



FINAL

Oregon Department of Environmental Quality

Operations and Maintenance Report January 2023 to December 2023

McCormick & Baxter Superfund Site
Portland, Oregon
ECSI No. 74

August 14, 2024

Prepared by:



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EXPIRES: June 1, 2025

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Kevin Woodhouse, RG
Site Manager
Haley & Aldrich, Inc.

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Abbreviations and Acronyms

µg/L	micrograms per liter
ACB	articulated concrete block
AWQC	ambient water quality criteria
BES	City of Portland, Bureau of Environmental Services
bgs	below the ground surface
DEQ	Oregon Department of Environmental Quality
DNAPL	dense non-aqueous phase liquid
EPA	U.S. Environmental Protection Agency
FWDA	Former Waste Disposal Area
FYR	Five-Year Review
GSI	GSI Water Solutions, Inc.
IC	institutional control
IGA	Intergovernmental Agreement
LiDAR	Light Detection and Ranging
LNAPL	light non-aqueous phase liquid
mg/kg	milligrams per kilogram
NAPL	non-aqueous phase liquid
NAVD 88	North American Vertical Datum of 1988
O&M	Operations and Maintenance
PAH	polycyclic aromatic hydrocarbon
PCP	pentachlorophenol
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
Site	McCormick & Baxter Superfund Site
TRM	turf-reinforced matting
USGS	U.S. Geological Survey

1 Introduction and Purpose

On behalf of the Oregon Department of Environmental Quality (DEQ), GSI Water Solutions, Inc. (GSI), and Haley & Aldrich, Inc., have prepared this Operations and Maintenance (O&M) Report for the McCormick & Baxter Superfund Site (the “Site”) located in Portland, Oregon. Figures 1-1 and 1-2 show the location and layout of the Site, respectively. This O&M Report documents the O&M activities implemented at the Site between January 1, 2023, and December 31, 2023.

The Site was a former wood treating facility from 1944 through 1991. The facility primarily used creosote but also used other preservatives. Due to historical operations and disposal practices, non-aqueous phase liquid (NAPL) releases occurred to soil, groundwater, and sediment (Figure 1-3). From 2003 to 2005, DEQ, as lead agency, and U.S. Environmental Protection Agency (EPA), as support agency, implemented a remedy at the Site. The remedy consists of three elements, as shown on Figures 1-4 and 1-5:

1. A subsurface barrier was placed around 18 acres, a portion of the upland area where heavy NAPL impacts remain, to control groundwater flow and prevent NAPL groundwater migration (Figures 1-5 and 1-6)
2. A soil cap was placed over the upland area and within the barrier wall extent, consisting of 15 acres of Resource Conservation and Recovery Act (RCRA)-type impermeable cap and 3 acres of permeable cap within the shoreline riparian zone. To manage precipitation infiltration, a perforated storm sewer line was installed above the impermeable cap layer to collect and direct infiltrated rainwater to an outfall along the shoreline. An 18-acre permeable soil cap was installed outside the barrier wall in the upland area with a drainage swale and infiltration basin to support rainfall drainage.
3. A 22-acre sediment cap was placed along the shoreline and in the Willamette River to prevent NAPL migration to the river. The sediment cap extends to Willamette Cove located to the north of elevated railroad tracks that cross the Willamette River.

O&M activities are performed to maintain the integrity and effectiveness of the remedies. O&M activities are identified in the Final O&M Plan prepared by DEQ and EPA (DEQ and EPA, 2014). The Final O&M Plan defines the administrative, financial, and technical details and requirements for inspecting, operating, and maintaining the remedial actions at the Site. DEQ and EPA reduced the scope and frequency of O&M activities conducted at the Site in 2010 from that conducted at the Site from 2005 through 2010. The Final O&M Plan reflects the reduction of scope and frequency of O&M. The O&M Manual specifies the Sampling and Analysis Plan procedures, quality assurance and quality control, technical information, and data necessary for implementing O&M activities. The O&M Manual is a living document that is modified periodically to reflect necessary monitoring and maintenance needs at the Site. Haley & Aldrich and GSI updated the O&M Manual in 2023 (Haley & Aldrich and GSI, 2023). Supplemental monitoring activities are periodically conducted by EPA, including in 2023, the results of which are prepared by EPA in separate documents. O&M activities documented in this report are further evaluated every 5 years in the Five-Year Review (FYR). The purpose of a FYR is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment.

The purpose of this O&M Report is to document the operation, monitoring, and maintenance activities that occurred in calendar year 2023. This report has been prepared by DEQ’s contractor team of GSI and Haley & Aldrich. The O&M performance standards and activities for the soil cap and sediment cap are discussed in Sections 2 and 3, respectively. The groundwater performance standards and activities are summarized in Section 4. Vegetation management is presented in Section 5. Section 6 discusses the remedy performance, and Section 7 presents recommendations for 2024. Section 8 provides references. Appendix A provides Site activity documentation, including the Site inspection meeting summaries,

photographs of Site activities and observations associated with O&M activities, and the sign-in logs. Appendix B provides a photograph log of vegetation observations. Appendix C provides the Access Agreement between the University of Portland and DEQ with the engineer drawings of the North Van Houten Place upgrades.

Routine operation, monitoring, and maintenance activities in 2023 were implemented primarily by DEQ's contractor, GSI, and its teaming partner Haley & Aldrich (under subcontract to GSI). O&M activities were also performed by AKS Engineering & Forestry, American Backflow Services, Elite Signs, and ACTEnviro. Key personnel for implementation of O&M activities include:

- Sarah Miller: DEQ Project Officer
- Danielle Johnson: DEQ Contract Officer
- Rick Ernst: GSI Program Manager
- Chris Rhea: GSI Task Order Manager
- Kevin Woodhouse: Haley & Aldrich Site Manager

2 Soil Cap Performance Standards and Activities

This section summarizes soil cap performance standards, observations, and maintenance activities at the Site for the reporting period January 1, 2023, through December 31, 2023, and a summary of remedy performance as related to the performance standards. The Final O&M Plan provides a description of the remedial action objectives and the soil operable unit remedy. Table 2-1 provides the soil cap activities conducted in 2023.

2.1 Soil Cap Performance Standards

Contaminated surface soil was removed, and an upland soil cap was constructed on approximately 40 acres of the Site in September 2005. Establishment of institutional controls (ICs) has not been completed for this portion of the Site. Soil beneath the soil cap remains contaminated with arsenic, pentachlorophenol (PCP), polycyclic aromatic hydrocarbons (PAHs), dioxins/furans, and NAPL and as such, the soil cap requires long-term monitoring and maintenance. The performance standards for the soil cap are as follows:

- Maintain contaminant concentrations in surface soil below the following risk based cleanup goals, as specified in the Record of Decision (ROD) for the Site (EPA, 1996):
 - Arsenic: 8 milligrams per kilogram (mg/kg)
 - PCP: 50 mg/kg
 - Total carcinogenic PAHs: 1 mg/kg
 - Dioxins/furans: 0.00004 mg/kg
- Maintain the topsoil layer to within 50 percent of its design specification as follows:
 - Maintain a topsoil thickness of at least 6 inches for the area over the impermeable geomembrane cap.
 - Maintain a topsoil thickness of at least 12 inches for all areas except over the impermeable geomembrane cap.
- Minimize infiltration of rainwater within the subsurface barrier wall by maintaining the subsurface stormwater conveyance system.
- Minimize stormwater erosion and ponding outside the barrier wall by maintaining grading, surface stormwater conveyance, and native vegetation.
- Maintain native vegetation within the approximate 6-acre riparian zone for compliance with the National Marine Fisheries Service Biological Opinion (NOAA, 2004).

2.2 Soil Cap Observations

Soil cap observations were conducted according to the Final O&M Plan. Routine quarterly site inspections were conducted by DEQ, GSI, and Haley & Aldrich on March 16, June 9, September 19, and December 7, 2023. Observations of interest from the routine inspections are summarized in Figure 2-1 and are described in Section 2.2.1. Appendix A includes representative photographs of the Site taken in 2023, completed site inspection summary forms, and a log of all visitors to the Site in 2023.

2.2.1 Visual Inspection

The upland soil cap provides habitat for rabbits, ground squirrels, Canada geese and several other species of birds, and coyotes. Despite placing gravel to fill gaps under a fence that surrounds the upland portion of the Site, periodic burrowing continues to be observed under the fence and along the perimeter road. These

burrows are filled as necessary and are not of major concern. Burrows were observed primarily beneath the southwestern perimeter fence line and filled sporadically throughout the year.

Ground squirrel activity continues to be observed at several locations throughout the upland soil cap. Ground squirrels are common to the area, and burrows typically extend to approximately 1 foot below the ground surface (bgs). The ground squirrels use the surplus articulated concrete block (ACB) stockpiled at the Site, the paved roadway, and concrete well monuments as habitat. During 2023 inspections, no burrows greater than 6 inches deep were noted. Continued monitoring of burrows will be performed; however, no action will be taken to remove burrowing animals or to fill in burrows less than 6 inches. If burrows deeper than 6 inches are observed, maintenance activities will be performed to fill them in. The soil cap continues to operate as designed, isolating Site contaminants from human and ecological receptors.

Avian wildlife frequents the Site and evidence of foraging was observed throughout the year in the central portion of the Site, though no avian wildlife was observed during site visits. Flocks of geese were observed in 2022 and the continued presence of goose scat observed throughout the soil cap over the course of 2023 indicates that substantial geese flocks continue to periodically visit the Site. Coyotes were briefly observed on the cap and along the northeastern perimeter fence sporadically throughout the year. Sightings occur at a distance upon entry into the Site by field staff at which point the coyotes immediately leave the Site through the burrows? they dig beneath the perimeter fence.

In 2023, the University of Portland began upgrades to North Van Houten Place which provides the alternate access route to the Site. The North Van Houten Place upgrades increased the roadbed elevation by approximately 3 to 4 feet and effectively eliminated Site access unless improvements were made on Site. An Access Agreement was signed between DEQ and UP in November 2023 to allow UP contractors to construct Site improvements including a new gravel ramp entrance, adjust or install a new fence and a new gated entrance, and create a temporary access point (Appendix C). The temporary access point, or cut in the existing fence line, was located at the southern end of the northeastern fence along the Union Pacific railroad embankment. All work was conducted on top of the 2 ft soil cap. UP contractors completed the work by January 2024, including restoring temporary access fence to its original condition.

During N Van Houten Place construction, field staff and visitors to the Site exclusively used the primary route on North Edgewater Street. Previous access issues with multiple locks on a chain on the Portland Bureau of Transportation gate were resolved by the installation of a new multi-lock latch mechanism.

The Union Pacific Railroad tracks, which run parallel to the northwest of the Site and neighboring properties, are often used by the public to access the area. Access to the area generally does not affect security because of the surrounding fence and lighting at the Site; however, periodic acts of trespassing or vandalism occur. Cut locks and/or chains occurred in February, twice in June, and October 2023 and were replaced upon discovery.

2.2.2 Soil Cap Subsidence

In June 2008, subsidence of the soil cap was observed near groundwater monitoring wells EW-1s and MW-23d. An upland site survey confirmed that the ground surface had subsided up to approximately 0.8 feet in a limited area around the wells between the time that the soil cap was installed in 2005 and 2008. A Subsidence in Upland Cap Memorandum (Hart Crowser and GSI, 2008) and an Additional Subsidence Monitoring Memorandum (Hart Crowser and GSI, 2010) present the results of the survey and additional investigation to determine the cause of the subsidence.

Based on elevated groundwater temperatures in well EW-1s (40 °C) and the large amount of buried woody debris in the area, it was suspected that aerobic degradation of woody debris was occurring and causing the ground to subside. Decreasing groundwater levels within the barrier wall also may have contributed to the subsidence of the soil cap by opening a larger unsaturated zone to allow compaction. In 2009, EW-1s was sealed to reduce the amount of oxygen reaching the unsaturated zone. After the well was sealed, subsidence ceased. Since 2009, no additional subsidence has been observed. The groundwater temperature dropped to approximately 21 to 23 °C and has remained stable since 2011. Current temperatures in the well are approximately 19 to 20 °C. This temperature remains higher than groundwater from surrounding wells (approximately 13 °C) indicating that some heat is still being produced in the subsurface at or near well EW1s. This may be caused by anaerobic degradation, which generates less heat than aerobic degradation.

Ground surface subsidence in the area of well EW-1s is monitored by measuring the inner polyvinyl chloride casing at well MW-23d relative to the steel outer casing of the well. The inner casing extends to 182 feet bgs and is considered stable. In 2008, field staff noticed that the inner casing for MW-23d extended approximately 4 inches above the outer casing and interfered with the well monument lid closing correctly. In August 2008, the inner casing for MW-23d was trimmed down to approximately 4 inches below the outer casing. The outer casing is representative of the ground surface and if the casing (or ground surface) subsides, then the distance between the inner and outer casing decreases. Between November 2008 (first periodic measurement conducted) and 2010, the total distance between the inner and outer casing decreased by approximately 1.35 inches to a total distance of approximately 2.75 inches. Most of the decrease between the inner and outer casing occurred in 2009, with 0.5 inches of decrease occurring between November 2008 and January 2009. Since 2010, the distance has not changed, being measured at approximately 2.75 inches. Slight differences in the distance measured have been observed, within 0.10 inch for all events, and are likely due to variability in measuring equipment and field personnel.

Prior to 2008, the Site was last surveyed in 2005. An evaluation of the difference in ground surface elevations between the 2005 and 2008 surveys indicated ground surface subsidence of up to 0.8 feet in areas where wood debris is present (Hart Crowser and GSI, 2010). A topographic survey and storm sewer video inspection were performed in 2019 to collect data and evaluate if additional subsidence had occurred from a previous similar survey in 2008 (additional measurements were collected for EW-1s and MW-23d in 2009). The results of the 2019 subsidence monitoring activities were discussed in the 2019 O&M Report and are presented in the Technical Memorandum - Subsidence Monitoring and Evaluation (Hart Crowser, 2020). Survey results indicated elevation decreases of 6.72 inches for EW-1s and 2.64 inches for MW 23d between 2009 and 2019. Two sags in the high-density polyethylene storm sewer pipe in the vicinity of EW-1s and MW-23d (between manholes SDMH-B and SDMH C) were previously documented in 2008. The 2019 storm sewer inspection did not find any new sags or changes to the existing sags in the storm sewer pipe. No additional changes or impacts to the storm sewer pipe (e.g., cracking or root intrusion) were observed.

Subsidence monitoring was performed in 2023 to evaluate the continued effectiveness of EW-1s well sealing activities and to determine if additional settling had occurred since 2009. Measurements of the difference between the inner and outer well casing of MW-23d continue to remain at approximately 2.75 inches indicating additional subsidence has not occurred since 2010.

While not anticipated, additional settling in this area could affect the performance of the stormwater conveyance system. The stormwater conveyance system is observed quarterly and continues to perform as designed with steady flow from the outfall during and immediately after rainfall events.

2.3 Soil Cap Maintenance Activities

Routine maintenance activities performed at the Site in 2023 included checking for cut locks and chains, filling animal ruts beneath the perimeter fence, monitoring vegetation, and water supply meter backflow testing. Non-routine maintenance performed in 2023 included providing access to Portland General Electric (PGE) repair crews, removing brush, overseeing sign installation, and organizing and cleaning the shop building within the support facility.

On February 21, 2023, Haley & Aldrich replaced a cut lock on the main gate and re-secured the Site after parties from adjacent properties notified DEQ that the gate was open.

On March 14, 2023, Haley & Aldrich coordinated access to the Site for Portland General Electric (PGE) maintenance crews to repair a utility pole adjacent to the perimeter fence. PGE did not end up performing repairs that day and ultimately performed the repairs by accessing the utility pole from outside the Site's perimeter fence.

On June 9, 2023, the main gate lock was found cut upon entry by the project team for the quarterly site inspection. Haley & Aldrich replaced the cut lock prior to departing from the site.

On June 14, 2023, GSI oversaw the installation of a sign on the side of the shop building by Elite Signs of Portland, Oregon. The sign indicates that the project receives funding from EPA.

On June 21, 2023, Haley & Aldrich replaced a cut lock, picked up trash and debris, cut brush growing through the catch basin grate and along the fence line from the paved storage area, and performed maintenance on the Kubota Utility task vehicle.

On September 14, 2023, a vegetation and drought assessment inspection on the soil cap was performed. The vegetation inspection results are described in further detail in Section 5.3.2. Trees and shrubs were healthy and did not show signs of drought stress. The need for targeted weed removal and herbicide application was identified and an event will be performed in spring 2024.

On September 19, 2023, American Backflow Services of Portland, Oregon, tested the Site's water supply line backflow prevention valve. The backflow prevention valve met state regulation standards.

On October 31, 2023, the main gate lock was found cut upon entry by Haley & Aldrich and AKS Engineering & Forestry, LLC for the lidar survey. Haley & Aldrich replaced the cut lock.

2.4 Summary of Soil Cap Remedy Performance

Overall, upland soil cap observations and inspections revealed no significant change in remedy performance or areas of concern. The soil cap continues to have a consistent layer of vegetative cover across the Site. Future O&M activities will consist primarily of quarterly inspections and routine maintenance. Although gate locks are periodically cut and require replacement, there is no evidence that trespassers damage the integrity of the soil cap.

The upland soil cap subsidence near wells EW-1s and MW 23d is currently stable. Monitoring will continue in 2024 by taking inner and outer casing measurements at well MW 23d; by monitoring stormwater flow at the outfall during quarterly inspections; and by collecting and reviewing transducer data from EW-1s that measures groundwater temperature and elevation.

ICs have not been fully implemented per the ROD (i.e., deed restrictions have not been implemented as the property has not yet transferred ownership). To date, no activities have occurred that could damage the soil cap or that would have been prohibited by deed restrictions.

3 Sediment Cap Performance Standards and Activities

This section summarizes sediment cap performance standards and observation and maintenance activities for the reporting period January 1, 2023, through December 31, 2023. Site observations and maintenance activities were conducted according to the Final O&M Plan. Observations of interest based on the routine inspections and site meetings are presented in Figure 2-1. Routine inspections are documented in site inspection summaries and are presented in Appendix A. Table 3-1 provides a summary of sediment cap activities conducted in 2023.

3.1 Sediment Cap Performance Standards

The sediment remedy consists of a 23-acre cap over contaminated sediment within the Willamette River and includes ICs. The sediment cap remedy was completed in September 2005, and an Easement and Equitable Servitude was completed in 2006 to restrict sediment cap use and access. Sediment beneath the sediment cap remains contaminated with arsenic, PCP, PAHs, dioxins/furans, and NAPL. The performance standards for the sediment cap are as follows:

- Maintain contaminant concentrations in surface sediment below the following risk-based cleanup goals, as specified in the ROD (EPA, 1996).
 - Arsenic: 12 mg/kg, dry weight
 - PCP: 100 mg/kg, dry weight
 - Total carcinogenic PAHs: 2 mg/kg, dry weight
 - Dioxins/furans toxic equivalency: 8×10^{-5} mg/kg, dry weight
 - Protection of benthic organisms based on sediment bioassay tests, resulting in impaired survival and growth (i.e., weight)
- Minimize contaminant releases from sediment that might result in contamination of the Willamette River in excess of the following federal and state ambient water quality criteria (AWQC):
 - Arsenic (III): 190 micrograms per liter ($\mu\text{g/L}$)
 - Chromium (III): 210 $\mu\text{g/L}$
 - Copper: 12 $\mu\text{g/L}$
 - Zinc: 110 $\mu\text{g/L}$
 - PCP: 13 $\mu\text{g/L}$
 - Acenaphthene: 520 $\mu\text{g/L}$
 - Fluoranthene: 54 $\mu\text{g/L}$
 - Naphthalene: 620 $\mu\text{g/L}$
 - Total carcinogenic PAHs: 0.031 $\mu\text{g/L}$
 - Dioxins/furans: 1.4×10^{-5} nanograms per liter
- Maintain the armoring layer to within 50 percent of the design specification throughout the cap. The design specifications are as follows:
 - 6-inch rock armoring: maintain at least 6 inches thick
 - 12-inch rock armoring: maintain at least 7.5 inches thick
 - 24-inch rock armoring: maintain at least 12 inches thick
- Maintain uniformity and continuity of ACB armoring.
- Assess performance of organophilic clay to ensure it is preventing the release of mobile NAPL to the Willamette River (potential assessment parameters include sorption capacity, measure of NAPL currently sorbed, and permeability).

