1]	Shoreline Well	Coordinates [2]		Top of Casing Elevation (ft NAVD88) [3]	Bottom of Well Screen (ft NAVD88)	Total Well Depth (ft btoc)	Top of Well Screen (ft btoc)	Bottom of Well Screen (ft btoc)
			Northing	Easting					
CMW-1 [4]	shallow	X	199375.36	1273356.80	16.10	-1.4	17.8	2.5	17.5
CMW-2 [4]	shallow	X	199223.67	1273303.67	16.30	-1.2	17.8	2.5	17.5
CMW-3 [4]	shallow	X	199072.08	1273239.41	16.46	-2.0	18.8	3.5	18.5
CMW-4 [4]	shallow	X	198940.14	1273167.51	16.01	-2.0	18.4	2.5	18.0
CMW-5 [4]	shallow	X	198829.50	1273003.17	16.60	-1.4	18.4	3.0	18.0
CMW-6 [4]	shallow	X	198692.03	1272872.72	16.42	-3.1	19.9	5.0	19.5
CMW-7 [4]	shallow	X	198703.24	1272711.78	16.44	-2.9	19.7	4.5	19.3 [4]
SLR-1	shallow		199652.19	1273064.50	16.25 [5]	-2.8	19.3	9.2	19.0
SLR-2	shallow		199673.90	1273280.25	15.10 [5]	-2.7	18.1	8.0	17.8
SLR-3	shallow		199530.53	1273163.01	11.86	-1.8	14.0	3.9	13.7
SLR-6	shallow		199543.67	1273285.44	12.37	-1.3	14.0	3.9	13.7
SLR-7	shallow		199538.61	1272997.42	14.15	0.2	14.3	4.2	14.0
DMW-2	shallow		199181.92	1272715.23	16.46	-2.2	19.0	5.0	18.7
DMW-3	shallow		199085.93	1272715.09	16.47	-2.2	19.0	5.0	18.7
DMW-6B	shallow		198943.01	1272809.64	16.30	-3.4	20.0	5.0	19.7
HC-4 [4]	shallow		198785.55	1272720.30	16.45	0.3	16.5	6.5	16.2
HC-20 [4]	shallow		199231.28	1272652.10	16.66	-2.5	19.5	9.5	19.2
EMW-1S	shallow		199762.87	1272940.19	16.13	-3.7	20.0	5.0	19.8
EMW-2S	shallow		199571.31	1273329.79	12.66	-6.9	19.8	4.8	19.6
EMW-3S	shallow	X	199487.42	1273364.83	16.43	-3.4	20.0	5.0	19.8
EMW-4D	intermediate	X	199352.33	1273365.96	16.80	-33.0	50.0	40.0	49.8
EMW-5SA	shallow		199397.01	1273133.30	16.34	-3.5	20.0	5.0	19.8
EMW-6S	shallow		199487.50	1272871.49	16.17	-3.6	20.0	5.0	19.8
EMW-7S	shallow		199379.09	1272655.29	16.71	-3.1	20.0	5.0	19.8
EMW-9SA	shallow		199128.45	1273076.13	16.34	-3.5	20.0	5.0	19.8
EMW-10D	intermediate		199094.38	1272714.09	16.82	-33.0	50.0	40.0	49.8
EMW-11S	shallow		199007.93	1272657.71	16.61	-3.2	20.0	5.0	19.8
EMW-12S	shallow	X	198751.82	1272670.76	16.81	-3.0	20.0	5.0	19.8
EMW-13S	shallow	X	198667.92	1272788.91	16.39	-3.4	20.0	5.0	19.8
EMW-14D	intermediate	X	198695.81	1272872.68	16.42	-33.1	49.7	39.5	49.5
EMW-15D	intermediate	X	198939.73	1273164.77	16.07	-33.4	49.7	39.5	49.5
EMW-16D	intermediate	X	198688.30	1272699.81	16.52	-32.8	49.5	39.5	49.3
EMW-17S	shallow		199365.38	1272611.79	16.04	-4.0	20.3	5.0	20.0
EMW-18S	shallow		199134.80	1272603.63	15.21	-4.8	20.3	5.0	20.0
EMW-19D	deep		199096.93	1272734.26	16.50	-63.5	80.3	75.0	80.0
EMW-20D	deep	X	198936.36	1273157.51	15.97	-64.0	80.3	75.0	80.0
EMW-21D	deep	X	198670.55	1272750.99	16.18	-63.8	80.3	75.0	80.0
EMW-22D	deep	X	199362.73	1273355.76	15.98	-64.0	80.3	75.0	80.0
EMW-23S	shallow		198942.80	1272597.70	14.54	-5.0	19.5	4.2	19.2
NE Corner of Pier [6]	--		198912.40	1273224.34	17.04	--	--	--	--

Notes

[1] For zone: "shallow" = up to 20 feet (approx); "intermediate" = 40 to 50 feet; "deep" = 75 to 80 feet.

[2] Horizontal datum is North American Datum of 1983 Washington State Plane North Zone.

[3] Top of casing elevations were surveyed relative to the North Americal Vertical Datum of 1988.

[4] Well installation details (total constructed well depth, top of screen and bottom of screen) are estimated from the boring log.

[5] Top of well is above the ground surface.

[6] Measure depth to surface water in Slip 4 from top of concrete at northeast corner of facility pier.

btoc = below top of casing

ft = feet

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS [2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with low plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand; elastic silt
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50%	"GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50%	"very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30%	"gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15%	"with gravel," "with sand," "with silt," etc.
	≤ 5%	"with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

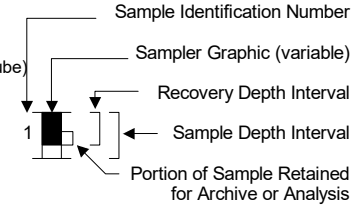
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE & METHOD

Graphic	Code	Description
☒	a	3.25-in OD, 2.42-in ID Split Spoon
⧓	b	2.00-in OD, 1.50-in ID Split Spoon
◧	c	Thin-Wall Sampler (aka Shelby Tube)
◲	d	Grab Sample
◨	e	Single-Tube Core Barrel
◨	f	Double-Tube Core Barrel
☒	g	2.50-in OD, 2.00-in ID WSDOT
☒	h	3.00-in OD, 2.37-in ID Mod. Calif.
☒	i	Other - See text if applicable
	1	300-lb Hammer, 30-inch Drop
	2	140-lb Hammer, 30-inch Drop
	3	Direct Push
	4	Vibrocore
	5	Other - See text if applicable
	6	Piston Extraction

SAMPLE NUMBER & INTERVAL



Groundwater

- ▽ Approximate water level at time of drilling (ATD)
- ▼ Approximate water level at time after drilling/excavation/well

Field and Lab Test Data

Code	Description
WOR	Weight of Rod
WOH	Weight of Hammer
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
UU	Triaxial Unconsolidated Undrained (UU) Strength
CU	Triaxial Consolidated Undrained (CU) Strength
Consol	1-D Consolidation Test
Perm	Permeability Test
CA	Chemical Analysis

LANDAU ASSOCIATES

8th Ave Terminals, Inc. Site
Seattle, WA

Soil Classification System and Key

Figure C-1

EMW-23S

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	SOIL PROFILE
							Drilling Method: Hollow-Stem Auger Ground Elevation (ft): 15.01 Drilled By: Cascade Envrironmental
0						AC	Asphalt
						ML	Light brown **SILT**, no odor, no sheen (very loose, dry to damp)
		d		0.0		SP-SM	@ 1.6 feet: 2.5-inch gray silt lense
						SP-SM	Brown, fine **SAND** with silt and trace fine gravel, no odor, no sheen (very loose, dry to damp)
							Brown, very fine **SAND** with silt and trace fine gravel and trace organics, no odor, no sheen (very loose, moist)
5		a2	4	0.0		SP	Brown, fine **SAND** with silt, no odor, no sheen (very loose, moist)
				0.2			Soil Sample: EMW-23S-7.5-8.0
		a2	4			SM	@ 8.0 feet: Becomes wet
							Brown, silty, fine **SAND** , no odor, no sheen (very loose, wet)
10		a2	3	0.0		SP-SM	Gray-brown, fine **SAND** with silt, no odor, no sheen (very loose, wet)
						SM	Gray, silty, fine **SAND**, no odor, no sheen (very loose, wet)
						SP	Gray, medium to fine **SAND**, no odor, no sheen (very loose, wet)
		a2	4	0.0			
15		a2		0.0			@ 15.0 - 16.5 feet: No blow counts due to heave during drilling
		a2	5	0.0			
		a2	4	0.0			
20							
25							