AWQCs listed above were the surface water criteria in effect at the time of the ROD (EPA, 1996). Since completion of the ROD, additional recommended EPA water quality criteria were published in 2007, and more stringent AWQCs for human health were adopted by DEQ and approved by EPA in 2011. During meetings in August 2007 among stakeholders (DEQ, EPA, National Oceanic and Atmospheric Administration, Confederated Tribes of Warm Springs, and Yakama Nation), it was agreed that for comparison purposes, the following five criteria would be included in analytical results summary tables in Annual O&M Reports.

- Two AWQCs in effect at the time the ROD was issued:
 - 1996 criteria for chronic effects to aquatic life
 - 1996 criteria for human health based on fish consumption
- Two 2007 National Recommended Water Quality Criteria (NRWQCs):
 - 2007 criteria for chronic effects to aquatic life
 - 2007 criteria for human health (consumption of organisms)
- Current EPA maximum contaminant levels

The criteria above are for comparison only; the 1996 AWQCs remain the regulatory screening criteria for the Site. Comparison criteria also include the EPA-approved 2011 AWQCs updated in 2017 for human health (DEQ, 2017), and other applicable AWQCs at the time of sediment cap water sampling events. The next scheduled sediment cap water sampling event is in 2025.

3.2 Sediment Cap Observations

Routine sediment cap inspections were conducted during the four quarterly site inspections (March 16, June 9, September 19, and December 7, 2023). Observations were made regarding habitat enhancement features, wildlife, vandalism, and/or trespassing. Representative photographs of the Willamette River and Willamette Cove shorelines taken in 2023 are presented in Appendix A. Sediment cap inspection documentation is also included in Appendix A. In general, the sediment cap remains in good condition.

3.2.1 Shoreline Conditions

During the March 2023 inspection, large amounts of trash and debris from the winter rainstorms were observed along the shoreline. Trash included general containers, wrappers, and clothing. Large debris items included small vessel fragments, a derelict plastic 8ft paddleboat, numerous empty containers and tanks, and waterlogged drums. Significant trash and debris were not present during the subsequent inspection in June 2023.

During the October 2018 site inspection, multiple 2- to 6-inch-wide voids and unconformities were observed in the ACB along the shoreline in Willamette Cove during coinciding seasonal and tidal low water levels. The gaps were visible during the September inspections in 2021, 2022, and 2023 during low tide periods. In September 2022 and 2023, minor undulations and unconformities were observed with gaps of up to approximately 6 inches between ACB mat sections being present. The source of the undulations and unconformities is unknown. To obtain quantitative data on the unconformities, a Light Detection and Ranging (LiDAR) survey was performed in October 2023 and is discussed in further detail in Section 3.3.

Shoreline seepage and ebullition are monitored to determine if the sediment cap is performing as intended and if NAPL from creosote seeps is reaching the Willamette River. NAPL seepage was not observed during any site inspections in 2023. Ebullition was observed from the central portion of the Willamette River shoreline during the September 2023 inspection and consisted of sporadic bubbles approximately every 10 seconds. Ebullition is also monitored as a measure of granular organophilic clay integrity. Sediment cap evaluations

performed in 2008 through 2010 determined that total organic carbon decay resulted in methane gas production and ebullition in those areas.

3.2.2 Habitat Enhancement Features and Wildlife

Habitat enhancement features, such as boulder clusters and sand cover as a biotic layer, are design elements of the sediment cap. Driftwood also provides habitat enhancement along the shoreline and in the riparian area above the shoreline. The distribution of sand cover over the ACB is similar to previous years. Originally, sand was placed over a large portion of the shoreline and Willamette Cove ACB armoring, but high river flow conditions and wakes from passing boats have washed sand from the ACB where the bank slopes are steeper. Rounded 1.5 inch-minus gravel was placed within the ACB voids along a large portion of the shoreline and Willamette Cove in October 2012. Subsequent to gravel placement, some gravel has washed down from the steeper, upslope shoreline areas and has settled onto lower ACB surfaces where it has largely remained in place through 2023.

Large pieces of driftwood are deposited along the shoreline at higher elevations during high river-stage events. The amount of driftwood moving through the Site appears to remain fairly consistent every year. Three areas of the shoreline appear to accumulate more woody debris than other areas:

- The south end of the shoreline near the City of Portland outfall.
- Along the central portion of the Site's shoreline.
- The north end of the Site near the Burlington Northern Railroad bridge.

Boulder clusters placed during the sediment cap construction remained in place during 2023. Numerous wildlife species continue to be observed site-wide; birds seen most frequently include Canada geese, gulls, cormorants, crows, pigeons, blue herons, ospreys, and hawks.

3.2.3 Public Use

The shoreline along the Site and Willamette Cove is publicly accessible and used for various forms of recreation. Homeless encampments are periodically observed along the shoreline. Pedestrian trash indicates that recreational visitors continued to access the shoreline throughout the year.

Numerous dilapidated boats (presumably used as dwellings) have been consistently observed anchored in Willamette Cove during recent years. Vessels were observed anchored in Willamette Cove during each of the 2023 site inspections. All vessels appeared to be anchored beyond the sediment cap.

3.2.4 Buoys

In August 2011, five permanent buoys were installed along the perimeter of the sediment cap to warn boaters of navigational hazards. All buoys were observed during the March and June 2023 inspections. During the September 2023 inspection, Buoy 2 was not observed and confirmed missing during the December 2023 inspection. Replacement of Buoy 2 will be required, and initiation of replacement activities will occur in 2024.

3.3 Sediment Cap Maintenance Activities

As described in Section 3.2.1, unconformities have been visually observed in the sediment cap in Willamette Cove. To monitor and document the unconformities, a LiDAR survey of the sediment cap was conducted by AKS Engineering and Forestry on October 31, 2023. The survey used an unmanned aerial system (i.e., a drone) to collect high resolution LiDAR data of the sediment cap surface above the waterline at the time of

the survey. The survey was performed at the daily low tide to capture as much square footage of the sediment cap as possible. The remaining portion of the sediment cap surface not surveyed will be supplemented with additional bathymetric survey data collected in 2020 by GSI as part of investigative activities for the Willamette Cove cleanup project. The results of the survey will be presented in a technical memorandum to be prepared in early 2024.

3.4 Summary of Sediment Cap Remedy Performance

Overall, the sediment cap observations and inspections during 2023 revealed no significant change in remedy performance or areas of concern. Future O&M activities primarily will consist of quarterly inspections and routine maintenance. Previously, several voids in the ACB were observed along Willamette Cove in 2018, and 2021 through 2023. Minor undulations of the ACB armoring were also observed in Willamette Cove. The voids and undulations do not show signs of impairment to the cap; however, survey data was collected to provide quantifiable data to evaluate the voids and undulations to determine if maintenance to the sediment cap are required. Results will be presented in the 2024 Annual Report. The O&M Manual will be updated with the procedures used for evaluation.

Sand covers the shoreline at lower, less steep elevations, and significant amounts of large driftwood accumulated along the shoreline in 2023. This accumulated driftwood creates wildlife habitat. Numerous wildlife species continue to be observed; various birds including Canada geese, gulls, cormorants, crows, pigeons, blue herons, ospreys, and hawks were observed in 2023.

Rounded gravel used to fill voids within the ACB created a more stable substrate for wildlife and a consistent, safer walking surface for public use, although much of the gravel has been eroded from the upper portions of the ACB and deposited on the lower portion. Sediment cap conditions lower on the shoreline and in the intertidal zone show little change from construction conditions.

The public frequents the shoreline for recreation, most commonly for hiking or walking dogs. No homeless encampments were observed along the Willamette River shoreline during 2023, although vessels were observed anchored in Willamette Cove throughout the year.

4 Groundwater Performance Standards and Activities

This section summarizes groundwater performance standards and activities for the reporting period January 1, 2023, through December 31, 2023. The current monitoring well network is shown on Figure 4-1. Ongoing groundwater monitoring consists of (1) semiannual Site-wide manual measurements of NAPL and groundwater levels; and (2) continuous water level measurements in 11 Site wells via dedicated transducers (the dedicated transducers in these wells were replaced in January 2024). Groundwater remedy observations and maintenance activities were conducted according to the O&M Manual (Haley & Aldrich and GSI, 2023). Manual measurements of NAPL and groundwater levels were collected during Site-wide semiannual monitoring events on June 14 and September 27, 2023.

4.1 Groundwater Flow Direction and Gradient Assessment

Groundwater levels measured during the 2023 period are consistent with water table measurements since 2003, when the barrier wall was installed. This section summarizes groundwater flow based on the 2023 water level measurements.

4.1.1 Water Level Measurements

Manual groundwater measurements were collected during the falling limb of the hydrograph or immediately following low tide in the Willamette River. The semiannual groundwater elevation data are included in Table 4-1 (June 14, 2023) and Table 4-2 (September 27, 2023). Figures 4-2 and 4-3 present manual measurements collected at monitoring wells screened in the shallow groundwater zone, and Figures 4-4 and 4-5 present measurements collected at monitoring wells screened in the deep groundwater zone. Manual measurements were not collected at wells MW-58s, MW-58i, and MW-58d during the June 2023 monitoring due to an encampment on the roadway leading to the well nest, subsequently preventing access to the wells.

Transducer data was downloaded at the 11 Site wells with dedicated transducers during the June and September 2023 monitoring events. Continuous water level measurements from these 11 Site wells are presented on Figures 4-6 through 4-9. During the June 2023 data download, transducers were removed from the wells to confirm cable length and hang depth relative to their respective measuring point. Some transducers needed to be re-set at the appropriate hang depth and resulted in corrections to the associated data. Considerable corrections were applied to wells EW-1s, MW-44s, and MW-53s.

The hydrographs in Figures 4-8 through 4-9 compare groundwater level elevations for selected well pairs to river stage elevation and precipitation data. River stage data were recorded every 30 minutes from U.S. Geological Survey (USGS) Station number 14211720 (USGS, 2024a). This Station is located on the upstream side of the Morrison Bridge (river mile 12.8), approximately 5.6 river miles from the Site. The river stage elevation data reported by USGS are in a datum unique to Portland, Oregon, known as the Portland City Datum, approximately 5.1 feet lower than NAVD 88 (EPA, 2016). This value was used to correct all stage data to NAVD 88.

Precipitation data were obtained from the Astor Elementary School rain gauge located approximately 0.5 miles from the Site. This rain gauge is part of the City of Portland Hydra Network (USGS, 2024b).

4.1.2 Horizontal Flow Direction and Gradients

Shallow groundwater elevation contour maps were developed for each semiannual event during what is typically the seasonal high (June) and low (September) river stage. As shown in Figures 4-2 and 4-3, the

shallow horizontal groundwater gradient within the subsurface barrier wall is independent of the gradient outside the barrier wall. The groundwater gradient inside the barrier wall remains flat (typically less than approximately 0.003 feet per foot), compared to the steeper groundwater gradients observed outside the barrier wall (ranging from approximately 0.003 to 0.08 feet per foot). An anomalously low water level measurement (2 feet lower than nearby wells) was observed at well MW-15s during the June 2023 monitoring event and an anomalously low water level measurement (4 feet lower than nearby wells) was observed at well MW-38d during the September 2023 monitoring event. The cause for the anomalous water level measurements has not been identified. Manual measurements collected at MW-15s during the September 2023 monitoring event coincided with nearby wells. Similarly, manual measurements collected at MW-38d during the June 2023 event coincided with nearby wells. The anomalous water level measurements are not expected to present issues with the efficacy of the subsurface barrier, and water levels at these wells will continue to be monitored closely in the future.

On the southern side of the barrier wall, groundwater flows southwest toward the Willamette River, while on the northern side of the barrier wall, groundwater flows to the west toward Willamette Cove. This demonstrates that the barrier wall has effectively cut off the horizontal hydraulic connection between the shallow groundwater zone and outside of its boundaries. Historically, the hydraulic separation is apparent from the paired monitoring well cluster MW-52s and MW-53s, located in the upgradient area and at the northeastern edge of the barrier wall. Groundwater elevations are relatively higher at MW-53s (outside of the barrier wall) compared to MW-52s (inside the barrier wall), as shown on Figure 4-6. This trend demonstrates hydraulic separation between the well pair.

Comparison of groundwater levels for interior monitoring wells EW-1s, MW-52s, MW-36s, and MW-44s (Figure 4-7) illustrate shallow groundwater levels within the barrier wall are usually relatively lower near the Willamette River (i.e., the water level in EW-1s is typically higher than MW-36s), and therefore groundwater typically flows to the west. However, during periods of peak flow in the Willamette River (e.g., May 2023), groundwater levels within the west corner of the barrier wall increase and cause a partial gradient reversal (i.e., the water level in MW-36s becomes higher than the levels in other interior wells) (Figure 4-7). This partial reversal is caused by a deep hydraulic connection through a sand layer at the base of the western edge of the barrier wall; when the river level exceeds the groundwater level within the barrier wall area, an upward vertical gradient results. Vertical gradients are further discussed in Section 4.1.3.

Groundwater measurements were also collected during the June and September monitoring events at 15 monitoring wells screened in the deeper groundwater zone located below the terminal depth of the barrier wall. Manual well measurements indicate deeper groundwater has an overall flow to the west towards the Willamette River, as illustrated on Figures 4-4 and 4-5. Due to a relatively limited number of wells screened in the deeper zone and only three wells are located inland from the river, deep groundwater elevation contour maps were not developed for the Site.

Across the Site, horizontal groundwater gradients among deeper wells PW-2d and MW-60d were measured at approximately 0.003 and 0.002 feet per foot in June and September 2023, respectively. At the eastern portion of the Site, located upgradient and further from the Willamette River, the horizontal groundwater gradient is slightly steeper and ranged up to 0.008 feet per foot between wells PW-2d and MW-23d in 2023.

Closer to the Willamette River, the horizontal gradient is relatively flat. Gradients between well MW-23d and nearshore wells (e.g., MW-37d to MW-45d) show gradients of approximately 0.001 feet/foot in June 2023 and between -0.001 and -0.003 feet per foot in September 2023. For the September 2023 event, measured water levels in nearshore wells were higher than well MW-23d resulting in an apparent gradient reversal (i.e., negative value). Nearshore wells are in hydraulic connection with the Willamette River and, as evidenced by transducer data (Figures 4-8 and 4-9), respond to river tides. During the September 2023 event, there was a

3.8-foot tidal swing and nearshore wells were measured near high tide. During low tide, nearshore water levels drop, and the gradient would again be toward the river. Thus, any reversals would be temporary.

4.1.3 Vertical Flow Direction and Gradients

Willamette River stage differences directly influence groundwater elevations in the adjacent nearshore areas. Daily tidal fluctuations in river stage typically range from 2 to 5 feet during the late summer and fall months (July through September) when stage/discharge is lowest and from 1 to 2 feet during the spring months (April through June) when stage/discharge is highest.

Vertical gradients inside and outside the barrier wall along the Willamette River were assessed in monitoring well clusters MW-36/MW-37 and MW-44/MW-45 (Figures 4-8 and 4-9). Due to a failed pressure transducer, limited groundwater elevation data was collected for MW-37s (data were successfully collected from September 2022 to April 2023 and June 2023 to July 2023). Hydrographs for these wells (Figures 4-8 and 4-9) indicate the deep groundwater zone is in direct hydraulic connection with the river. The deep zone both inside (MW-36d and MW-44d) and outside (MW-37d and MW-45d) of the barrier wall closely mimics the river stage, both in elevation and timing, with small vertical gradient changes that occur in response to the daily tidal changes and seasonal river stage trends. The exterior shallow well MW-45s, is also in hydraulic connection with the river and shows a dampened amplitude in comparison with the deeper wells (Figure 4-9).

Shallow groundwater levels at MW-36s (inside barrier wall) respond to tidal effects observed in the river but are muted in amplitude compared with the variations observed in the river stage (Figure 4-8). Well MW-44s (inside barrier wall) shows a negligible response to tidal effects and river levels (Figure 4-9). The muted amplitude or negligible response of interior shallow wells compared with the deep-zone wells indicates a hydraulic disconnect between most of the shallow aquifer within the barrier wall and the deeper water-bearing zones. This disconnect is due to (1) the presence of the barrier wall which prevents horizontal flow across it; and (2) the presence of a confining silt layer between the shallow and deep zones throughout most of the barrier wall area, including near the MW-44/MW-45 well cluster. The shallow interior response is greatest, but still significantly muted, in well MW-36s (Figure 4-8), where a hydraulic connection exists at the base of the barrier wall (which is completed in a sandy unit at depth). The timing of the groundwater oscillations in MW-37s (exterior shallow well) and MW-36s (interior shallow well) were closely linked; however, the amplitude of the oscillations was muted inside the barrier wall at well MW-36s.

The net vertical gradients between the shallow and deep zones have been calculated (when possible) using the transducer data available for each well cluster between September 29, 2022, to September 28, 2023. Table 4-3 presents the net vertical gradient in each well cluster. In interior well clusters MW-36 and MW-44, the net annual vertical gradient is downward between the shallow zone and deep zones. The net downward gradient is greater inside the barrier wall (MW-36 and MW-44 clusters) because the net shallow groundwater elevation inside the barrier wall continues to be slightly elevated compared to the net river elevation. While outside the barrier wall, in well cluster MW-37, the net annual vertical gradient is slightly down between the shallow zone and deep zone, whereas in MW-45, the vertical gradient is slightly upward. The net vertical gradient outside the barrier wall is small and varies between upward and downward according to the trends of the Willamette River. Neutral or upward vertical gradients occurred when the river stage was at a higher elevation for a prolonged period. The Site hydrographs illustrate the relative difference in groundwater elevation measurements, which are indicative of these vertical gradient trends. The vertical gradients in 2023 were comparable (both in direction and magnitude) to the gradients reported in previous annual reports. However, the lack of transducer data for the entire year in well MW-37s does result in a net vertical gradient calculation that does not capture vertical gradients at all river stages observed during 2023.

Although precipitation in the Willamette River watershed ultimately affects the stage of the river, direct precipitation appears to play a minor role in determining the water levels of wells within the barrier wall and along the river. The RCRA-type soil cap at the Site was designed to divert precipitation so that little infiltration occurs within the barrier wall. Although some infiltration occurs along the fringes of the soil cap and within the riparian zone, the volume of infiltration is expected to be minimal. Between the barrier wall and the river, precipitation inputs are overshadowed by the response of groundwater to variations in river stage. The shallow zone upgradient or cross-gradient from the barrier wall appears to react subtly to precipitation and is less connected to the river because of its distance from the river and the presence of the barrier wall, which is sealed into the underlying silt. One location where infiltration may influence groundwater elevation and flow path is in the infiltration pond (Figures 1-4 and 1-5) that receives diverted runoff from the soil cap. Historical water level data indicates that the groundwater gradient in this area is flat, but a slight groundwater mound east of the soil cap may be seasonally present.

4.2 NAPL Gauging and Monitoring Assessment

Between February 1993 and April 2011, approximately 6,550 gallons of NAPL were extracted from Site wells. Because recovery was slow and there was uncertainty about the benefits of ongoing recovery, a NAPL investigation in the former waste disposal area (FWDA) outside the barrier wall (the remaining area with active NAPL recovery) was conducted in 2011. Based on the findings from the NAPL investigation (Hart Crowser and GSI, 2011b) and extensive monitoring of the sediment cap (described in the Third Five-Year Review Report [DEQ and EPA, 2011]), DEQ and EPA decided to discontinue NAPL extraction on April 20, 2011. Subsequent monitoring of the post-extraction NAPL thickness in the FWDA was conducted in 2011 (Hart Crowser and GSI, 2011b). The results supported the regulatory decision and confirmed the residual NAPL in the FWDA is isolated and stable and does not pose a risk to the Willamette River. To confirm that this remains the case and to continue to evaluate the functional performance of the barrier wall and soil cap, NAPL presence and thickness continues to be monitored during the semiannual monitoring events.