GROUNDWATER

Water Level: ATD

Monitoring Well Detail (DOE#: BPR-881)

8 in

- Concrete Seal
- Flush-mounted monument with locking cap
- Bentonite chips
- 2-inch diameter, Schedule 40, PVC well casing
- 2/12 sand pack
- 2-inch diameter, Schedule 40, PVC screen (0.010-inch slot size)
- Threaded end cap

Boring Completed 03/06/24
Total Depth of Boring = 20.0 ft.

Monitoring Well Completed 03/06/24
Elevation at Top of Protective Casing = 15.01 ft.
Elevation at Top of Monitoring Well Casing = 14.54 ft.
Total Depth of Monitoring Well = 20.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

2175001.020.022 3/26/24 N:\PROJECTS\2175001.GPJ WELL LOG

LANDAU ASSOCIATES

8th Ave Terminals, Inc. Site
Seattle, WA

Log of Monitoring Well
EMW-23S

Figure
C-2

LANDAU ASSOCIATES

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site
Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event
Well ID: CMW-1
Weather: 50s, overcast
Sample ID: CMW-1- 240312
Landau Representative: SKL, G_J, AT, DSB
Date: 03/12/24 Time: 14:48

WELL INFORMATION

Screened Interval: Top (ft): ____ Bottom (ft): ____ Well Secure? ☐ No ☑ Yes Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): ____ Time: ____ Describe: Flush Mount
Static DTW (ft): 7.89 Time: 14:30 Flow-Thru Cell Vol.: 200 mL WQM No.: YSI 4
Begin Purge (Date/Time): 3/12/2024 14:31 End Purge (Date/Time): 3/12/2024 14:47 Gallons Purged: 1.25
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other: ____

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
14:34	9.3	7.36	7666	7.27	34.2	-	8.05	yes	
14:37	9.4	7.31	8398	7.11	48.3	-	8.06	yes	
14:40	9.4	7.18	8791	7.01	59.9	-	8.06	yes	
14:43	9.6	7.06	8871	7.02	64.1	-	8.06	yes	
14:46	9.2	7.02	8873	7.02	69.6	-	8.06	yes	
14:49									
14:52									
14:55									
14:58									
15:01									

Sample Description (turbidity, color, odor, sheen): clear, colorless, no odor, no sheen Fe 2^+ (mg/L): ____

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump Type: Peristaltic Pump
Material: ☐ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence): ____

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ____ ☐ MS/MSD
Comments: ____
Signature: SKL Date: 03/12/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: CMW-2
Weather: sunny, 40's | Sample ID: CMW-2- 240313
Landau Representative: SKL, G_J, AT, DSB | Date: 03/13/24 | Time: 14:35

WELL INFORMATION

Screened Interval: Top (ft): 2.50 | Bottom (ft): 17.50 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): | Time: | Describe: Flush Mount
Static DTW (ft): 11.15 | Time: 14:14 | Flow-Thru Cell Vol.: 200 mL | WQM No.: YSI 4
Begin Purge (Date/Time): 3/13/2024 14:16 | End Purge (Date/Time): 3/13/2024 14:34 | Gallons Purged: 1.5
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
14:19	9.8	8.58	9542	7.56	107.3	-	11.31	yes	
14:22	9.2	7.90	8825	7.73	106.1	-	11.35	yes	
14:25	9.2	7.17	8918	7.63	103.2	-	11.40	yes	
14:28	9.5	7.41	8927	7.41	100	-	11.43	yes	
14:31	9.6	7.43	8972	7.37	98.9	-	11.49	yes	
14:34	9.6	7.41	8987	7.40	96.3	-	11.56	yes	
14:37									
14:40									
14:43									
14:46									

Sample Description (turbidity, color, odor, sheen): clear, colorless, no odor, no sheen | Fe 2^+ (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☐ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: SKL | Date: 03/13/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: CMW-3
Weather: sunny, 40's | Sample ID: CMW-3- 240313
Landau Representative: SKL, G_J, AT, DSB | Date: 03/13/24 | Time: 15:19

WELL INFORMATION

Screened Interval: Top (ft): 3.50 | Bottom (ft): 18.50 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): | Time: | Describe: Flush Mount
Static DTW (ft): 12.12 | Time: 14:54 | Flow-Thru Cell Vol.: 200 mL | WQM No.: YSI 4
Begin Purge (Date/Time): 3/13/2024 14:56 | End Purge (Date/Time): 3/13/2024 15:18 | Gallons Purged: 1.75
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
14:59	9.8	7.03	3196	7..42	94..6	-	12.16	yes	
15:02	9.8	6.81	3322	7.40	97.6	-	12.16	yes	
15:05	9.9	6.71	3595	7.32	112.1	-	12.16	yes	
15:08	9.9	6.77	3692	7.34	108.4	-	12.16	yes	
15:11	9.8	6.52	3785	7.31	110	-	12.16	yes	
15:14	9.9	6.32	3823	7.37	109.6	-	12.16	yes	
15:17	9.9	6.31	3849	7.36	103.3	-	12.16	yes	
15:20									
15:23									
15:26									

Sample Description (turbidity, color, odor, sheen): clear, colorless, no odor, no sheen | Fe 2^+ (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☐ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: SKL | Date: 03/13/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: CMW-4
Weather: SUNNY, 50S BREEZE | Sample ID: CMW-4- 240313
Landau Representative: KVP | Date: 03/13/24 | Time: 16:04

WELL INFORMATION

Screened Interval: Top (ft): 2.50 | Bottom (ft): 18.00 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): | Time: | Describe: Flush Mount
Static DTW (ft): 13.20 | Time: 15:20 | Flow-Thru Cell Vol.: 200 mL | WQM No.: YSI 1
Begin Purge (Date/Time): 3/13/2024 15:28 | End Purge (Date/Time): 3/13/2024 16:00 | Gallons Purged: 1.0
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
15:31	10.7	9.90	8280	7.11	-23.8	-	13.52	YES	HAD TO LOWER INTAKE TO WATER
15:34	10.7	8.42	8333	7.15	-28.7	-	13.54	YES	
15:37	10.9	9.11	8433	7.22	-403.5	-	13.53	YES	
15:40	10.7	8.76	8469	7.21	-363.3	-	13.52	YES	
15:43	10.8	8.44	8550	7.20	-203.4	-	13.52	YES	
15:46	10.7	8.70	8610	7.20	-136.5	-	13.52	YES	
15:49	10.6	8.67	8709	7.20	-111.9	-	13.52	YES	
15:52	10.5	8.53	8748	7.20	-103.9	-	13.52	YES	
15:55	10.4	8.63	8827	7.20	-97.9	-	13.52	YES	
15:58	10.4	8.78	8975	7.20	-96.7	-	13.52	YES	

Sample Description (turbidity, color, odor, sheen): CLEAR COLORLESS NO ODOR OR SHEEN | Fe 2^+ (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☐ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: KVP | Date: 03/13/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site
Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event
Well ID: CMW-5
Weather: sunny, 40's
Sample ID: CMW-5- 240314
Landau Representative: G_J
Date: 03/14/24 Time: 10:45