Semiannual monitoring events were performed on June 14, 2023, and September 27, 2023. Measurable thicknesses of NAPL were present in 11 Site wells (EW-1s, EW-8s, EW-10s, EW-15s, EW-18s, EW-23s, MW-10r, MW-20i, MW-22i, MW-Ds, and MW-Gs). Figures 4-10 and 4-11 show the locations of wells with measurable quantities of light NAPL (LNAPL) and/or dense NAPL (DNAPL) during the June and September 2023 monitoring events, respectively. Tables 4-1 and 4-2 provide semiannual NAPL gauging measurements. Figures 4-10 through 4-22 show the NAPL and groundwater elevations versus time in individual wells that regularly had NAPL detections. The screened interval elevations and the well depth are also shown. The thickness of LNAPL can be calculated by subtracting the LNAPL elevation (when LNAPL is present) from the groundwater elevation. Similarly, the DNAPL thickness is represented by the difference between the DNAPL/water contact elevation and the well depth elevation.

Given that NAPL within the barrier wall is constrained laterally, NAPL observations within and outside of the barrier wall are discussed separately below.

4.2.1 Outside the Barrier Wall

Historically, NAPL has been primarily observed outside the barrier wall next to the western corner that corresponds to the FWDA (Figure 1-3). During the June and September 2023 monitoring events, measurable DNAPL was observed in four wells (EW-10s, MW-20i, MW-Ds, and MW-Gs) located outside the northwestern corner of the barrier wall (Figures 4-10 and 4-11).

As shown on Figures 4-12 through 4-15, the DNAPL thicknesses measured in wells EW-10s, MW-20i, MW-Ds, and MW-Gs in 2023 are generally consistent with measurements made since NAPL recovery was discontinued in April 2011, with the following notable observations:

- Approximately 2 to 3 feet of DNAPL have been observed at well MW-Ds since active DNAPL recovery was discontinued in 2011. In 2021 and 2022, DNAPL thickness at MW-Ds increased to approximately 3 to 5 feet. In 2023, DNAPL thickness was observed to be approximately 3 to 3.5 feet. DNAPL conditions at MW-Ds will continue to be monitored.
- Approximately 2 feet of DNAPL was previously observed at well EW-2s in June 2021 (first occurrence since 2014), but DNAPL was not observed at that well in September 2021 or in 2022 or 2023. Given the location of well EW-2s in proximity to other wells with DNAPL and the proximity to a sewer line with NAPL-impacted backfill (Hart Crowser and GSI, 2011b), the observed DNAPL is not unexpected. EW-2s will continue to be monitored for DNAPL. Well EW-2s is in the western corner where DNAPL has consistently been observed in other wells.

Overall, the 2023 observations are consistent with historical observations and support the conclusion that NAPL observed in the FWDA is localized and relatively stable. NAPL was not observed in downgradient well EW19s or in the MW-37 well cluster, and DNAPL in EW10s only appears in the sump. NAPL was not observed in the deeper wells located outside of the barrier wall in the FWDA (MW-34i, MW-60d, and MW-37d). Additionally, NAPL was not observed within the barrier wall in the MW-36 well cluster. Therefore, there is no evidence of NAPL mobility either across the barrier wall or to the Willamette River.

4.2.2 Inside the Barrier Wall

During the June 2023 monitoring event, measurable LNAPL was present in two wells (EW-15s and EW-23s) within the barrier wall (Figure 4-10). Measurable DNAPL was observed in four wells (EW-1s, EW-8s, EW-18s, and MW-22i) inside the barrier wall (Figure 4-10). During the September 2023 monitoring event, measurable LNAPL was observed in three interior wells (MW-10r, EW-15s, and EW-23s) and measurable DNAPL was observed in the same four wells as the June 2023 event (Figure 4-11).

Figures 4-16, 4-17, and 4-18 show the elevations of LNAPL and shallow groundwater over time in wells EW-15s, EW-23s, and MW-56s, respectively. As shown in these figures, the LNAPL thickness is generally greater when the groundwater elevation is low. This is the result of gravity drainage of LNAPL through the unsaturated zone when the water table drops. This pattern has been consistent since mid-2006 when LNAPL ceased being recovered inside of the barrier wall. Although the LNAPL thickness varies cyclically with changes in the groundwater elevation, the overall LNAPL thickness in these wells has remained relatively stable, with slight increases during low groundwater levels. Figures 4-19 and 4-22 for wells EW-1s and EW-18s also show historical presence of LNAPL, although LNAPL has not been recorded in these wells since 2015.

Measurable DNAPL was present during the 2023 semiannual monitoring events within the barrier wall near the former Tank Farm Area (Figure 1-3) in wells EW-1s, EW-8s, EW-18s, and MW-22i, as shown on Figures 4-19 through 4-22, respectively. After a temporary recovery period in April 2011, the DNAPL thickness in well EW-1s (Figure 4-19) increased to a thickness of approximately 8 to 10 feet by 2014; it has remained roughly the same, with the DNAPL thickness in EW-1s being 8.98 feet in September 2023. The DNAPL thickness in well MW-22i was 7.07 feet thick (Figure 4-20) during the September 2023 monitoring event, which is consistent with previous measurements. Approximately 2 feet of DNAPL is consistently present within the sump of well EW-8s. Occasional seasonal variations or spikes in the DNAPL thickness in EW-8s have previously been observed but were not observed during the 2023 monitoring events.

(Figure 4-21). Similarly, the DNAPL thickness in EW-18s has been generally stable at around 2 feet since 2012 and is typically only present in the sump of the well (Figure 4-22).

Overall, both LNAPL and DNAPL appear to be stable. NAPL is not observed in any of the well clusters along the barrier wall. Though LNAPL was observed in wells EW-15s and EW-23s close to the western corner of the barrier wall, no LNAPL was observed in any of the wells outside of the barrier wall. Given these observations, the barrier wall appears to be preventing mobilization of LNAPL or DNAPL to the Willamette River.

4.3 Groundwater Remedy Maintenance Activities

Table 4-4 provides the groundwater O&M activities conducted in 2023. Transducer data loggers were inspected during the semiannual monitoring events in 2023. An additional transducer inspection and data download was conducted in April 2023 to ensure consistent maintenance and data download procedures were being followed by GSI and Haley and Aldrich. Maintenance activities were carried out in accordance with the 2023 O&M Manual (Haley & Aldrich and GSI, 2023), and consisted of checking all transducers, measuring and resetting transducer depths, and replacing batteries.

Transducer data from the 11 Site wells were downloaded during the June 2023 monitoring event. Maintenance was performed on all transducers during the June 2023 download event after the data download was complete for each transducer. Data collected during the June 2023 download event suggested that the transducer in MW-52s was reporting erratic measurements. As the transducer appeared to be malfunctioning, it was pulled from the well and a replacement unit was deployed in MW-52s during the September 2023 download event.

During the September 2023 download event, a successful connection to the MW-37s transducer could not be established. The MW-37s transducer was pulled and corrosion was observed on the cable connection fitting on the unit. As the transducer appeared to be malfunctioning, the unit was submitted to the manufacturer for evaluation and repair. The manufacturer determined that water damage and corrosion was present, and that the unit was missing a connector pin, and recommended replacement of the unit. Minor maintenance was also conducted during the September 2023 download event and included checking and replacing transducer batteries and replacing the hardware used to hang the transducers in wells MW-53s and EW-1s.

Due to repeated failures of Site transducers, and that additional failures were expected to continue based on the age of the transducers, GSI recommended the replacement of all 11 Site transducers and the Site barometer. All 11 Site transducers and the Site barometer were replaced in January 2024.

Additionally, GSI coordinated the disposal of one drum containing wastewater generated by EPA during site groundwater sampling in 2023. The drum was picked up by ACTEnviro on October 12, 2023, for disposal at the Chemical Waste Management facility in Arlington, Oregon.

4.4 Summary of Groundwater Remedy Performance

Groundwater monitoring data are used to understand groundwater flow conditions inside and outside of the barrier wall. This information is evaluated to determine whether the barrier wall and impermeable RCRA-type soil cap are functioning as designed. As hydraulic conditions are consistent with previous years, the data from 2023 verifies that the remedy continues to function as designed.

DNAPL was measured in four wells outside the barrier wall. The DNAPL in the wells has remained generally stable and is not observed to be migrating to downgradient or deeper wells. LNAPL was not observed in any wells outside the barrier wall. Based on the findings from the DNAPL Data Gap Investigation (Hart Crowser and

GSI, 2011a), subsequent monitoring of the post-extraction NAPL thicknesses in wells in the FWDA, and extensive monitoring of the sediment cap and groundwater (described in the Third, Fourth, and Five-Year Review Reports [DEQ and EPA, 2011, 2016, 2021]), the decision to discontinue NAPL recovery was justified, and residual NAPL remaining in the FWDA does not pose a threat to the Willamette River.

Based on the evaluation of groundwater data from 2005 through 2023, the barrier wall and impermeable soil cap are functioning as designed to divert groundwater flow around NAPL source areas, minimize rainwater infiltration into NAPL source areas contained within the barrier wall, and prevent NAPL contained within the barrier wall from migrating to the Willamette River.

5 Vegetation Management

This section summarizes the vegetation management and monitoring activities for the reporting period from January 1, 2023, through December 31, 2023. Vegetation management activities on the upland cap were conducted in accordance with the McCormick & Baxter Vegetation Management Plan (Hart Crowser and GSI, 2011c).

The upland cap was constructed during a 2-year period beginning in 2004 with the re-grading of the Willamette River riverbank. The 6-acre riparian area cap was installed and tied into the in-water sediment cap. In 2005, a 34-acre soil cap was constructed to complete the upland cap. The City of Portland Bureau of Environmental Services (BES) entered into an Intergovernmental Agreement (IGA) with DEQ to provide vegetation planning and vegetation management services for the upland cap from 2005 through 2010. In February 2006, the soil cap was planted with native grasses, plants, and trees, and an irrigation system was installed. After the fifth growing season, BES determined that the vegetation was fully established. The irrigation system was deactivated in 2009 and decommissioned in 2015. Overall, the planting and vegetation management goals have been met.

Semiannual noxious weed control activities, including herbicide application, were conducted from spring 2006 through spring 2013. Herbicide application was temporarily discontinued in June 2013 when nearby desirable native vegetation was observed to be stressed and dying. No herbicide was applied in 2014 and 2015 but was resumed in 2016 after noxious weeds appeared to be spreading. Spot treatment occurred once each in 2017 and 2019. No herbicide application was performed in 2018 and 2021 through 2023.

Rodents that inhabit the cap have damaged vegetation in the past; however, except for some earlier targeted damage to the grand fir (*Abies grandis*) seedlings (BES, 2010), there has been insignificant damage to other plantings. Rodent activities are monitored during quarterly site inspections and were not observed to be causing significant damage during site visits in 2023.

On July 19, 2018, a fire burned approximately 1 acre at the north end of the riparian area. On September 24, 2018, another fire burned approximately 1 acre along the northeast side of the Site, approximately 200 feet southeast of the Site maintenance building and along the inside of the fence line. Both fires were likely caused by human activities. Vegetation recovered in these areas by July 2019 and continues to do well.

5.1 Vegetation Management Components and Goals

The upland cap has five distinct components, each with corresponding goals and objectives for managing hydrology, soil, and wildlife habitat (Figure 5-1). These components are:

- Entrance Area
- Earthen Cap
- Stormwater Retention Pond and Drainage Swale
- Impermeable Cap
- Riparian Area

Performance standards to assess whether the planting goals in the DEQ/BES IGA for the entire upland cap are met include:

- Bare soil spaces are small and well dispersed.

- Soil movement, such as active rills or gullies and soil deposition around plants or in small basins, is absent or slight and local.
- Plant litter is well distributed and effective in protecting the soil with few or no litter dams present.
- Native woody and herbaceous vegetation and germination micro-sites are present and well distributed across the Site.
- Vegetation structure results in rooting throughout the available soil profile.
- Plants have normal, vigorous growth form and a high probability of remaining vigorous, healthy, and dominant over undesired competing vegetation.
- Stream banks have less than 5 percent exposed soil with margins anchored by deeply rooted vegetation or coarse-grained alluvial debris.
- A continuous corridor of shrubs and trees provides shade for the entire stream bank.

Specific goals were also set for planting the riparian area to create habitat, including elements such as large woody material, riparian vegetation for food, habitat cover and shelter, and shading (NOAA, 2004).

5.2 Baseline Conditions in 2011

In 2010, BES determined that the vegetation had been fully established, as discussed in its final 2010 Vegetation Management Report (BES, 2010). Hart Crowser (now Haley & Aldrich, Inc.) assumed responsibility for the vegetation management at that time. On June 10, 2011, a Hart Crowser ecologist inspected the upland cap to confirm the vegetation conditions discussed in the report. The inspection included: visual observation of vegetation planting areas, species identification (native, non-native, and invasive), growth, density, general coverage, and relative health of vegetation throughout the Site. Photographs were taken to establish a baseline to evaluate the progress of the vegetation establishment and the qualitative observations at select Site locations. These locations or “Photograph Stations” are shown on Figure 5-1 and include Photograph Stations 1 through 9. Photographs taken from 2023 compared to baseline conditions in 2011 are included in Appendix B. The following sections summarize the initial conditions and observations made during the baseline visit in June 2011.

5.2.1 Riparian Area

The riparian area is divided into two components: lower and upper. Each component received similar vegetation treatments. The lower component is subject to Willamette River stage fluctuations, which influence vegetation conditions at its lower edge during high-water events. Vegetation, some weeds, and woody debris were present along the shoreline (Photograph Stations 7 and 9). Trees, shrubs, and herbaceous plants were present in the riparian area (Photograph Station 8).

Lower Component. The lower component originally was planted with a variety of native trees and shrubs including: Oregon ash (*Fraxinus latifolia*), Suksdorf’s hawthorn (*Crataegus suksdorfii*), cascara (*Rhamnus purshiana*), hardhack (*Spiraea douglasii*), red-osier dogwood (*Cornus sericea*), Pacific ninebark (*Physocarpus capitatus*), swamp rose (*Rosa pisocarpa*), river willow (*Salix fluviatilis*), Sitka willow (*Salix sitchensis*), rigid willow (*Salix rigida*) [sic: taxonomic update -MacKenzie’s willow (*S. prolixa*)], Piper’s willow (*Salix piperi*) [sic: *S. hookeriana*], and black twinberry (*Lonicera involucrata*). Groundcover species planted in the lower component included: California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*), meadow barley (*Hordeum brachyantherum*), slender hairgrass (*Deschampsia elongata*), spike bentgrass (*Agrostis exarata*), globe gilia (*Gilia capitata*), lupine (*Lupinus albicaulis*), and Canada goldenrod (*Solidago canadensis*). Tree plantings were not installed at lower elevations in the lower component of the riparian area because of the

potential for late season inundation from high river levels. Instead, appropriate shrubs, primarily willows, were installed along the lower edge of this component to provide food and shade.

In 2011, trees and shrubs within the lower component were observed to be well established and growing both vertically and laterally. No indications of stress were noted. Localized areas of exposed turf-reinforced matting (TRM) were observed along the length of the lower edge of the TRM, likely because of river fluctuations and movement of large woody debris along the shoreline. Canada thistle (*Cirsium arvense*) was the most common noxious weed with lesser quantities of knapweed (*Centaurea sp.*) and butterfly bush (*Buddleia davidii*) present. A significant quantity of large woody debris was also observed along the entire length of the lower edge.

Upper Component. The upper component was planted with native vegetation including: red alder (*Alnus rubra*), big-leaf maple (*Acer macrophyllum*), Western red cedar (*Thuja plicata*), madrone (*Arbutus menziesii*), grand fir, Garry oak (*Quercus garryana*), Oregon ash, black hawthorn, cascara, red elderberry (*Sambucus racemosa*), blue elderberry (*Sambucus cerulea*), Nootka rose (*Rosa nutkana*), tall Oregon-grape (*Mahonia aquifolium*), snowberry (*Symphoricarpos albus*), red-flowering currant (*Ribes sanguineum*), oceanspray (*Holodiscus discolor*), red-osier dogwood, black twinberry, and Pacific ninebark. Groundcover species in the upper component are identical to those in the lower component. Similar to the lower component, trees and shrubs were well established and appeared healthy. In 2011, trees were 6 to 12 feet tall. Few areas containing bare ground were observed. Thistle and knapweed were present in small quantities among the groundcover plantings throughout the upper component.

Summary. In general, the riparian area components appeared to be performing well in 2011, with the installed trees and shrubs looking healthy and spreading. Groundcover species provided relatively good coverage of the soil, except for a few areas containing bare ground and observed TRM along the shoreline. In addition, large driftwood was present throughout the lower component and in smaller quantities within the upper component. Noxious weeds, including thistle, knapweed, and butterfly bush were present in small quantities within the riparian area.

5.2.2 Upland Area

The upland area is divided into three components: the earthen cap; the stormwater retention pond/drainage swale; and the impermeable cap. The upland areas and photograph station locations are shown on Figure 5-1. A variety of native trees, shrubs, and herbaceous species were present on the earthen cap as shown in photographs captured at Photograph Stations 1, 2, 3, and 5 (Appendix B). Native shrubs and herbaceous species were present in the stormwater retention pond/drainage swale (Photograph Station 4). Meadow grasses and herbs are present on the impermeable cap (Photograph Station 6).

Earthen Cap Component. Originally, this component was planted with a variety of native trees, shrubs, and grasses including Garry oak, Ponderosa pine (*Pinus ponderosa*), black hawthorn (*Crataegus douglasii*), madrone, snowberry, blue elderberry (*Sambucus cerulea*), Oregon-grape, Nootka rose, red-flowering currant, oceanspray, serviceberry (*Amelanchier alnifolia*), and mock orange (*Philadelphus lewisii*). Herbaceous species installed on the earthen cap included: chewings fescue (*Festuca rubra var. comutata*), California brome, meadow barley, slender hairgrass, Spanish clover (*Lotus purshiana*), claria (*Clarkia amoena*), globe gilia, meadow checkermallow (*Sidalcea campestris*), large-leaved lupine (*Lupinus polyphyllus*), and Canada goldenrod. By 2011, nearly all these plant varieties remained on the earthen cap and appear to be well established and growing both vertically and laterally. Nootka rose had dominated the northwest corner of the earthen cap component; however, some of the Nootka rose appeared to have been highly stressed or had died, and most were regenerating. The black hawthorn had grown to 6 to 8 feet tall. Localized areas of moss

were observed within the grasses and herbaceous vegetation. Small quantities of knapweed and thistle were also present.

Stormwater Retention Pond/Drainage Swale Component. This component was planted with a native shrub overstory consisting of hardhack, Sitka willow, and Piper's willow (Photograph Station 4). By 2011, volunteer red alder and black cottonwood (*Populus balsamifera*) were observed among the shrub plantings. Understory herbaceous species were planted in the pond and swale area based on anticipated inundation within the pond and swale area and included: water plantain (*Alisma plantago aquatica*), slough sedge (*Carex obnupta*), soft stem bulrush (*Schoenoplectus tabernaemontanii*), small-fruited bulrush (*Scirpus microcarpus*), Western sloughgrass (*Beckmania syzigachne*), Western mannagrass (*Glyceria occidentalis*), tufted hairgrass (*Deschampsia cespitosa*), slender hairgrass, meadow barley, spike bentgrass, meadow foxtail (*Alopecurus geniculatus*), self-heal (*Prunella vulgaris*), Spanish clover, and gumweed (*Grindelia integrifolia*). By 2011, the shrub plantings in the pond and swale area were well established and appeared healthy. Many of the grasses and herbs in the pond area did not survive because the infiltration of surface runoff limits moisture and the understory is dominated by sand and bare ground. Given that the shrubs were well established, the area is flat, and erosion generally was not occurring, replanting grasses and herbs was not recommended. No noxious weeds were observed in this component.