WELL INFORMATION

Screened Interval: Top (ft): 3.00 Bottom (ft): 18.00
Well Secure? ☐ No ☑ Yes Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): 9.02 Time: 10:08 Describe: Flush Mount
Static DTW (ft): 9.06 Time: 10:10 Flow-Thru Cell Vol.: 200 mL WQM No.: #5
Begin Purge (Date/Time): 3/14/2024 10:13 End Purge (Date/Time): 3/14/2024 10:44 Gallons Purged: 1.0
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
10:16	12.4	0.17	1152	6.57	3.2	-	9.16	yes	
10:19	12.5	0.15	1139	6.57	-6.9	-	9.18	yes	
10:22	12.0	0.18	1128	6.59	-44.4	-	9.23	yes	
10:25	11.9	0.21	1134	6.59	-59.9	-	9.26	yes	
10:28	11.8	0.28	1138	6.59	-70.4	-	9.31	yes	
10:31	11.9	0.31	1139	6.59	-76.1	-	9.35	yes	
10:34	12.2	0.33	1132	6.59	-81.1	-	9.40	yes	
10:37	12.0	0.17	1132	6.59	-86.6	-	9.48	yes	
10:40	12.1	0.16	1130	6.59	-87.9	-	9.50	yes	
10:43	12.3	0.16	1131	6.59	-91.6	-	9.53	yes	

Sample Description (turbidity, color, odor, sheen): clear, yellow hue, organic odor, no sheen
Fe 2^+ (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump Type: Peristaltic Pump
Material: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☑ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual)

☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments: resample for geochemical analysis
Signature: G_J Date: 03/14/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: CMW-6
Weather: CLEAR | Sample ID: CMW-6- 240313
Landau Representative: DSB | Date: 03/13/24 | Time: 14:17

WELL INFORMATION

Screened Interval: Top (ft): 5.00 | Bottom (ft): 19.50 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): 13.96 | Time: 13:46 | Describe: Flush Mount
Static DTW (ft): 13.98 | Time: 13:48 | Flow-Thru Cell Vol.: 200 mL | WQM No.: YSI 2
Begin Purge (Date/Time): 3/13/2024 13:49 | End Purge (Date/Time): 3/13/2024 14:05 | Gallons Purged: 1.0
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
13:52	10.8	8.31	13106	7.27	141.7	-	14.06	yes	
13:55	10.9	8.31	13170	7.34	144.7	-	14.07	yes	
13:58	10.9	8.04	13233	7.37	144.7	-	14.08	yes	
14:01	10.5	8.35	13397	7.41	145.1	-	14.08	yes	
14:04	10.3	8.17	13570	7.45	145.7	-	14.08	yes	
14:07									
14:10									
14:13									
14:16									
14:19									

Sample Description (turbidity, color, odor, sheen): clear, colorless, no odor, no sheen | Fe 2^{+} (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☐ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: DSB | Date: 03/13/24

LANDAU ASSOCIATES

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site
Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event
Well ID: CMW-7
Weather: CLEAR WIND
Sample ID: CMW-7- 240312
Landau Representative: SKL, G_J, AT, DSB
Date: 03/12/24 Time: 15:17

WELL INFORMATION

Screened Interval: Top (ft): 4.50 Bottom (ft): 19.30 Well Secure? ☐ No ☑ Yes Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): 13.43 Time: 14:46 Describe: Flush Mount
Static DTW (ft): 13.43 Time: 14:48 Flow-Thru Cell Vol.: 200 mL WQM No.: YSI 2
Begin Purge (Date/Time): 3/12/2024 14:49 End Purge (Date/Time): 3/12/2024 15:14 Gallons Purged: 1.5
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
14:52	12.1	1.34	4641	7.01	-1.1	-	13.38	yes	
14:55	12.2	0.44	2481	6.94	4	-	13.38	yes	
14:58	12.2	0.35	2347	6.90	5.1	-	13.38	yes	
15:01	12.5	0.29	2240	6.88	4.1	-	13.38	yes	
15:04	12.4	0.28	2215	6.87	3.3	-	13.38	yes	
15:07	12.4	0.26	2189	6.86	1.3	-	13.38	yes	
15:10	12.4	0.25	2212	6.86	-2.2	-	13.38	yes	
15:13	12.4	0.24	2190	6.86	-4.9	-	13.38	yes	
15:16									
15:19									

Sample Description (turbidity, color, odor, sheen): clear, colorless, no odor, no sheen
Fe 2^+ (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump Type: Peristaltic Pump
Material: ☐ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual)

☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: DSB Date: 03/12/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: SLR-1
Weather: 50s, overcast | Sample ID: SLR-1- 240312
Landau Representative: SKL, G_J, AT, DSB | Date: 03/12/24 | Time: 13:50

WELL INFORMATION

Screened Interval: Top (ft): 9.20 | Bottom (ft): 19.00 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): | Time: | Describe: Stick Up
Static DTW (ft): 9.61 | Time: 15:26 | Flow-Thru Cell Vol.: 200 mL | WQM No.: YSI 4
Begin Purge (Date/Time): 3/12/2024 15:27 | End Purge (Date/Time): 3/12/2024 | Gallons Purged: 1.75
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
15:30	11.8	0.32	368.9	7.23	-109.8	-	9.72	yes	
15:33	11.8	0.26	294.1	7.18	-117.2	-	9.74	yes	
15:36	11.8	0.23	284.6	7.14	-122.9	-	9.77	yes	
15:39	11.8	0.20	284	7.12	-124.9	-	9.81	yes	
15:42	11.8	0.18	283.7	7.10	-127.8	-	9.84	yes	
15:45	11.9	0.17	281.7	7.10	-126.8	-	9.85	yes	
15:48	12.1	0.17	283.4	7.08	-127.8	-	9.88	yes	
15:51									
15:54									
15:57									

Sample Description (turbidity, color, odor, sheen): clear, colorless, no odor, no sheen | Fe 2^+ (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☐ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: SKL | Date: 03/12/24

LANDAU ASSOCIATES

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site
Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event
Well ID: SLR-2
Weather: sunny, 40's
Sample ID: SLR-2- 240313
Landau Representative: G_J
Date: 03/13/24 Time: 14:00

WELL INFORMATION

Screened Interval: Top (ft): 8.00 Bottom (ft): 17.80 Well Secure? ☐ No ☑ Yes Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): 6.23 Time: 13:37 Describe: Stick Up
Static DTW (ft): 6.25 Time: 13:48 Flow-Thru Cell Vol.: 200 mL WQM No.: #5
Begin Purge (Date/Time): 3/13/2024 13:49 End Purge (Date/Time): 3/13/2024 13:59 Gallons Purged: 1.0
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	**± 3%**	**± 10%**	**± 3%**	**± 0.1 units**	**± 10 mV**	**± 10%**	**± 0.00 ft**	**(Yes/No)**	
13:52	9.7	7.92	76.5	7.22	27.9	-	6.69	yes	
13:55	8.9	7.49	76.4	7.20	25.4	-	6.71	yes	
13:58	8.7	7.47	76.9	7.18	34.8	-	6.72	yes	
14:01									
14:04									
14:07									
14:10									
14:13									
14:16									
14:19									

Sample Description (turbidity, color, odor, sheen): clear, colorless, no odor, no sheen **Fe 2^+ (mg/L):**

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump Type: Peristaltic Pump
Material: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☑ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: G_J Date: 03/13/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: SLR-3
Weather: sunny, 50's | Sample ID: SLR-3- 240313
Landau Representative: G_J | Date: 03/13/24 | Time: 16:05

WELL INFORMATION

Screened Interval: Top (ft): 3.90 | Bottom (ft): 13.70 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): 6.70 | Time: 15:32 | Describe: Flush Mount
Static DTW (ft): 6.70 | Time: 15:35 | Flow-Thru Cell Vol.: 200 mL | WQM No.: #5
Begin Purge (Date/Time): 3/13/2024 15:37 | End Purge (Date/Time): 3/13/2024 16:02 | Gallons Purged: 1.0
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
15:40	12.8	0.19	636	6.80	-67.4	-	7.00	yes	
15:43	12.8	0.13	642	6.82	-86.1	-	7.03	yes	
15:46	12.8	0.11	667	6.82	-98.8	-	7.04	yes	
15:49	12.9	0.12	668	6.82	-104.8	-	7.05	yes	
15:52	12.7	0.12	666	6.82	-109.0	-	7.05	yes	
15:55	12.7	0.14	666	6.82	-113.6	-	7.05	yes	
15:58	12.7	0.14	665	6.82	-114.9	-	7.05	yes	
16:01	12.7	0.14	666	6.83	-118.1	-	7.05	yes	
16:04									
16:07									