Impermeable Cap Component. This component was seeded with a grassland mixture including: chewings fescue, California brome, meadow barley, slender hairgrass, large-leaved collomia (*Collomia grandiflora*), globe gilia, large-leaved lupine, and Canada goldenrod. By 2011, these grassland species provided excellent cover of the impermeable cap. Moss was present in localized areas where grasses and herbs did not become established. Small quantities of knapweed, thistle, skeletonweed (*Chondrilla juncea*), and dandelion (*Taraxacum officinale*) were present within the southwestern portion of this component and did not appear to be encroaching on desirable vegetation.

Summary. In general, the upland area appeared to be performing well in 2011 (baseline conditions) with the installed trees and shrubs looking healthy and spreading on the earthen cap component, shrubs being well established within the stormwater retention pond/drainage swale component, and good soil coverage and vegetative diversity on the impermeable cap component. Groundcover species provided excellent coverage of the ground, except for a few sections containing bare ground and the relatively bare understory in the pond area. Limited quantities of noxious weeds were observed in the upland area and were primarily limited to the southwestern edge of the impermeable cap component.

5.3 Vegetation Observations in 2023

On September 15, 2023, Haley & Aldrich inspected the upland cap to assess the current conditions as compared to the baseline conditions observed in June 2011. Qualitative data were recorded on species composition, cover and density of vegetation, and effectiveness of previous noxious weed treatments. Photograph Stations during this inspection were paired with photographs from previous reports to provide an understanding of vegetation changes. Photograph Stations are shown on Figure 5-1. Species nomenclature and nativity follows U.S. Department of Agriculture standards (USDA, 2024). Current observations are summarized below.

5.3.1 Riparian Area

The lower and upper components of the riparian area were inspected in September 2023. The lower component is subject to Willamette River stage fluctuations, which influence vegetation conditions at its lower edge during high-water events. Vegetation and woody debris are present along the shoreline as shown

in Photographs B14 and B18 (Appendix B). Trees, shrubs, and herbaceous plants in the upper riparian area are shown in Photograph B16 (Appendix B).

Lower Component. In 2023, dominant species were similar to 2011 conditions with Oregon ash, cascara, Pacific ninebark, black twinberry and several willow species growing well. Much of the herbaceous layer was characterized by wildrye, fescue (*Festuca pratensis*), downy brome (*Bromus tectorum*), and a variety of forbs that came up from the seed bank. A small portion of this lower area was unintentionally burned in 2018. The fire top-killed many of the shrubs. The hawthorn, twinberry, elderberry, ninebark, snowberry, and cascara have re-sprouted, and no evidence of the fire is present. Many of the woody plants survived the fire. In 2019, the newly exposed soil of the burned area had a higher density of turnip (*Brassica rapa*), a non-native herbaceous species. As expected, many of the perennial grasses have re-sprouted and are now competing with the annual, non-native grasses. The turnip has completely disappeared along with most of the annual plants.

Small, localized areas of TRM are visible along the length of the lower edge of the TRM, but adventive vegetation is continuing to cover the areas since repairs were made in December 2015. A significant quantity of driftwood was observed along the entire length of the lower component of the riparian area. Large driftwood pieces continue to accumulate along the shoreline to the middle of the bank near the break between the upper and lower components. Canada thistle has been the most common noxious weed with some knapweed and common St. Johns-wort (*Hypericum perforatum*) also present. The invasive butterfly bush was established in this area but was successfully removed in 2020 using cutting and stem spraying with herbicide.

In 2017, herbicide application was successful at treating the black mustard (*Brassica nigra*), Scotch broom (*Cytisus scoparius*), knapweed, and Canada thistle; however, some thistle and Scotch broom was observed in the lower portion of the riparian area. No herbicide treatment was performed in 2018. In 2019, several noxious weeds in the area were sprayed including Canada and bull thistle (*Cirsium vulgare*), butterfly bush, and false indigo bush (*Amorpha fruticosa*). Shiny-leaf geranium (*Geranium lucidum*) was also noted within the articulated block of the riparian zone. After the 2019 herbicide application, the butterfly bush and false indigo were eliminated, and the thistle population was reduced. One young false indigo was observed in the ACB in 2022. The thistles and Scotch broom were also observed indicating that populations are encroaching onto the site.

Noxious weeds continued to be monitored. In 2023, more individuals of false indigo were found along with some small individuals of purple loosestrife (*Lythrum salicaria*). The purple loosestrife is growing with another invasive species, European pennyroyal (*Mentha pulegium*) (this species is not on the noxious weed list). These plants and the noxious yellow flag iris (*Iris pseudacorus*) are common just downstream along the river from the Site and will continually provide a seed source for future invasion.

Upper Component. In 2023, trees and shrubs in the upper component were well established and were healthy. The area is fully vegetated, completely recovered from the fires and other earlier stressors. Invasive species have been reduced through periodic herbicide treatments.

From 2016 through 2020, the riparian area was watered once or twice in the summer if drought conditions or stressed vegetation was observed. Watering events have not been needed since 2020. Ponderosa pine, madrone, Nootka rose, snowberry, Oregon-grape, hawthorn, and blue elderberry appeared well established and performing best within this area. Approximately 80 to 90 percent of the grand fir perished during the 2015 summer drought. This species was not the best suited for this community. In July 2018, a fire burned approximately 1 acre at the north end of the riparian area and reduced the woody biomass but did not kill many of the woody species.

In 2023, shrubby species like oceanspray, cascara, twinberry, and Pacific ninebark, all stump sprouted well and are surviving. Taller species like bigleaf maple and madrone had lower branches burned by the fire and are doing well; however, coniferous species such as cedar and fir were a total loss. The area vacated by these species is quickly occupied by other native species, especially snowberry, elderberry, and roses. The woody species now established fits the Site conditions well and are expected to survive the natural disturbances (i.e., drought, occasional fire) and are not expected to need additional human maintenance (i.e., watering or seeding). The herbaceous species planted are doing well locally. In some of the areas, these species are being replaced by the native shrubs. Areas still dominated by herbaceous species are found in the more southern portion of this zone. In this area, checkermallow, large-leaved and sicklekeel lupine, horsetail (*Equisetum arvense*), self-heal, and many species of grasses are present. Overall, this zone is doing very well and is completely covered by primarily native species. Many of these native species that came up from the seed bank like horsetail, gumweed, several species of cudweed (*Pseudognaphalium* sp.), and poison-oak (*Toxicodendron diversilobum*) provide good wildlife value.

Several B-list noxious weeds were also found within this zone that include Canada thistle, two knapweeds (*Centaurea diffusa* and *C. stoebe*), Scotch broom, common St. John's-wort, tansy ragwort (*Senecio jacobaea*), and a small amount of Himalayan blackberry (*Rubus armeniacus*). Also found was tansy (*Tanacetum vulgare*), an invasive species not found on the Oregon Noxious Plant List (Oregon Department of Agriculture, 2022). Tansy was included in the Site list because it is invasive in character, has started to form large patches at the Site, and is included on other states' lists as a noxious plant. In 2020, a rudimentary survey of the 2019 herbicide application effectiveness showed mixed results. Scotch broom, Himalayan blackberry, tansy ragwort, and the knapweeds were significantly decreased or eliminated. Other aggressive perennial species like the St. John's-wort, Canada thistle, and tansy were less effected by the treatment. Some of these species were found to have started to increase again in 2021 and continue to increase in 2023. Currently several populations of Himalayan blackberry, tansy ragwort, tansy, Scotch broom, Canada thistle and knapweed occur in this area. Species like the blackberry, Canada thistle, tansy and Scotch broom often need several treatments to eradicate them. Species like the tansy ragwort and the Canada thistle create large seed banks that can germinate and reestablish the species. Regardless, single year treatments are only to reduce and not eliminate the species.

5.3.2 Upland Area

The upland area is divided into three components: the earthen cap; the stormwater retention pond/drainage swale; and the impermeable cap (Figure 5-1). A variety of native trees, shrubs, and herbaceous species are present on the earthen cap as shown in Photographs B1 through B6, B9, and B10 (Appendix B). The stormwater retention pond/drainage swale and the vegetation coverage on the impermeable cap are shown on Photographs B7 and B8, and Photographs B11 and B12, respectively (Appendix B).

Earthen Cap Component. In 2023, the area was observed to be fully vegetated with sporadic patches of trees and shrubs with nearly all the originally planted varieties present. Tree and shrub plantings on the earthen cap are healthy and growing well (Appendix B, Photographs B9 and B10). Ponderosa pine, Oregon grape, blue elderberry, lupine, rose and serviceberry continue to perform the best. Nootka rose dominates the northwest portion of the earthen cap. Herbaceous species provide full coverage of the ground. During the September 2023 site visit, gumweed, three species of lupine, mullein (*Verbascum thapsus*), Canada goldenrod, and many species of grasses dominated the earthen cap. No indications of significant stress were observed.

Scattered areas of noxious weeds were located during 2023, including spotted knapweed, tree of heaven (*Ailanthus altissima*), Canada thistle, bull thistle, tansy ragwort, skeletonweed, Scotch broom, medusahead rye, and Himalayan blackberry. The latter three species are beginning to increase at the Site. Most of these

were treated through herbicide application in 2019. In 2020, the tree of heaven, bull thistle, Himalayan blackberry, and knapweed were greatly reduced in coverage. The Canada thistle, knapweed and blackberry are tough to control, and are starting to rebound. By 2023, Canada thistle, Scotch broom, knapweed and blackberry have spread to levels before herbicide application in 2019.

Along the fence and near the parking area are populations of blackberry, the noxious tree of heaven, and the invasive princess tree (*Paulownia tomentosa*). These species have been treated in the past along the fence and have regrown.

Stormwater Retention Pond/Drainage Swale Component. In 2023, dense shrub and tree thickets were found to the north and east of the pond. The shrub plantings established well, although many of the grasses and herbs in the pond area did not survive because the infiltration of surface runoff limits moisture and the understory is dominated by sand and bare ground. The pond depression is too dry for successful wetland vegetation that were previously planted. The depression is primarily vegetated by annual grasses: silver hairgrass (*Aira caryophylla*) and annual fescue (*Vulpia myuros*). A good shrubby edge around the pond and swale was present with Sitka and piper's willow up to 15-feet tall (Appendix B, Photographs B7 and B8), red-osier dogwood, black cottonwood, and snowberry. Invasive butterfly bush was sprayed in 2019, resulting in its successful elimination from this area in 2020. Currently small populations of Scotch broom and blackberry are growing adjacent to the pond.

Impermeable Cap Component. In 2023, barley, hair grass, and lupine have performed the best of the species seeded in 2011. A recent survey of this area found these dominant species along with gumweed, velvet grass (*Holcus lantana*), sweet vernal grass (*Anthroxanthum odoratum*), and downy brome. Small populations of noxious weeds were present, including spotted knapweed, Canada and bull thistle, and skeletonweed. Larger populations of the B-listed noxious weed, medusahead rye, were in the more disturbed areas of the cap and along paths. This annual would be hard to eliminate and would be best controlled by an increased dominance of perennials. Spot treatment of knapweed and the two thistles in 2019 were able to reduce their presence without creating bare ground areas. In 2023, medusahead is predominantly the most common noxious weed on the cap. Populations of blackberry, skeletonweed, and knapweed are spreading slowly. The dry, hard soil of the cap slows the spread of these species.

5.4 Vegetation Maintenance Activities

The general planting goals continue to be met. A preventive control approach continues to be implemented as part of an ongoing effort to inhibit the spread of noxious weed species. Spot spraying was last completed over the entire Site in June 2019. This followed weed suppression efforts in spring and fall of 2016 and spot treatment of the Site in 2017. No herbicide treatment was applied in 2018, 2021, 2022, or 2023. Weed treatment will be needed in 2024 to prevent increases in noxious weed populations.

Due to exceptionally dry summer conditions, irrigation water was applied in the riparian area to help alleviate stressed vegetation in 2015, 2016, and 2017. In 2018, as a precautionary measure and to encourage plant growth in areas damaged by the July 2018 fire, one watering event was completed in August 2018. No watering events have been needed since 2018 due to the well-established plants and sporadic summer rainfall. As vegetation becomes well established in this area, watering events should be discontinued for the riparian area.

5.5 Vegetation Performance Summary

Overall, the tree, shrub, and herbaceous plantings are well established and are spreading throughout the Site. Most of the woody vegetation that was planted or that came in through natural corridors is native. Much

of the stormwater retention pond remains vegetated by non-native annual grasses or is unvegetated. Native willow and black cottonwood are growing in and around the depression and are spreading. Herbaceous and woody species are providing excellent coverage for the rest of the Site. The vegetation community will continue to be inspected in 2024, with the next inspection in May or June.

The vegetation has rebounded from the fires in 2018, and these areas have been observed to become fully vegetated in 2020 without the need for additional intervention. In September 2023, like in the last two years, there were no significant changes in overall vegetation. The summer of 2021 had record high temperatures for the region that occurred after the yearly monitoring. Signs of stress from this extreme heat may be evidenced as dead branches or dead branch tips (new seasonal growth) in developing trees, and dead seedling trees. None of the signs of stress from the extreme 2021 heat were observed in 2022 and no replanting was necessary. The maturing vegetation community is tolerant of such a disturbance and would persist through these extremely high temperatures.

Noxious weed coverage was reduced by the 2017 spring herbicide application, and again in 2019. During 2019, more B-listed noxious species were identified and treated than in 2017. One new noxious weed species were observed in 2023 as purple loosestrife was found growing along the river. Also, noxious plant species will be monitored to determine if another round of herbicide treatments is necessary. It has been 5 years (2019) since the last herbicide treatment. Some of the weed populations like blackberry, Scotch broom, Canada thistle and tree of heaven are approaching coverages noted in 2019. In the next year, it is recommended strongly to spray the noxious weeds to prevent populations from becoming out of control.

6 Summary of Overall Remedy Performance

Overall, the 2023 soil and sediment cap observations and inspections, and groundwater and NAPL level monitoring revealed no significant change in remedy performance or areas of concern. The remedy continues to perform as designed and is protective of human health and the environment.

7 Summary of Planned Activities for 2024

Table 7-1 presents the soil cap O&M activities planned through 2028. Soil cap O&M activities in 2024 will consist primarily of quarterly inspections and routine maintenance. Semiannual inspections will continue in 2024 to assess and monitor vegetation planting areas, species identification (native, non-native, and invasive), growth, density, and general coverage throughout the Site. An herbicide application event will be performed in spring 2024 to control noxious weed populations. Watering events were discontinued in 2018. However, if woody species experience drought significant enough to affect their health, the resumption of watering events will be evaluated. Non-routine activities to be performed include the replacement of warning signs, specifically the faded perimeter warning sign along the fence on North Van Houten Place, as well as fence repairs as needed, such as the repair of the cut barb wire strand in the northwest corner that occurred in January 2024.

Table 7-2 presents the sediment cap O&M activities planned through 2028. In 2024, routine activities will include quarterly inspections and routine maintenance, and cleanup of riparian area trash and dumpsites (if present). Non-routine activities to be performed will include the replacement of Buoy 2, which has been missing since the September 2023 site inspection. Additionally, a sediment cap survey memorandum will be prepared and submitted to DEQ in early 2024.

Table 7-3 presents groundwater O&M activities planned through September 2028. In 2024, routine activities will include quarterly inspections and semi-annual gauging of Site monitoring wells. In January 2024, new transducers were installed in 11 Site wells along with a new barometer for the Site. Routine maintenance of the data logger transducers and barometric pressure transducer are also included as elements of groundwater O&M.

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Table 2-1
Soil Cap O&M Activities in 2023

O&M Activity	Frequency in 2023
Visual Inspections:	
Cap surface	March, June, September, December
Subsidence near EW-1s	March, June, September, December
Stormwater conveyance system	March, June, September, December
Security fencing	March, June, September, December
Warning signs	March, June, September, December
Abundance and survival of vegetation	March, June, September, December
Routine Maintenance and Monitoring:	
Manual removal of weeds and invasive plants	June
Targeted application of herbicides	None
Non-Routine Maintenance:	
Replace cut locks	February, June (x2), October
Utilities Service:	
Water (Backflow Testing)	September

Table 3-1
Sediment Cap O&M Activities in 2023

O&M Activity	Frequency in 2023
Visual Inspections (from shore):	
Warning buoys	March, June, September, December
Cap surface	March, June, September, December
Habitat quality	March, June, September, December
Routine Monitoring:	
Surface Water, Inter-armor Porewater, and	None
Sub-armor Porewater sampling	None
Crayfish tissue sampling	None
Organoclay core sampling	None
Non-Routine Monitoring:	
Willamette Cove Sediment Cap Survey	October
Non-Routine Maintenance:	
Buoy replacement	None

Table 4-1
Groundwater and NAPL Elevations: June 2023

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation (ft NAVD88)	Groundwater Elevation LNAPL corrected (ft NAVD88)
EW-1s	6/14/2023	16:43	39.54	-	26.24	38.92	-	9.20	13.30	13.30
EW-2s	6/14/2023	11:35	42.40	-	31.70	-	-	-	10.70	10.70
EW-8s	6/14/2023	15:41	40.55	-	27.35	52.74	-	2.01	13.20	13.20
EW-10s	6/14/2023	12:12	29.59	-	20.25	41.28	-	1.61	9.34	9.34
EW-15s	6/14/2023	10:55	43.00	30.84	32.73	-	1.89	-	10.27	12.12
EW-18s	6/14/2023	16:53	40.79	-	27.59	42.82	-	1.77	13.20	13.20
EW-19s	6/14/2023	12:30	25.97	-	16.23	-	-	-	9.74	9.74
EW-23s	6/14/2023	12:38	37.64	26.00	30.04	-	4.04	-	7.60	11.56
MW-1r	6/14/2023	17:06	37.81	-	24.68	-	-	-	13.13	13.13
MW-7 WC	6/14/2023	11:08	36.69	-	23.35	-	-	-	13.34	13.34
MW-10r	6/14/2023	16:35	41.85	-	30.61	-	-	-	11.24	11.24
MW-15s	6/14/2023	13:22	43.41	-	32.31	-	-	-	11.10	11.10
MW-17s	6/14/2023	12:58	41.34	-	28.45	-	-	-	12.89	12.89
MW-20i	6/14/2023	11:55	41.72	-	33.05	68.29	-	6.43	8.67	8.67
MW-22i	6/14/2023	16:25	42.34	-	32.98	51.73	-	7.31	9.36	9.36
MW-23d	6/14/2023	10:21	40.81	-	31.49	-	-	-	9.32	9.32
MW-32i	6/14/2023	11:59	39.45	-	26.49	-	-	-	12.96	12.96
MW-34i	6/14/2023	12:41	32.82	-	24.49	-	-	-	8.33	8.33
MW-35r	6/14/2023	11:19	32.27	-	21.02	-	-	-	11.25	11.25
MW-36d	6/14/2023	13:45	30.59	-	22.10	-	-	-	8.49	8.49