Sample Description (turbidity, color, odor, sheen): clear, brown hue, no, odor, no sheen | **Fe 2⁺ (mg/L):**

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☑ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: G_J | Date: 03/13/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: SLR-6
Weather: sunny, 50's | Sample ID: SLR-6- 240313
Landau Representative: G_J | Date: 03/13/24 | Time: 15:20

WELL INFORMATION

Screened Interval: Top (ft): 3.90 | Bottom (ft): 13.70 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): 6.81 | Time: 14:59 | Describe: Flush Mount
Static DTW (ft): 6.81 | Time: 15:01 | Flow-Thru Cell Vol.: 200 mL | WQM No.: #5
Begin Purge (Date/Time): 3/13/2024 15:03 | End Purge (Date/Time): 3/13/2024 15:19 | Gallons Purged: 1.0
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
15:06	7.5	6.11	161.2	6.87	56.3	-	7.16	yes	
15:09	7.3	5.71	161.1	6.82	60.0	-	7.26	yes	
15:12	7.3	5.89	159.6	6.79	49.9	-	7.41	yes	
15:15	7.3	5.95	159.5	6.77	48.7	-	7.46	yes	
15:18	7.3	5.95	159.5	6.77	45.1	-	7.61	yes	
15:21									
15:24									
15:27									
15:30									
15:33									

Sample Description (turbidity, color, odor, sheen): clear, colorless, med turbidity w/ organic matted, no odor, no | Fe 2^{+} (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☑ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: G_J | Date: 03/13/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: SLR-7
Weather: Sunny, 50s | Sample ID: SLR-7- 240314
Landau Representative: SKL, G_J, AT, DSB | Date: 03/14/24 | Time: 12:49

WELL INFORMATION

Screened Interval: Top (ft): 4.20 | Bottom (ft): 14.00 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): | Time: | Describe: Flush Mount
Static DTW (ft): 5.04 | Time: 12:22 | Flow-Thru Cell Vol.: 200 mL | WQM No.: YSI 3
Begin Purge (Date/Time): 3/14/2024 12:25 | End Purge (Date/Time): 3/14/2024 12:38 | Gallons Purged: 1.0
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
12:28	12.3	3.90	637	6.88	129	-	5.07	Yes	
12:31	12.1	3.92	574	6.85	129.5	-	5.09	Yes	
12:34	12.2	3.72	571	6.82	128.8	-	5.10	Yes	
12:37	12.2	3.67	567	6.82	127.7	-	5.10	Yes	
12:40									
12:43									
12:46									
12:49									
12:52									
12:55									

Sample Description (turbidity, color, odor, sheen): clear, colorless, no odor, no sheen | Fe 2^+ (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☐ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: SLR-17-2403 ☐ MS/MSD
Comments:
Signature: Adam Torocsik | Date: 03/14/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: SLR-17
Weather: Sunny, 50s | Sample ID: SLR-17- 240314
Landau Representative: SKL, G_J, AT, DSB | Date: 03/14/24 | Time: 12:39

WELL INFORMATION

Screened Interval: Top (ft): 4.20 | Bottom (ft): 14.00 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): | Time: | Describe: Flush Mount
Static DTW (ft): 5.04 | Time: 12:22 | Flow-Thru Cell Vol.: 200 mL | WQM No.: YSI 3
Begin Purge (Date/Time): 3/14/2024 12:25 | End Purge (Date/Time): 3/14/2024 12:35 | Gallons Purged: 1.0
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
12:28	12.3	3.90	627	6.86	129.4	-	5.07	Yes	
12:31	12.1	3.89	573	6.84	129.4	-	5.09	Yes	
12:34	12.2	3.67	577	6.83	128.6	-	5.10	Yes	
12:37	12.2	3.66	576	6.83	128.7	-	5.10	Yes	
12:40									
12:43									
12:46									
12:49									
12:52									
12:55									