Table 4-1
Groundwater and NAPL Elevations: June 2023

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation (ft NAVD88)	Groundwater Elevation LNAPL corrected (ft NAVD88)
MW-36i	6/14/2023	13:35	30.30	-	21.85	-	-	-	8.45	8.45
MW-36s	6/14/2023	13:40	30.62	-	18.77	-	-	-	11.85	11.85
MW-37d	6/14/2023	13:55	26.19	-	17.69	-	-	-	8.50	8.50
MW-37i	6/14/2023	13:52	26.07	-	17.57	-	-	-	8.50	8.50
MW-37s	6/14/2023	13:50	24.98	-	15.54	-	-	-	9.44	9.44
MW-38d	6/14/2023	14:00	31.96	-	23.28	-	-	-	8.68	8.68
MW-38i	6/14/2023	14:05	32.15	-	23.54	-	-	-	8.61	8.61
MW-38s	6/14/2023	14:10	32.41	-	20.09	-	-	-	12.32	12.32
MW-39d	6/14/2023	14:15	29.93	-	21.20	-	-	-	8.73	8.73
MW-39i	6/14/2023	14:20	30.18	-	21.59	-	-	-	8.59	8.59
MW-39s	6/14/2023	14:22	29.88	-	20.39	-	-	-	9.49	9.49
MW-40d	6/14/2023	14:37	28.81	-	19.94	-	-	-	8.87	8.87
MW-40i	6/14/2023	14:35	28.92	-	20.19	-	-	-	8.73	8.73
MW-40s	6/14/2023	14:33	28.53	-	16.41	-	-	-	12.12	12.12
MW-41d	6/14/2023	14:30	27.56	-	18.76	-	-	-	8.80	8.80
MW-41i	6/14/2023	14:28	27.22	-	18.55	-	-	-	8.67	8.67
MW-41s	6/14/2023	14:25	27.96	-	18.59	-	-	-	9.37	9.37
MW-42d	6/14/2023	14:52	32.26	-	23.41	-	-	-	8.85	8.85
MW-42i	6/14/2023	14:54	32.67	-	23.92	-	-	-	8.75	8.75
MW-42s	6/14/2023	14:56	32.42	-	19.29	-	-	-	13.13	13.13

Table 4-1
Groundwater and NAPL Elevations: June 2023

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation (ft NAVD88)	Groundwater Elevation LNAPL corrected (ft NAVD88)
MW-43d	6/14/2023	14:45	28.57	-	19.51	-	-	-	9.06	9.06
MW-43i	6/14/2023	14:48	30.49	-	21.59	-	-	-	8.90	8.90
MW-43s	6/14/2023	14:50	31.24	-	21.98	-	-	-	9.26	9.26
MW-44d	6/14/2023	15:14	29.55	-	20.22	-	-	-	9.33	9.33
MW-44i	6/14/2023	15:09	29.47	-	20.59	-	-	-	8.88	8.88
MW-44s	6/14/2023	15:12	29.90	-	16.54	-	-	-	13.36	13.36
MW-45d	6/14/2023	15:03	28.12	-	18.84	-	-	-	9.28	9.28
MW-45i	6/14/2023	15:06	28.05	-	19.12	-	-	-	8.93	8.93
MW-45s	6/14/2023	15:01	28.20	-	18.84	-	-	-	9.36	9.36
MW-46s	6/14/2023	15:20	35.51	-	22.39	-	-	-	13.12	13.12
MW-47s	6/14/2023	15:22	35.56	-	25.45	-	-	-	10.11	10.11
MW-48s	6/14/2023	15:06	38.58	-	25.14	-	-	-	13.44	13.44
MW-49s	6/14/2023	15:02	37.61	-	18.23	-	-	-	19.38	19.38
MW-50s	6/14/2023	14:23	39.12	-	25.70	-	-	-	13.42	13.42
MW-51s	6/14/2023	14:36	39.54	-	20.35	-	-	-	19.19	19.19
MW-52s	6/14/2023	9:54	40.70	-	27.63	-	-	-	13.07	13.07
MW-53s	6/14/2023	9:41	40.42	-	22.14	-	-	-	18.28	18.28
MW-54s	6/14/2023	13:50	41.78	-	28.69	-	-	-	13.09	13.09
MW-55s	6/14/2023	14:01	41.09	-	25.48	-	-	-	15.61	15.61
MW-56s	6/14/2023	16:17	43.45	-	31.00	-	-	-	12.45	12.45

Table 4-1
Groundwater and NAPL Elevations: June 2023

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation (ft NAVD88)	Groundwater Elevation LNAPL corrected (ft NAVD88)
MW-57s	6/14/2023	13:32	42.01	-	30.57	-	-	-	11.44	11.44
MW-58d	NA ¹	NA	41.43	-	NA	-	-	-	-	-
MW-58i	NA ¹	NA	40.99	-	NA	-	-	-	-	-
MW-58s	NA ¹	NA	41.51	-	NA	-	-	-	-	-
MW-59s	6/14/2023	15:23	35.85	-	18.78	-	-	-	17.07	17.07
MW-60d	6/14/2023	13:25	40.18	-	31.81	-	-	-	8.37	8.37
MW-61s	6/14/2023	11:41	43.65	-	27.33	-	-	-	16.32	16.32
MW-62i	6/14/2023	12:49	42.73	-	34.34	-	-	-	8.39	8.39
MW-As	6/14/2023	12:06	39.32	-	21.13	-	-	-	18.19	18.19
MW-Ds	6/14/2023	11:25	43.26	-	32.12	35.80	-	3.16	11.14	11.14
MW-Gs	6/14/2023	12:03	40.27	-	29.96	42.78	-	1.99	10.31	10.31
MW-Os	6/14/2023	14:12	40.96	-	21.74	-	-	-	19.22	19.22
PW-1d	6/14/2023	10:44	44.05	-	31.19	-	-	-	12.86	12.86
PW-2d	6/14/2023	9:00	41.83	-	28.91	-	-	-	12.92	12.92

Notes:¹Not measured due to transient camp blocking access to wellLNAPL specific gravity estimated as 0.981 g/cm³.

Corrected groundwater elevation = [LNAPL thickness * LNAPL specific gravity] + groundwater elevation

Abbreviations and Acronyms:

DNAPL = dense non-aqueous phase liquid

ft = foot or feet

g/cm³ = gram per cubic centimeter

LNAPL = light non-aqueous phase liquid

MP = measuring point

NAVD88 = North American Vertical Datum of 1988

NA = not available, not measured, or erroneous data

Table 4-2
Groundwater and NAPL Elevations: September 2023

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation (ft NAVD88)	Groundwater Elevation LNAPL corrected (ft NAVD88)
EW-1s	9/27/2023	14:07	39.54	-	27.36	39.14	-	8.98	12.18	12.18
EW-2s	9/27/2023	11:09	42.40	-	34.53	-	-	-	7.87	7.87
EW-8s	9/27/2023	14:52	40.55	-	28.75	52.93	-	1.82	11.80	11.80
EW-10s	9/27/2023	10:27	29.59	-	22.12	41.26	-	1.63	7.47	7.47
EW-15s	9/27/2023	13:50	43.00	33.01	42.18	-	9.17	-	0.82	9.82
EW-18s	9/27/2023	14:36	40.79	-	28.97	42.77	-	1.82	11.82	11.82
EW-19s	9/27/2023	10:21	25.97	-	18.34	-	-	-	7.63	7.63
EW-23s	9/27/2023	15:29	37.64	28.09	33.14	-	5.05	-	4.50	9.45
MW-1r	9/27/2023	13:51	37.81	-	27.51	-	-	-	10.30	10.30
MW-7 WC	9/27/2023	16:05	36.69	-	26.66	-	-	-	10.03	10.03
MW-10r	9/27/2023	11:50	41.85	30.13	30.21	-	0.08	-	11.64	11.72
MW-15s	NA	NA	43.41	-	-	-	-	-	-	-
MW-17s	9/27/2023	11:14	41.34	-	30.18	-	-	-	11.16	11.16
MW-20i	9/27/2023	10:40	41.72	-	34.58	68.80	-	5.92	7.14	7.14
MW-22i	9/27/2023	11:56	42.34	-	34.90	51.97	-	7.07	7.44	7.44
MW-23d	9/27/2023	14:05	40.81	-	33.77	-	-	-	7.04	7.04
MW-32i	9/27/2023	15:10	39.45	-	29.26	-	-	-	10.19	10.19
MW-34i	9/27/2023	10:47	32.82	-	25.93	-	-	-	6.89	6.89
MW-35r	9/27/2023	16:45	32.27	-	23.79	-	-	-	8.48	8.48
MW-36d	9/27/2023	15:53	30.59	-	21.93	-	-	-	8.66	8.66

Table 4-2
Groundwater and NAPL Elevations: September 2023

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation (ft NAVD88)	Groundwater Elevation LNAPL corrected (ft NAVD88)
MW-36i	9/27/2023	15:51	30.30	-	21.83	-	-	-	8.47	8.47
MW-36s	9/27/2023	15:52	30.62	-	21.10	-	-	-	9.52	9.52
MW-37d	9/27/2023	15:45	26.19	-	17.64	-	-	-	8.55	8.55
MW-37i	9/27/2023	15:44	26.07	-	17.57	-	-	-	8.50	8.50
MW-37s	9/27/2023	15:42	24.98	-	17.42	-	-	-	7.56	7.56
MW-38d	9/27/2023	15:57	31.96	-	27.23	-	-	-	4.73	4.73
MW-38i	9/27/2023	16:00	32.15	-	24.51	-	-	-	7.64	7.64
MW-38s	9/27/2023	16:01	32.41	-	22.24	-	-	-	10.17	10.17
MW-39d	9/27/2023	16:04	29.93	-	21.09	-	-	-	8.84	8.84
MW-39i	9/27/2023	16:07	30.18	-	21.54	-	-	-	8.64	8.64
MW-39s	9/27/2023	16:09	29.88	-	22.16	-	-	-	7.72	7.72
MW-40d	9/27/2023	16:26	28.81	-	19.80	-	-	-	9.01	9.01
MW-40i	9/27/2023	16:28	28.92	-	20.82	-	-	-	8.10	8.10
MW-40s	9/27/2023	16:31	28.53	-	18.26	-	-	-	10.27	10.27
MW-41d	9/27/2023	16:24	27.56	-	18.60	-	-	-	8.96	8.96
MW-41i	9/27/2023	16:22	27.22	-	18.55	-	-	-	8.67	8.67
MW-41s	9/27/2023	16:20	27.96	-	20.31	-	-	-	7.65	7.65
MW-42d	9/27/2023	16:40	32.26	-	23.30	-	-	-	8.96	8.96
MW-42i	9/27/2023	16:42	32.67	-	23.92	-	-	-	8.75	8.75
MW-42s	9/27/2023	16:43	32.42	-	20.86	-	-	-	11.56	11.56

Table 4-2
Groundwater and NAPL Elevations: September 2023

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation (ft NAVD88)	Groundwater Elevation LNAPL corrected (ft NAVD88)
MW-43d	9/27/2023	16:35	28.57	-	19.41	-	-	-	9.16	9.16
MW-43i	9/27/2023	16:37	30.49	-	21.52	-	-	-	8.97	8.97
MW-43s	9/27/2023	16:39	31.24	-	23.40	-	-	-	7.84	7.84
MW-44d	9/27/2023	15:13	29.55	-	21.59	-	-	-	7.96	7.96
MW-44i	9/27/2023	15:12	29.47	-	22.45	-	-	-	7.02	7.02
MW-44s	9/27/2023	15:10	29.90	-	17.91	-	-	-	11.99	11.99
MW-45d	9/27/2023	14:57	28.12	-	20.32	-	-	-	7.80	7.80
MW-45i	9/27/2023	15:06	28.05	-	20.77	-	-	-	7.28	7.28
MW-45s	9/27/2023	14:55	28.20	-	20.71	-	-	-	7.49	7.49
MW-46s	9/27/2023	14:46	35.51	-	23.73	-	-	-	11.78	11.78
MW-47s	9/27/2023	14:52	35.56	-	27.93	-	-	-	7.63	7.63
MW-48s	9/27/2023	14:23	38.58	-	26.03	-	-	-	12.55	12.55
MW-49s	9/27/2023	14:20	37.61	-	21.13	-	-	-	16.48	16.48
MW-50s	9/27/2023	14:20	39.12	-	26.79	-	-	-	12.33	12.33
MW-51s	9/27/2023	14:25	39.54	-	23.32	-	-	-	16.22	16.22
MW-52s	9/27/2023	12:05	40.70	-	29.05	-	-	-	11.65	11.65
MW-53s	9/27/2023	12:00	40.42	-	25.17	-	-	-	15.25	15.25
MW-54s	9/27/2023	11:50	41.78	-	30.20	-	-	-	11.58	11.58
MW-55s	9/27/2023	11:55	41.09	-	29.04	-	-	-	12.05	12.05
MW-56s	9/27/2023	11:37	43.45	-	33.05	-	-	-	10.40	10.40

Table 4-2
Groundwater and NAPL Elevations: September 2023

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft below MP)	Depth to water (ft below MP)	Depth to DNAPL (ft below MP)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation (ft NAVD88)	Groundwater Elevation LNAPL corrected (ft NAVD88)
MW-57s	9/27/2023	11:40	42.01	-	33.57	-	-	-	8.44	8.44
MW-58d	9/27/2023	16:20	41.43	-	32.50	-	-	-	8.93	8.93
MW-58i	9/27/2023	16:50	40.99	-	32.11	-	-	-	8.88	8.88
MW-58s	9/27/2023	16:38	41.51	-	33.68	-	-	-	7.83	7.83
MW-59s	9/27/2023	14:31	35.85	-	22.55	-	-	-	13.30	13.30
MW-60d	9/27/2023	10:52	40.18	-	33.34	-	-	-	6.84	6.84
MW-61s	9/27/2023	15:40	43.65	-	31.62	-	-	-	12.03	12.03
MW-62i	9/27/2023	11:07	42.73	-	37.90	-	-	-	4.83	4.83
MW-As	9/27/2023	15:15	39.32	-	23.05	-	-	-	16.27	16.27
MW-Ds	9/27/2023	11:27	43.26	-	31.19	35.44	-	3.52	12.07	12.07
MW-Gs	9/27/2023	10:34	40.27	-	32.45	42.80	-	1.97	7.82	7.82
MW-Os	9/27/2023	14:35	40.96	-	24.68	-	-	-	16.28	16.28
PW-1d	9/27/2023	14:55	44.05	-	33.95	-	-	-	10.10	10.10
PW-2d	9/27/2023	14:40	41.83	-	31.66	-	-	-	10.17	10.17

Notes:LNAPL specific gravity estimated as 0.981 g/cm³.

Corrected groundwater elevation = [LNAPL thickness * LNAPL specific gravity] + groundwater elevation

Abbreviations and Acronyms:

DNAPL = dense non-aqueous phase liquid

ft = foot or feet

g/cm³ = gram per cubic centimeter

LNAPL = light non-aqueous phase liquid

MP = measuring point

NAVD88 = North American Vertical Datum of 1988

NA = not available, not measured, or erroneous data

Table 4-3
Net Annual Vertical Gradients in Monitoring Well Clusters, 2023

Monitoring Well Cluster ID	2023 Net Annual Vertical Gradient ¹ From Shallow to Deep Zone
MW-36 (Interior)	0.0227
MW-37 (Exterior) ²	0.0008
MW-44 (Interior)	0.0461
MW-45 (Exterior)	-0.011

Notes:

¹Net vertical gradients between shallow and deep zones calculated using transducer data available for each well cluster between September 29, 2022 and September 28, 2023.

²No transducer data available for MW-37s between 4/7/23 to 6/15/23 and 7/22/23 to 9/22/23

Positive values indicate a net downward hydraulic gradient and negative values indicate a net upward hydraulic gradient

Vertical well gradients in each well cluster calculated for periods where transducers were present in both the shallow and deep well

$$i = \frac{(WL_s - WL_d)}{(M_s - M_d)}$$

i = gradient

WL_s = groundwater elevation of the shallow well

WL_d = groundwater elevation of the deep well

M_s = Elevation of the midpoint of the screened interval in the shallow well

M_d = Elevation of the midpoint of the screened interval in the deep well

Table 4-4
Groundwater O&M Activities in 2023

O&M Activity	Frequency in 2023
NAPL Monitoring: Manual gauging of site wells	June, September
Groundwater Monitoring: Groundwater Sampling (by EPA from select wells) Downloading continuous water level data from transducers Manual water level measurements from site wells	April April, June, September April ¹ , June, September
Routine Maintenance of Equipment: Transducers	April, June, September
Non-Routine Maintenance: Changed batteries in transducers (as needed)	April, June, September

Notes:¹Manual water level measurements collected in April to correct transducer data.

NAPL = non-aqueous phase liquid

Table 7-1
Soil Cap O&M Activities Planned through 2028

O&M Activity	Frequency
Visual Inspections:	
Cap surface	Quarterly
Subsidence near EW-1s	Quarterly
Stormwater conveyance system	Quarterly
Security fencing	Quarterly
Warning signs	Quarterly
Abundance and survival of vegetation	Quarterly
Routine Maintenance and Monitoring:	
Manual removal of invasive plants	Semiannually, if necessary
Targeted application of herbicides	Semiannually, if necessary
Non-Routine Maintenance:	
Repairs of fence	As needed
Replacement of warning signs	As needed
Repairs of gravel roads	As needed
Filling of potential animal burrow into the earthen cap	As needed
Removing sediments from manholes	As needed
Irrigation	As needed
Replanting unsuccessful trees and shrubs	As needed
Utilities Service:	
Water, electric, and solid waste	Continuous

Table 7-2
Sediment Cap O&M Activities Planned through 2028

O&M Activity	Frequency
Visual Inspections (from shore): Warning buoys Cap surface Habitat quality	Quarterly Quarterly Annually
Routine Monitoring: Water column and inter-armoring water sampling Organoclay core sampling	Every 5 years (next event in 2025) Not performed in 2020; additional sampling will be reconsidered during subsequent Five Year Reviews.
Non-Routine Monitoring: Sediment Cap Survey Technical Memorandum Multibeam bathymetric surveys, side-scan sonar survey Diver inspection	Fall 2024 After unforeseen natural event, if needed; Every 10 years, starting in 2020 Every 10 years, starting in 2020;
Non-Routine Maintenance: Replacement of Buoy 2 Additional armoring placement Additional organoclay capping Articulated concrete block grouting or armoring void space maintenance (habitat gravel)	Fall 2024 (low river stage conditions) After unforeseen natural event, if needed; As needed Every 5 years , or as needed based on site inspections

Table 7-3
Groundwater O&M Activities Planned through 2028

O&M Activity	Frequency
NAPL Monitoring: Manual gauging of site wells Manual extraction from exterior wells	Semiannually None
Groundwater Monitoring: Downloading continuous water level data from transducers Manual water level measurements from site wells	Quarterly Semiannually
Groundwater Sampling: Site-wide Infiltration pond (MW-59s)	Frequency to be determined Fall 2025 (every 5 years)
Routine Maintenance of Equipment: Interface probes, pumps, vehicle, data loggers / transducers, etc.	As needed



FIGURE 1-1

Vicinity Map

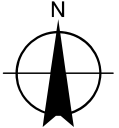
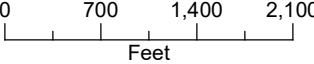
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

 Site Boundary



Date: January 11, 2024
Data Sources: City of Portland Imagery (Summer 2022)



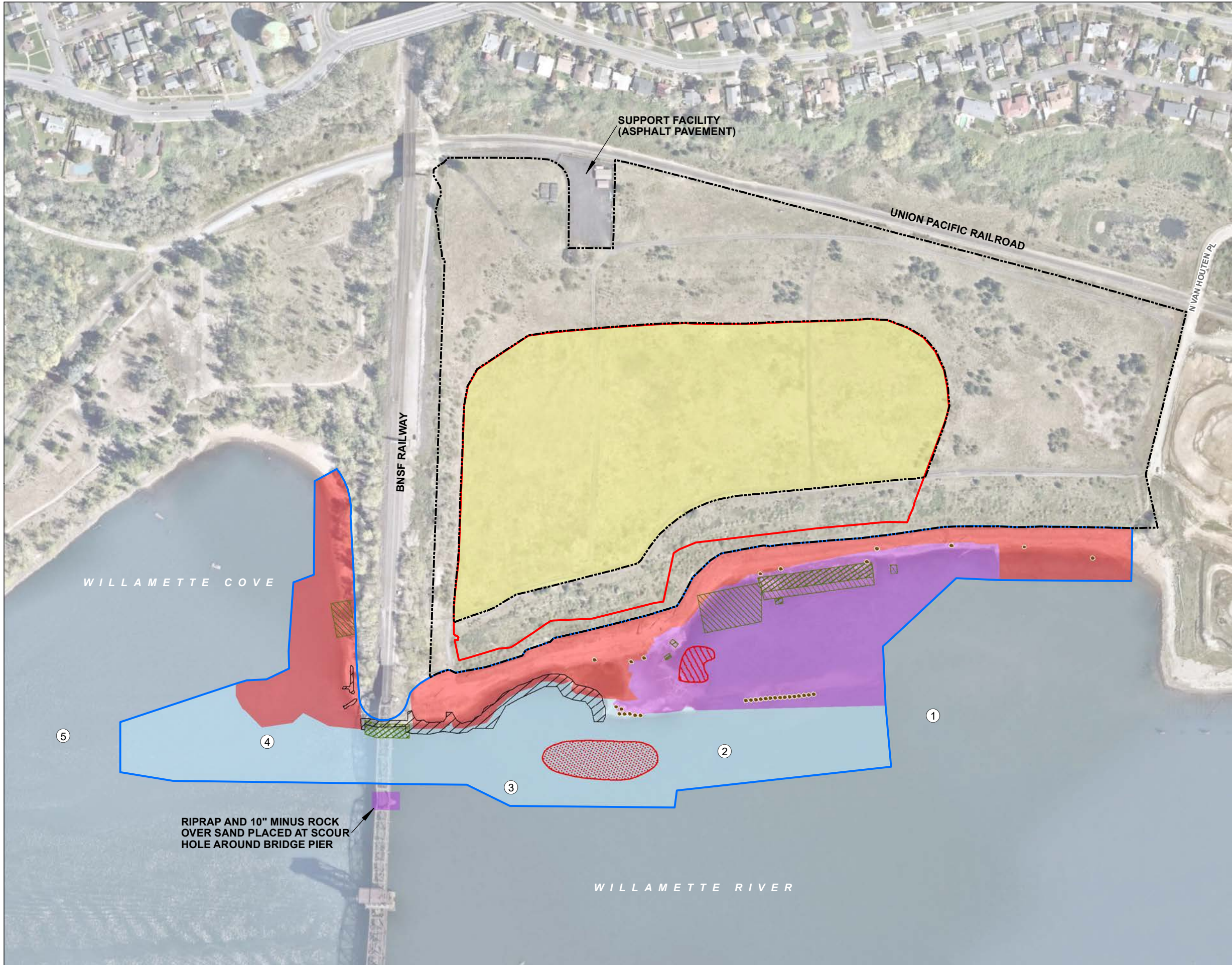


FIGURE 1-2
Current Site Layout and Features
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

- LEGEND**
- Buoy Locations
 - Subsurface Barrier Wall
 - Sediment Cap Boundary
 - Granular Organoclay
 - Organoclay Mat (Double Layer)
 - Organoclay Mat (Single Layer)
 - Hot Spot Treatment (thickened Sand Layer)
 - Riprap Armor
 - Boulder Clusters/Rock Mound
 - Articulated Concrete Block
 - 6-inch Minus Rock Armor
 - 10-inch Minus Rock Armor
 - Impermeable Cap
 - Earthen Soil Cap Boundary

NOTES
1. All features are approximate.
2. Aerial imagery source: Nearmap, 4/13/2021
Date: March 22, 2024
Data Sources: City of Portland Imagery (Summer 2022)

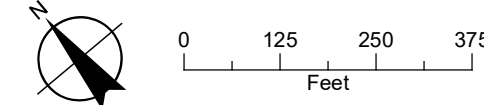




FIGURE 1-3
Historical Contaminant
Source Areas
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

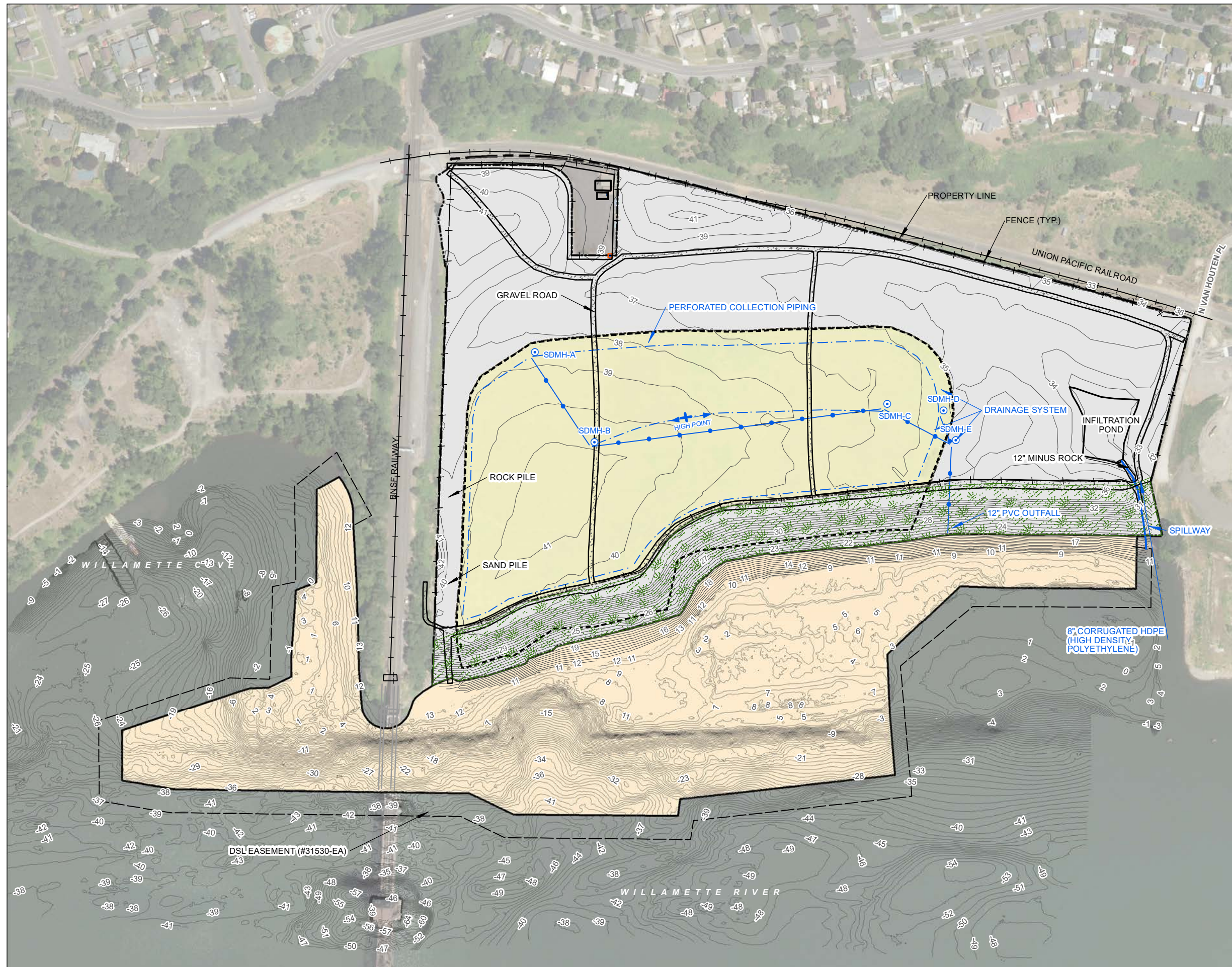
- LEGEND**
- Outfall
 - × × Fence
 - Shoreline
 - Former Feature
 - Historical Contaminant Source Area

Date: March 22, 2024
Data Sources: City of Portland Imagery (Summer 2022)

0 125 250 375
Feet



FIGURE 1-4
Site Capping Components
 McCormick & Baxter Superfund Site
 Portland, Oregon
 2023 Operations and Maintenance
 Report



LEGEND

- Stormwater Discharge Manhole
- Underground Storm Drain Line
- Elevation Contour, 1 ft. Interval (NAVD 88)
- Riparian Area (Vegetated)
- Sediment Cap Boundary
- Earthen Soil Cap Boundary
- Subsurface Barrier Wall
- Impermeable Cap

NOTES

1. Bathymetric survey conducted by David Evans and Associates, Inc., 2018.
2. Upland site surveyed by Westlake Consultants, 09/18/2019.
3. Horizontal Datum: North American Datum of 1983 - 91 adj. (NAD83/91), State Plane Coordinate System, Oregon North Zone. Units: International Feet.
4. Vertical Datum: North American Vertical Datum of 1988 (NAVD 88)
5. Contour Interval: One-Foot. Bathymetric contours were derived from a Digital Terrain Model based on a 3-foot grid of multibeam data.
6. All features are approximate.

Date: March 22, 2024

Data Sources: City of Portland Imagery (Summer 2022)



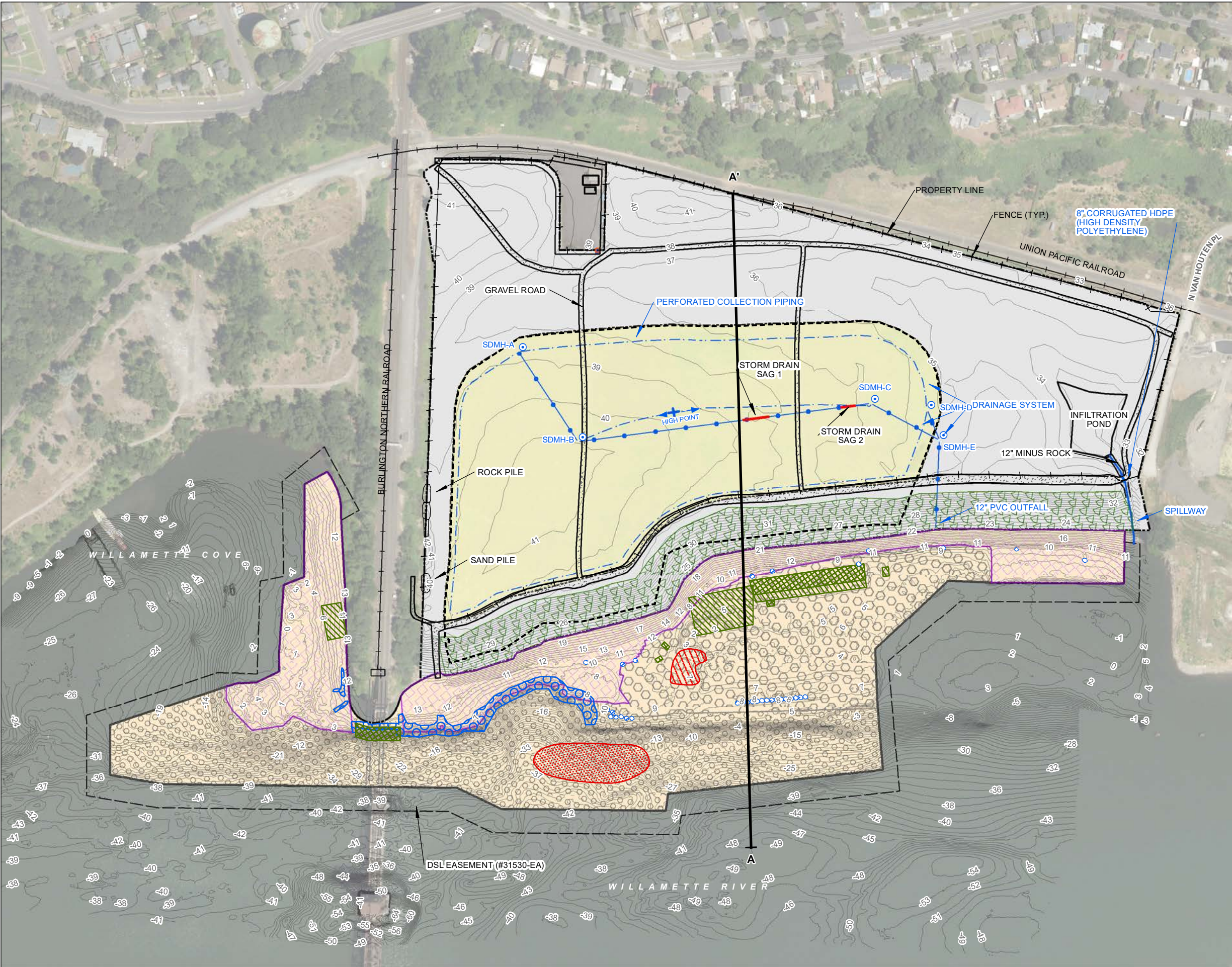


FIGURE 1-5
Current Site Layout with
Surface Elevations
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

- Elevation Contour, 1 ft. Interval (NAVD 88)
- Cross Section Line
- Boulder Clusters/Rock Mound
- Riprap Armor
- Granular Organoclay
- Organoclay Mat (Double Layer)
- Organoclay Mat (Single Layer)
- Hot Spot Treatment (thickened Sand Layer)
- Articulated Concrete Block
- 6-inch Minus Rock Armor
- 10-inch Minus Rock Armor
- Turf Reinforcement Mat over Earthen Cap
- Sediment Cap Boundary
- Earthen Soil Cap Boundary
- Subsurface Barrier Wall
- Impermeable Cap

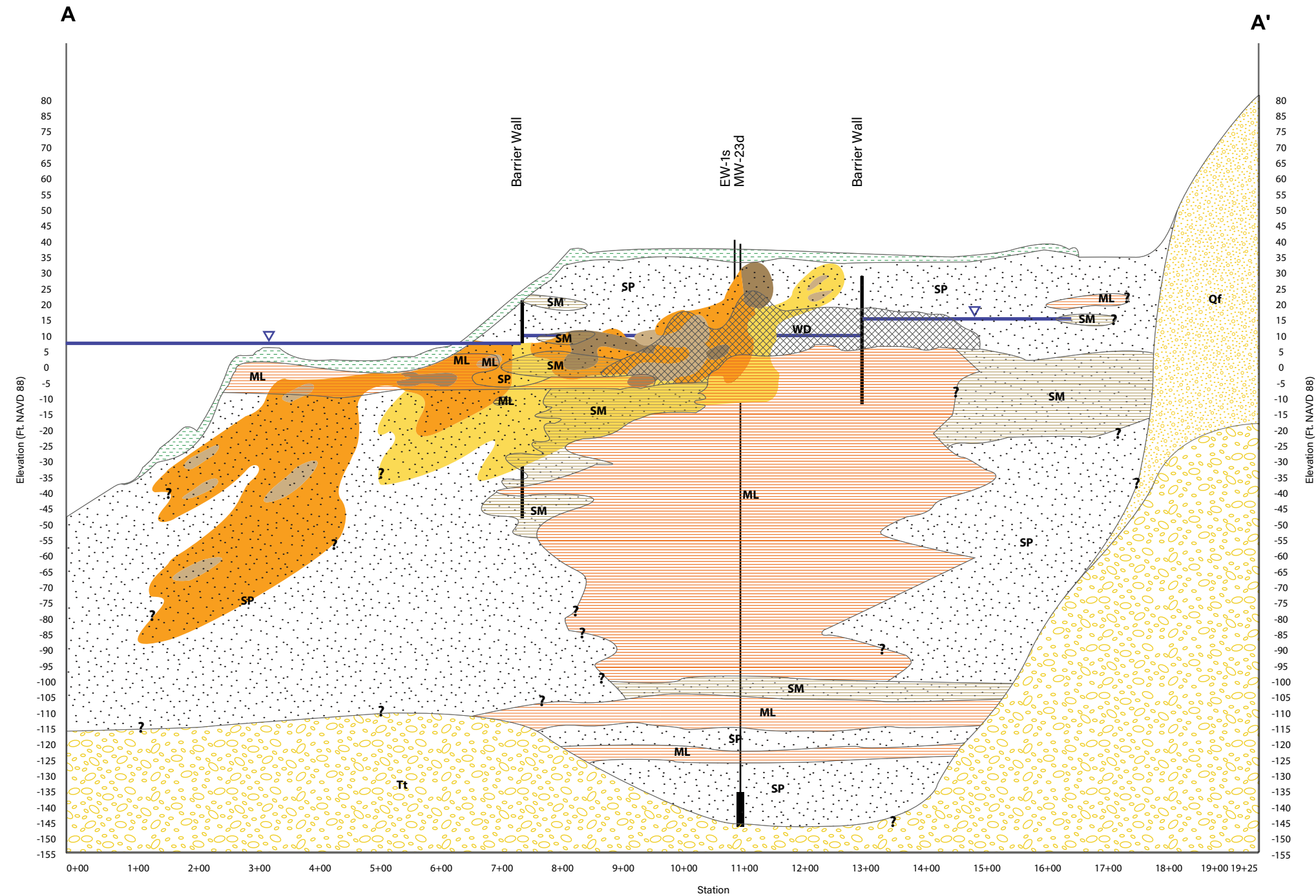
- NOTES**
- Bathymetric survey conducted by David Evans and Associates, Inc., 2018.
 - Upland site surveyed by Westlake Consultants, 09/18/2019.
 - Horizontal Datum: North American Datum of 1983 - 91 adj. (NAD83/91), State Plane Coordinate System, Oregon North Zone.
Units: International Feet.
 - Vertical Datum: North American Vertical Datum of 1988 (NAVD 88)
 - Contour Interval: One-Foot. Bathymetric contours were derived from a Digital Terrain Model based on a 3-foot grid of multibeam data.
 - All features are approximate.
- Date: March 22, 2024
Data Sources: City of Portland Imagery (Summer 2022)

0 125 250 375
Feet

GSI
Water Solutions, Inc.

HALEY
ALDRICH

FIGURE 1-6
Historical NAPL Distribution
Cross Section
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report



LEGEND

- SP- Sand, Fine to Medium, Poorly Graded
- SM- Silt Sand, or Thin Interbeds of Silt and Sand
- ML- Clayey Silt or Silty Clay
- WD- Wood Debris, Chips or Sawdust Occasionally
- Qf- Catastrophic Flood Deposits Consisting of Gravels and Sands
- Tt- Troutdale Formation
- Sediment/Soil Cap
- Creosote Odor
- Strong Creosote Odor
- Heavy Sheen
- Saturated
- Approximate Average Water Level 2008

NOTES

1. Refer to Figure 1-5 for Plan View of Cross Section Location.
2. Vertical Exaggeration = 5x

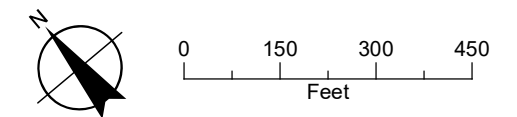
FIGURE 2-1
Site Observation Summary
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report



- LEGEND**
- Stormwater Discharge Manhole
 - Stormwater Discharge Piping Cleanout
 - Monitoring Well
 - Buoy Location (see inset table for buoy location information)
 - Boulder Clusters/Rock Mound
 - Riprap Armor
 - Granular Organoclay
 - Organoclay Mat (Double Layer)
 - Organoclay Mat (Single Layer)
 - Hot Spot Treatment (thickened Sand Layer)
 - Articulated Concrete Block
 - 6-inch Minus Rock Armor
 - 10-inch Minus Rock Armor
 - Turf Reinforcement Mat over Earthen Cap
 - Sediment Cap Boundary
 - Earthen Soil Cap Boundary
 - Gravel Habitat Layer
 - Subsurface Barrier Wall
 - Impermeable Cap

- NOTES**
- All locations are approximate.
 - Horizontal Datum: North American Datum of 1983 - 91 adj. (NAD83/91), State Plane Coordinate System, Oregon North Zone. Units: International Feet.
 - Vertical Datum: North American Vertical Datum of 1988 (NAVD 88)
 - Aerial Imagery source: Nearmap, 4/13/2021

UP: University of Portland
Date: July 19, 2024
Data Sources: City of Portland Imagery (Summer 2022)



Location ID	Buoy Label	Longitude			Latitude		
		Degree	Minute	Second	Degree	Minute	Second
1	Danger Rocks	-122	44	27.9115188	45	34	33.7505887
2 (missing)	Danger Rocks	-122	44	34.6730244	45	34	36.3603940
3	Danger Rocks	-122	44	41.5979124	45	34	39.0343156
4	Danger Rocks	-122	44	47.5345212	45	34	43.8265931
5	Danger Rocks	-122	44	53.2295880	45	34	47.1865397



FIGURE 4-1
Groundwater Monitoring Well
Location Map
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

-  Groundwater Monitoring Well
-  Groundwater Monitoring Well with Transducer
-  Extent of Impermeable Soil Cap
-  Subsurface Barrier Wall

Date: May 29, 2024
Data Sources: City of Portland Imagery (Summer 2022)

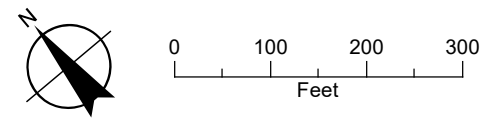




FIGURE 4-3
Shallow Zone Groundwater
Contour Map for September 2023
Monitoring Event

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

- LEGEND**
- Shallow Groundwater Monitoring Well
 - Groundwater Monitoring Well with Transducer
 - Groundwater Elevation (Dashed Where Inferred)
 - Willamette River Water Level During Sampling Event (6.07 feet)
 - Subsurface Barrier Wall

- NOTES**
- Groundwater elevation measurements collected at wells screened in the shallow water table. See tables for groundwater elevations at intermediate and deep intervals.
 - Elevations shown in NAVD88.
 - Aerial photo taken summer of 2022.
 - Water levels measured between 9:00 a.m. and 5:00 p.m. on 6/14/2023.
 - Willamette River low tide at 1:00 p.m. river elevation: 6.07 feet NAVD88 on 6/14/2023.
 - MW-Ds was omitted from groundwater contouring.