Sample Description (turbidity, color, odor, sheen): clear, colorless, no odor, no shen | Fe 2^+ (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☑ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: SLR-7-2403 ☐ MS/MSD
Comments:
Signature: Adam Torocsik | Date: 03/14/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: DMW2
Weather: Sunny, 50s | Sample ID: DMW2- 240314
Landau Representative: SKL, G_J, AT, DSB | Date: 03/14/24 | Time: 13:14

WELL INFORMATION

Screened Interval: Top (ft): 5.00 | Bottom (ft): 18.70 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): | Time: | Describe: Flush Mount
Static DTW (ft): 10.75 | Time: 12:50 | Flow-Thru Cell Vol.: 200 mL | WQM No.: YSI 1
Begin Purge (Date/Time): 3/14/2024 12:54 | End Purge (Date/Time): 3/14/2024 13:13 | Gallons Purged: 1.5
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
12:57	13.5	0.66	1101	6.70	-66.2	-	10.83	yes	
13:00	13.7	0.36	1006	6.63	-91.9	-	10.85	yes	
13:03	13.7	0.37	937	6.60	-92	-	10.91	yes	
13:06	13.8	0.40	893	6.56	-91.3	-	10.97	yes	
13:09	13.9	0.42	878	6.55	-90.1	-	11.01	yes	
13:12	13.9	0.40	875	6.53	-89.4	-	11.01	yes	
13:15									
13:18									
13:21									
13:24									

Sample Description (turbidity, color, odor, sheen): clear, colorless, no odor, no sheen | Fe 2^+ (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☐ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: SKL | Date: 03/14/24

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: 8th Avenue Teminals Site | Project Number: 2175001.020.022
Event: March Ground Water Monitoring Event | Well ID: DMW3
Weather: CLEAR | Sample ID: DMW3- 240314
Landau Representative: SKL, G_J, AT, DSB | Date: 03/14/24 | Time: 13:27

WELL INFORMATION

Screened Interval: Top (ft): 5.00 | Bottom (ft): 18.70 | Well Secure? ☐ No ☑ Yes | Damaged? ☑ No ☐ Yes
DTW After Cap Opened (ft): 11.19 | Time: 13:02 | Describe: Flush Mount
Static DTW (ft): 11.28 | Time: 13:09 | Flow-Thru Cell Vol.: 200 mL | WQM No.: YSI 2
Begin Purge (Date/Time): 3/14/2024 13:11 | End Purge (Date/Time): 3/14/2024 13:26 | Gallons Purged: 1.0
Water Disposal: ☑ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other:

PURGE DATA

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	± 3%	± 10%	± 3%	± 0.1 units	± 10 mV	± 10%	± 0.00 ft	(Yes/No)	
13:14	12.7	0.20	183.6	5.98	159.4	-	11.35	yes	
13:17	12.6	0.19	186.9	5.96	160.8	-	11.38	yes	
13:20	12.7	0.20	193.7	6.04	157	-	11.40	yes	
13:23	12.7	0.19	197.7	6.07	155.3	-	11.43	yes	
13:26	12.6	0.18	199.4	6.10	153.3	-	11.46	yes	
13:29									
13:32									
13:35									
13:38									
13:41									

Sample Description (turbidity, color, odor, sheen): CLEAR COLORLESS NONS | Fe 2^+ (mg/L):

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☑ Pump | Type: Peristaltic Pump
Material: ☐ Stainless Steel ☑ PVC ☐ Teflon ☑ Polyethylene ☐ Other ☑ Dedicated
Decon Procedure: ☑ Alconox Wash ☐ Tap Rinse ☑ DI Water ☐ Dedicated
☐ Other (describe sequence):

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual) ☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	**8260**	**8260 SIM**	8021	524	624		6	40 mL Voas
Semivolatiles:	**8270**	8270 SIM	8011	625			2	125 mL Ambers
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	**6020**	200.7	200.8	7471	☑ Field Filtered	2	250 mL Poly, 1 FF-1 not FF
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: ☐ MS/MSD
Comments:
Signature: DSB | Date: 03/14/24