NM = Not Measured, Not Accessible, or Erroneous Data

Date: March 21, 2024
Data Sources: City of Portland Imagery (Summer 2022)

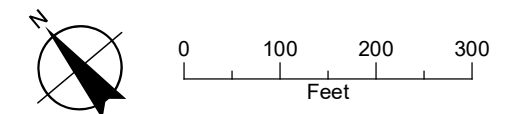




FIGURE 4-4
Deep Zone Groundwater
Elevations for June 2023
Monitoring Event
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

- LEGEND**
- Deep Groundwater Monitoring Well
 - Groundwater Monitoring Well with Transducer
 - Willamette River Water Level During Sampling Event (8.22 feet)
 - Inferred Groundwater Flow Direction
 - Subsurface Barrier Wall

- NOTES**
- Groundwater elevation measurements collected at wells screened in the deep groundwater zone
 - Elevations shown in NAVD88.
 - Aerial photo taken summer of 2022.
 - Water levels measured between 9:00 a.m. and 5:30 p.m. on 6/14/2023.
 - Willamette River at 1:00 p.m. elevation: 8.22 feet NAVD88 on 6/14/2023.

NM = Not Measured, Not Accessible, or Erroneous Data

Date: March 21, 2024
Data Sources: City of Portland Imagery (Summer 2022)

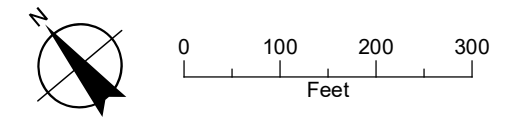


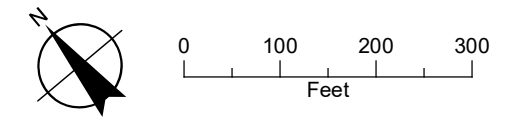


FIGURE 4-5
Deep Zone Groundwater
Elevations for September 2023
Monitoring Event
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

- LEGEND**
- Deep Groundwater Monitoring Well
 - Groundwater Monitoring Well with Transducer
 - Willamette River Water Level During Sampling Event (6.07 feet)
 - Inferred Groundwater Flow Direction
 - Subsurface Barrier Wall

- NOTES**
- Groundwater elevation measurements collected at wells screened in the deep groundwater zone
 - Elevations shown in NAVD88.
 - Aerial photo taken summer of 2022.
 - Water levels measured between 9:00 a.m. and 5:00 p.m. on 6/14/2023.
 - Willamette River low tide at 1:00 p.m. river elevation: 6.07 feet NAVD88 on 6/14/2023.
 - Anomalous lower water level observed at MW-38d.

Date: July 19, 2024
Data Sources: City of Portland Imagery (Summer 2022)



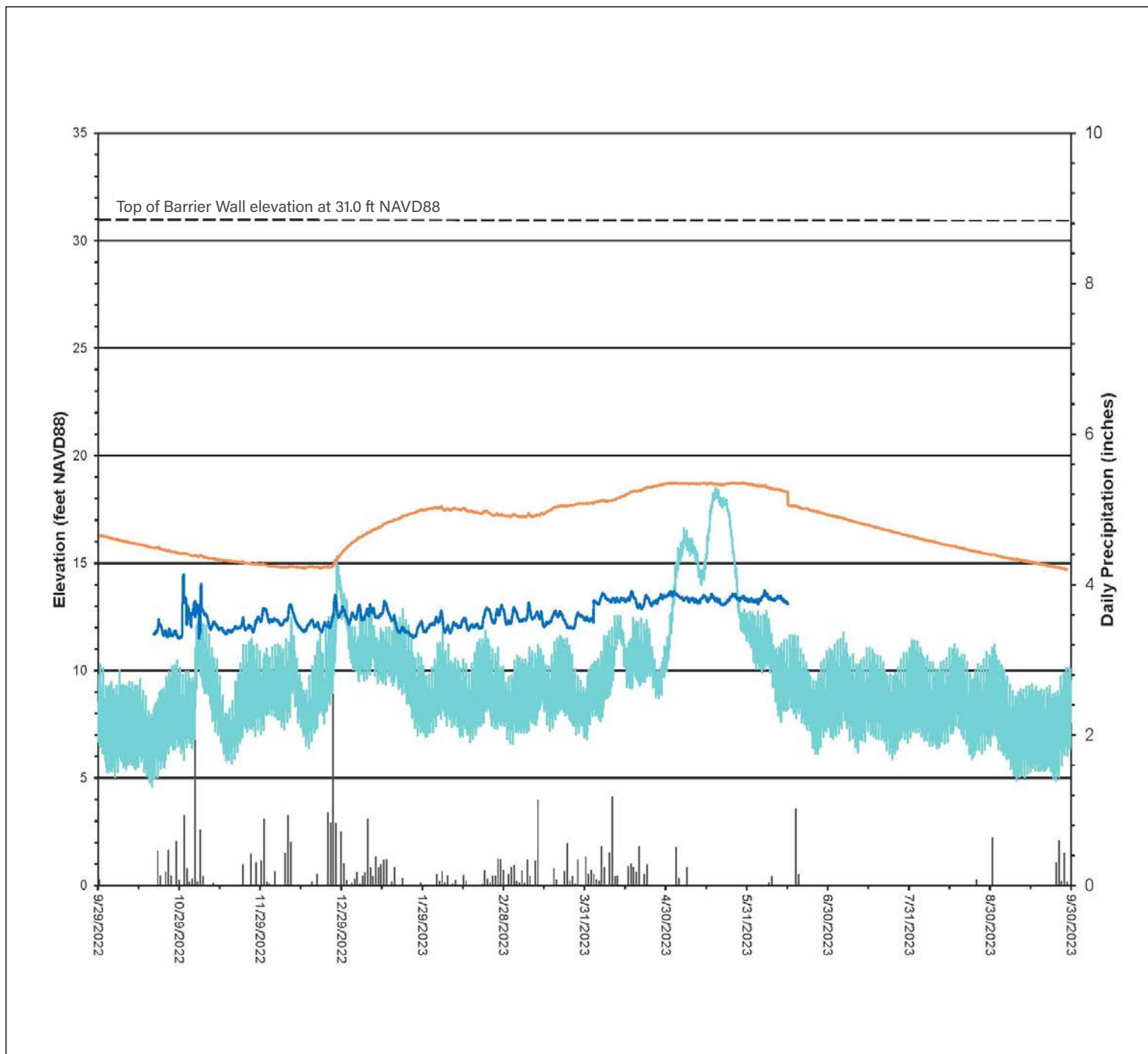


FIGURE 4-6

**2023 Groundwater Elevations
in Monitoring Wells MW-52s
and MW-53s**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

- MW-52s (interior)
- MW-53s (exterior)
- River
- Precipitation



NOTES

1. MW-52s is located inside the barrier wall and MW-53s is located outside the barrier wall.
2. Due to erroneous readings or pressure transducer failure, there is no data available for MW-52s prior to 10/20/2022 and after 6/15/2023.
3. Step down in MW-53s data on 6/15/23 due to hang depth adjustment to reflect hang depth at installation and manual measurement corrections.

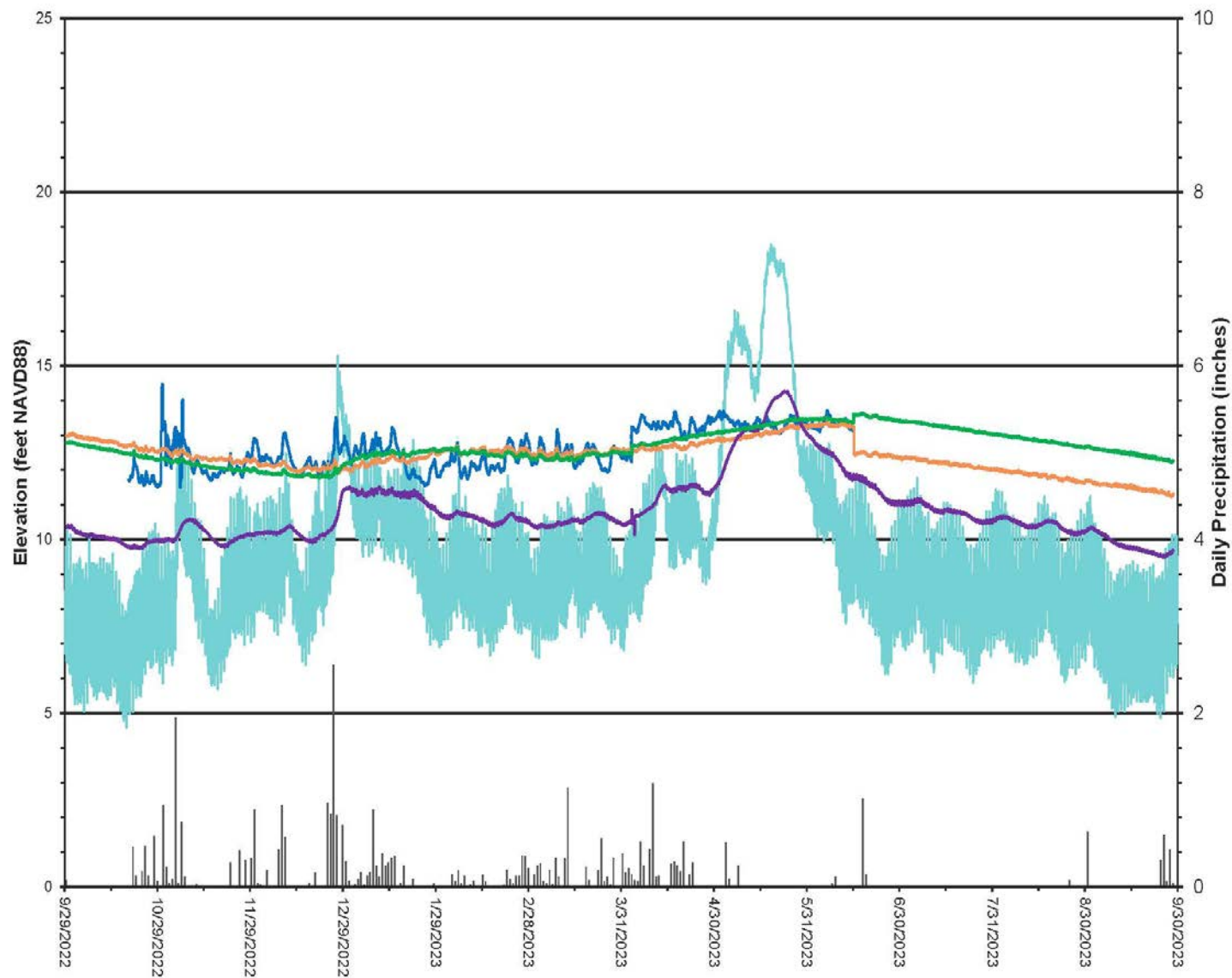


FIGURE 4-7

**2023 Groundwater Elevations
inside the Barrier Wall**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

- EW-1s
- MW-36s
- MW-44s
- MW-52s
- River
- Precipitation



NOTES

1. Monitoring wells EW-1s, MW-36s, MW-44s, and MW-52s are located inside the barrier wall.
2. Due to erroneous readings or pressure transducer failure, there is no data available for MW-52s prior to 10/20/2022 and after 6/15/2023.
3. Steps in EW-1s and MW-44s data due to manual measurement corrections.

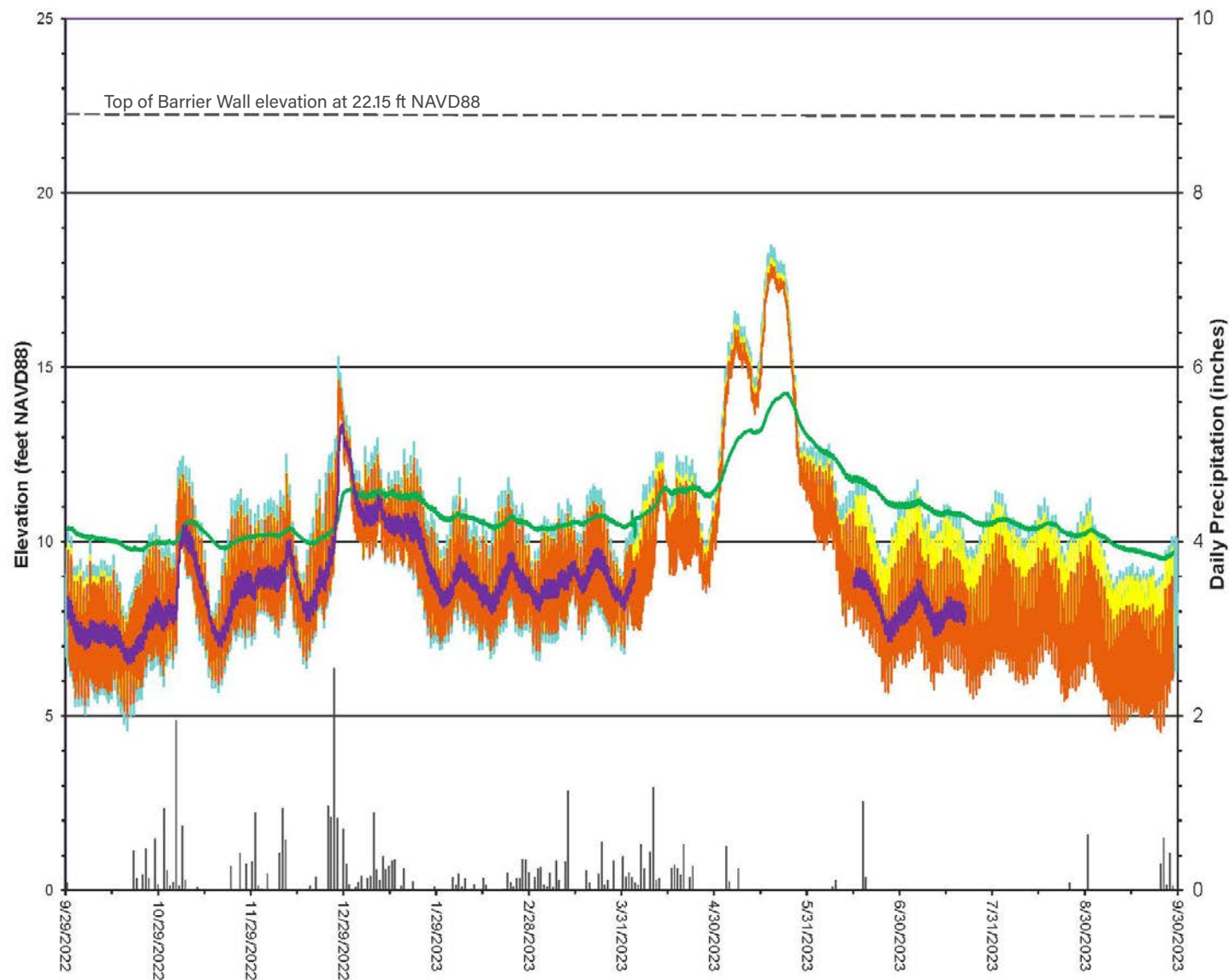


FIGURE 4-8

**2023 Groundwater Elevations
in Monitoring Wells MW-36s/d and
MW-37s/d**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

- MW-36s (interior)
- MW-36d (interior)
- MW-37s (exterior)
- MW-37d (exterior)
- River
- Precipitation



NOTES

1. MW-36 well cluster is located inside the barrier wall and MW-37 well cluster is located outside the barrier wall.
2. Due to erroneous readings or pressure transducer failure, there is no data available for MW-37s between 4/4/2023 and 6/15/2023, and 7/22/2023 and 9/28/2023



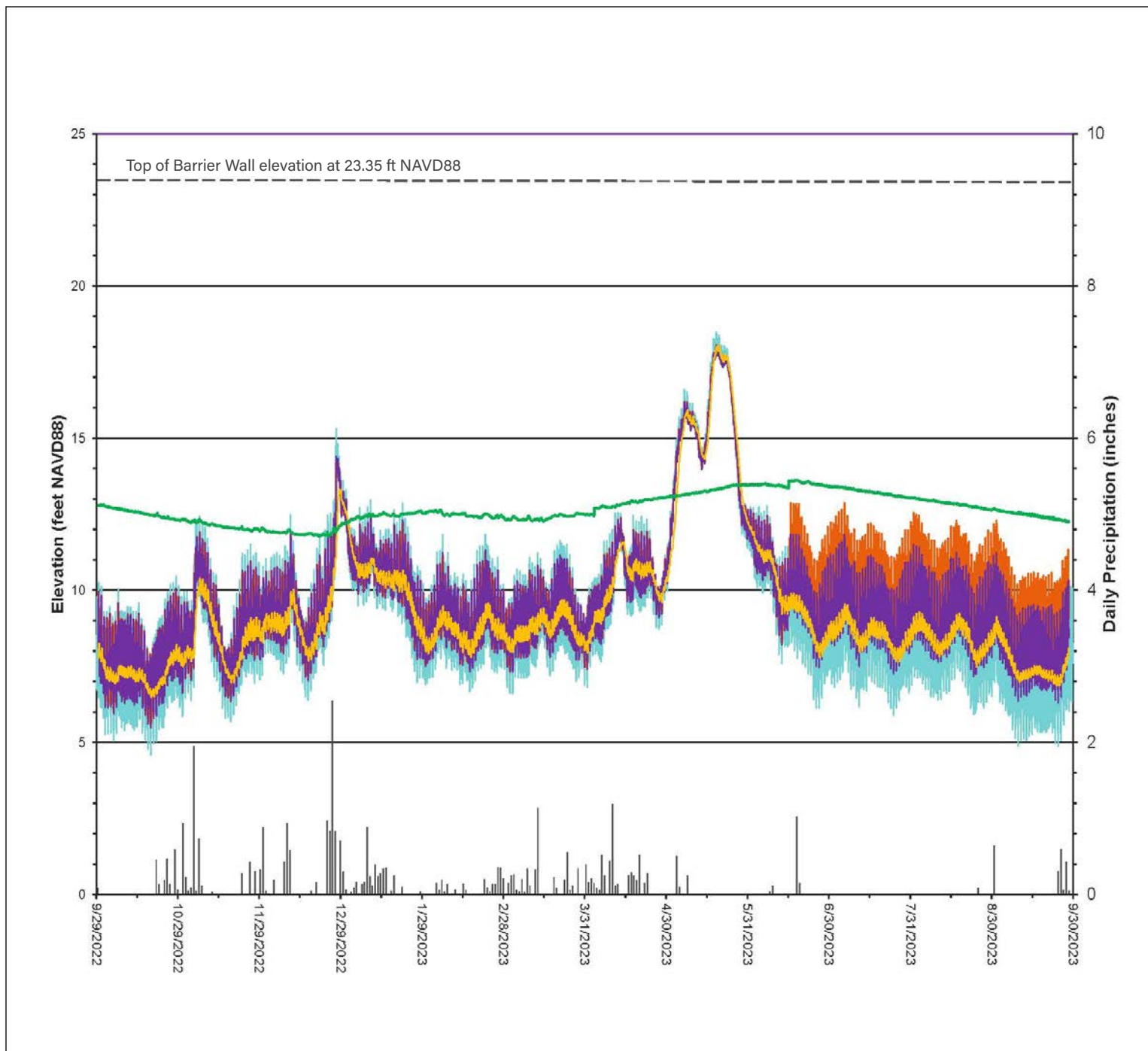


FIGURE 4-9

**2023 Groundwater Elevations
in Monitoring Wells MW-44s/d and
MW-45s/d**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

- MW-44s (interior)
- MW-44d (interior)
- MW-45s (exterior)
- MW-45d (exterior)
- River
- Precipitation



NOTES

1. MW-44 well cluster is located inside the barrier wall and MW-45 well cluster is located outside the barrier wall.

FIGURE 4-11
Measureable LNAPL and DNAPL
Distribution Map for September
2023 Monitoring Event
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

- LEGEND**
- Subsurface Barrier Wall
 - Groundwater Monitoring Wells**
(Thickness, feet, of LNAPL or DNAPL)
 - Well with Measureable LNAPL
 - Well with Measureable DNAPL
 - Well without Measureable LNAPL or DNAPL



Date: February 20, 2024
Data Sources: City of Portland Imagery (Summer 2022)

0 100 200 300
Feet



FIGURE 4-12

1999 to 2023 NAPL Thickness Plot for Well EW-10s

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

- LNAPL
- Groundwater
- DNAPL
- - - Well Screen (Top and Bottom)¹
- Well Bottom²
- End NAPL Recovery³

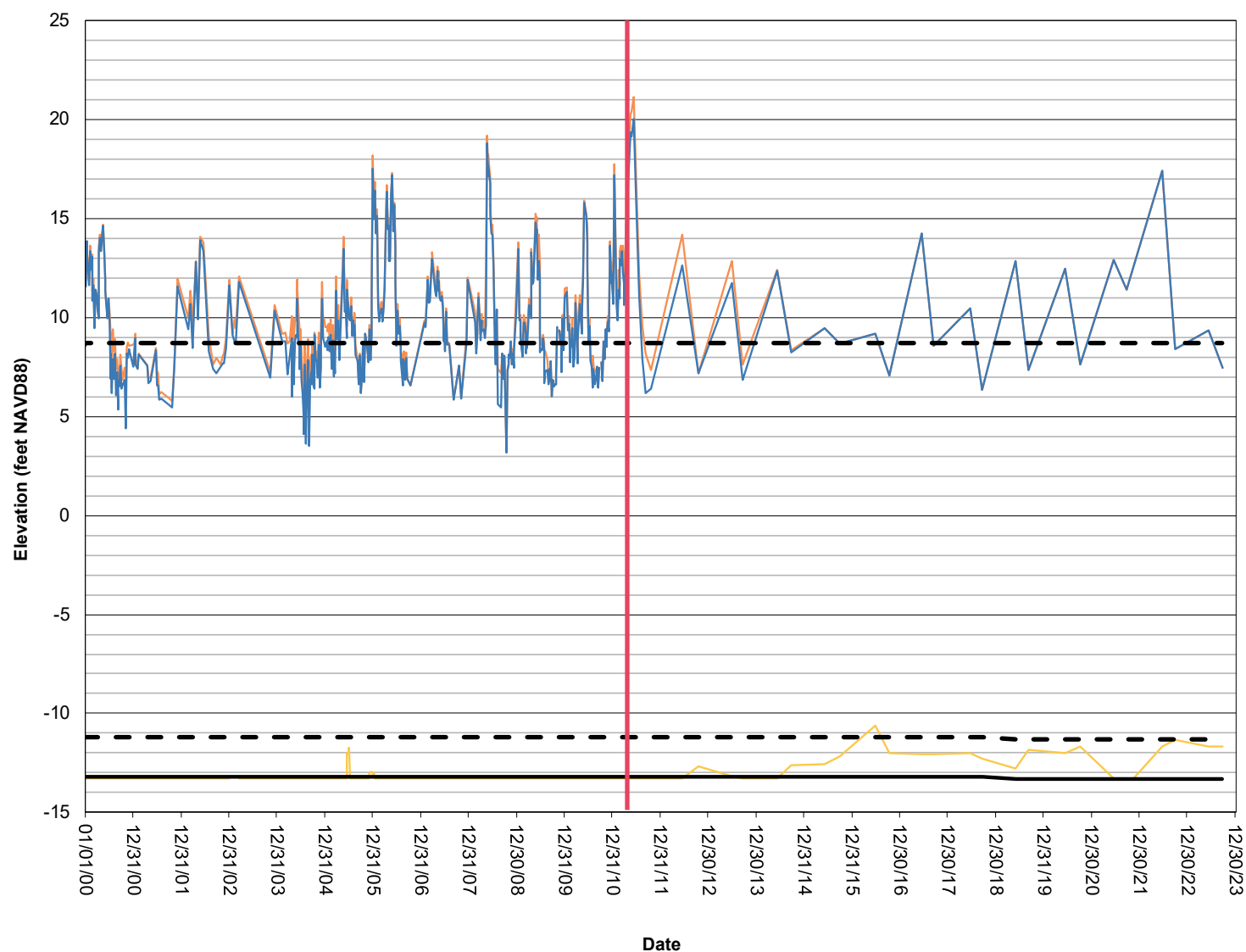


NOTES

- Barrier wall completed on 06/30/03.
- Grouting completed on 7/20/04.

1. Top of well screen to 8.80 ft NAVD88
2. Existing well depth to -13.30 ft NAVD88
3. NAPL recovery terminated 4/2/11.

The plotted well screen interval and well bottom elevations are referenced to the most recent land survey from August 2019 and available well construction logs. The elevations shown are approximate.



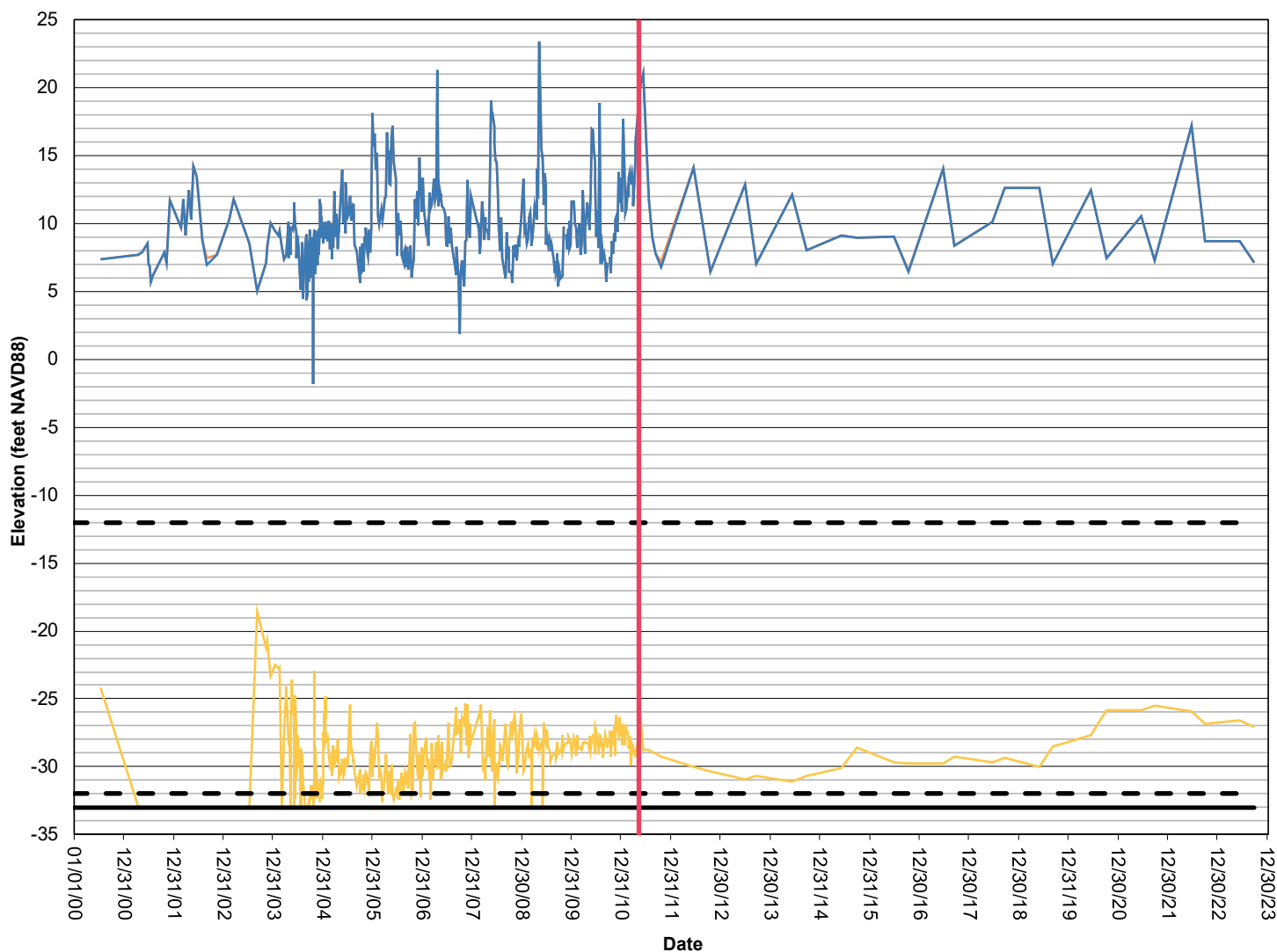


FIGURE 4-13

**2001 to 2023 NAPL Thickness Plot
for Well MW-20i**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)¹
- Well Bottom²
- End of NAPL Recovery³



NOTES

- Barrier wall completed on 06/30/03.
- Grouting completed on 7/20/04.

1. Top of well screen to -12.00 ft NAVD88 and bottom of well to -32.00 ft
2. Existing well depth to -33.00 ft NAVD88
3. NAPL Recovery terminated on 4/2/11.

DNAPL recovery was attempted in July 2007 but the extracted liquid appeared to be water with speck sized globules of DNAPL (with a creosote odor), rather than a distinct layer, suggesting that the DNAPL thicknesses measured may not accurately reflect the amount of DNAPL in the well.

The plotted well screen interval and well bottom elevations are referenced to the most recent land survey from August 2019 and available well construction logs. The elevations shown are approximate.



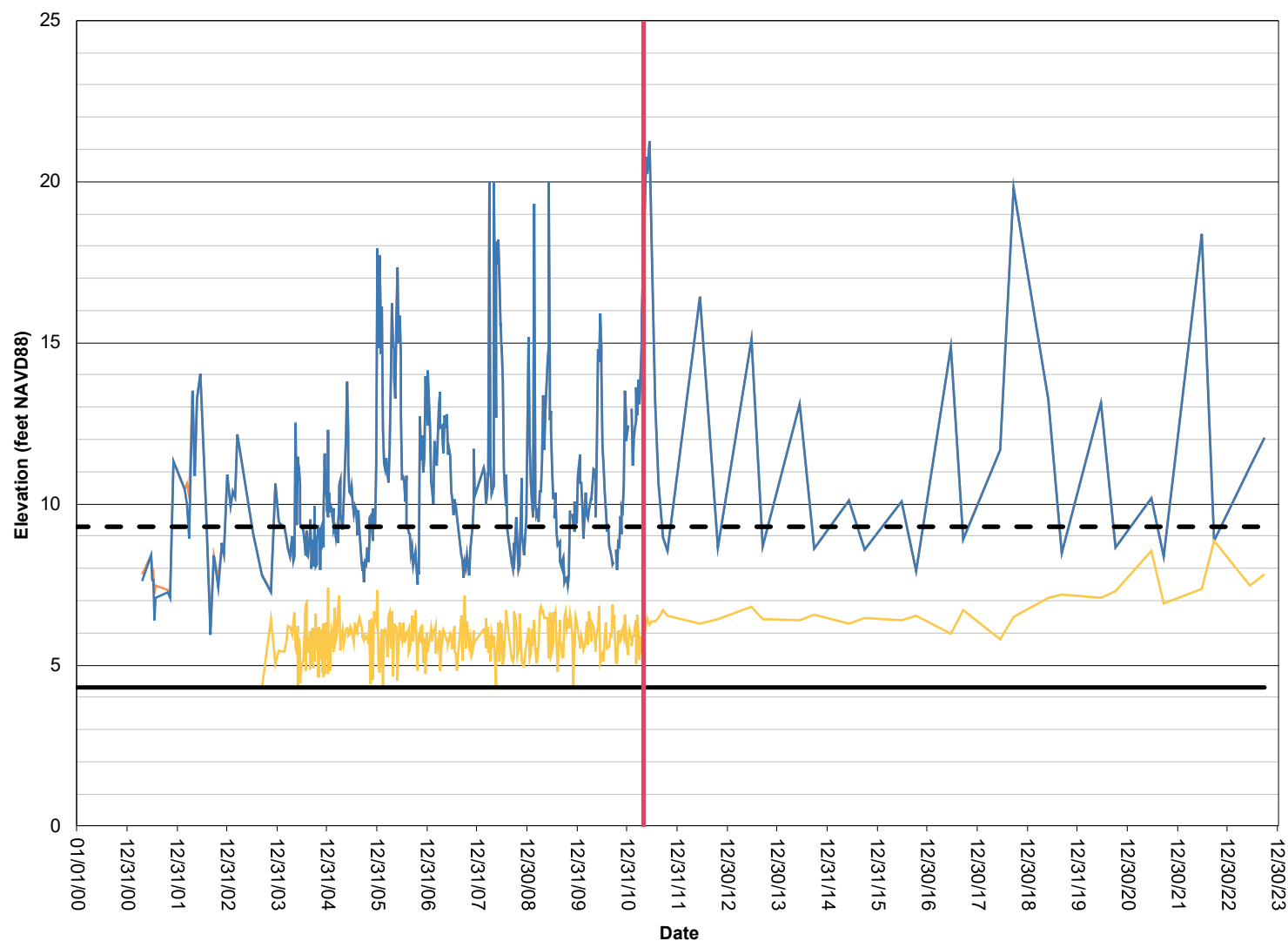
FIGURE 4-14

**2001 to 2023 NAPL Thickness Plot
for Well MW-Ds**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

- LNAPL
- Groundwater
- DNAPL
- - - Well Screen (Top and Bottom)¹
- Well Bottom²
- End of NAPL Recovery³



NOTES

- Barrier wall completed on 06/30/03.
- Grouting completed on 7/2004.

1. Top of well screen to 9.30 ft NAVD88
2. Existing well depth to 4.30 ft NAVD88
3. NAPL Recovery terminated on 4/2/11.

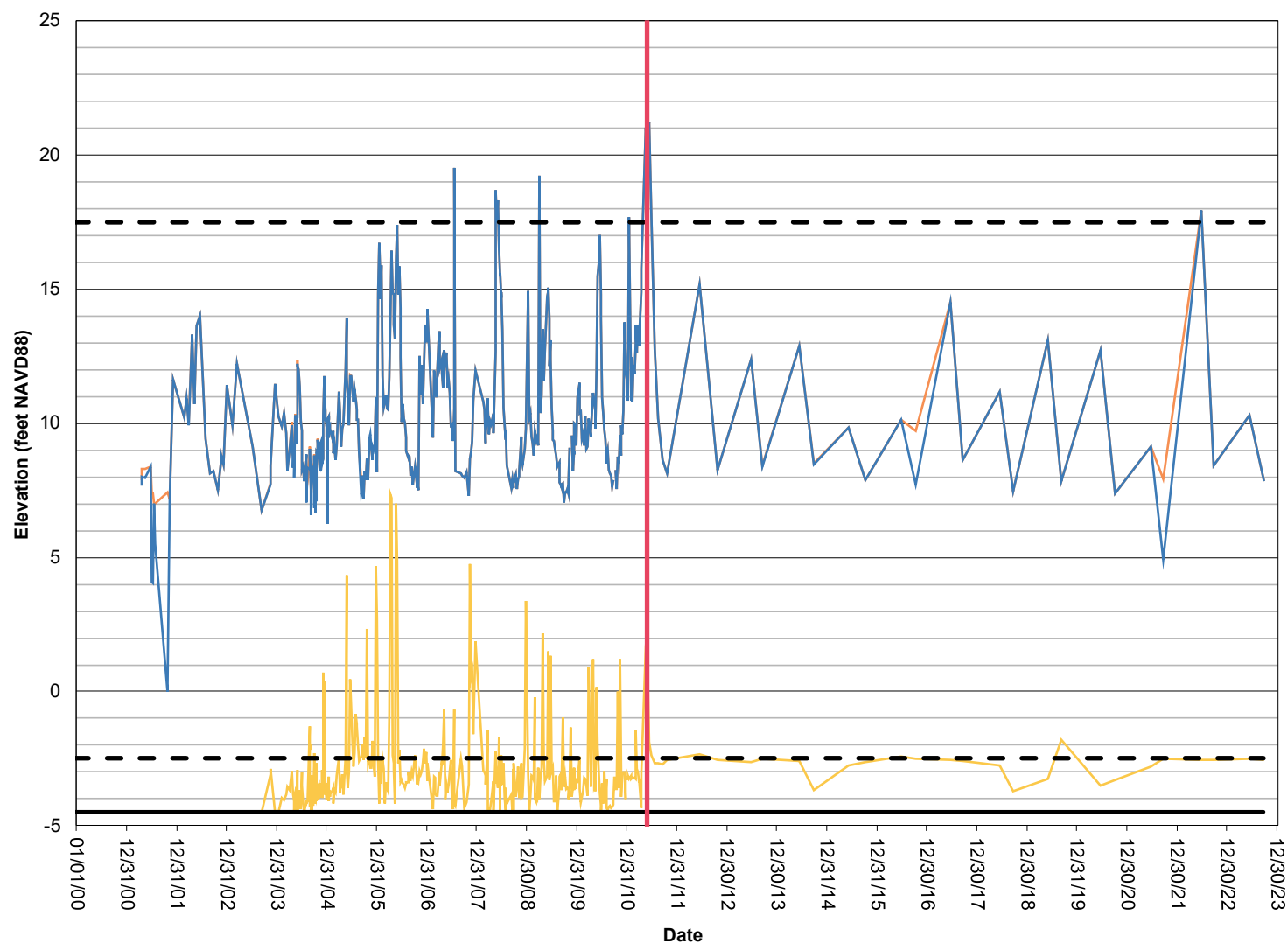
The plotted well screen interval and well bottom elevations are referenced to the most recent land survey from August 2019 and available well construction logs. The elevations shown are approximate.



FIGURE 4-15

**2001 to 2023 NAPL Thickness Plot
for Well MW-Gs**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report



LEGEND

- LNAPL
- Groundwater
- DNAPL
- - - Well Screen (Top and Bottom)¹
- Well Bottom²
- End of NAPL Recovery³



NOTES

- Barrier wall completed on 06/30/03.
- Grouting completed on 7/2004.

1. Top of well screen to 17.50 ft NAVD88 and bottom of well screen to -2.50 ft
2. Existing well depth to -4.50 ft NAVD88
3. NAPL Recovery terminated on 4/2/11.

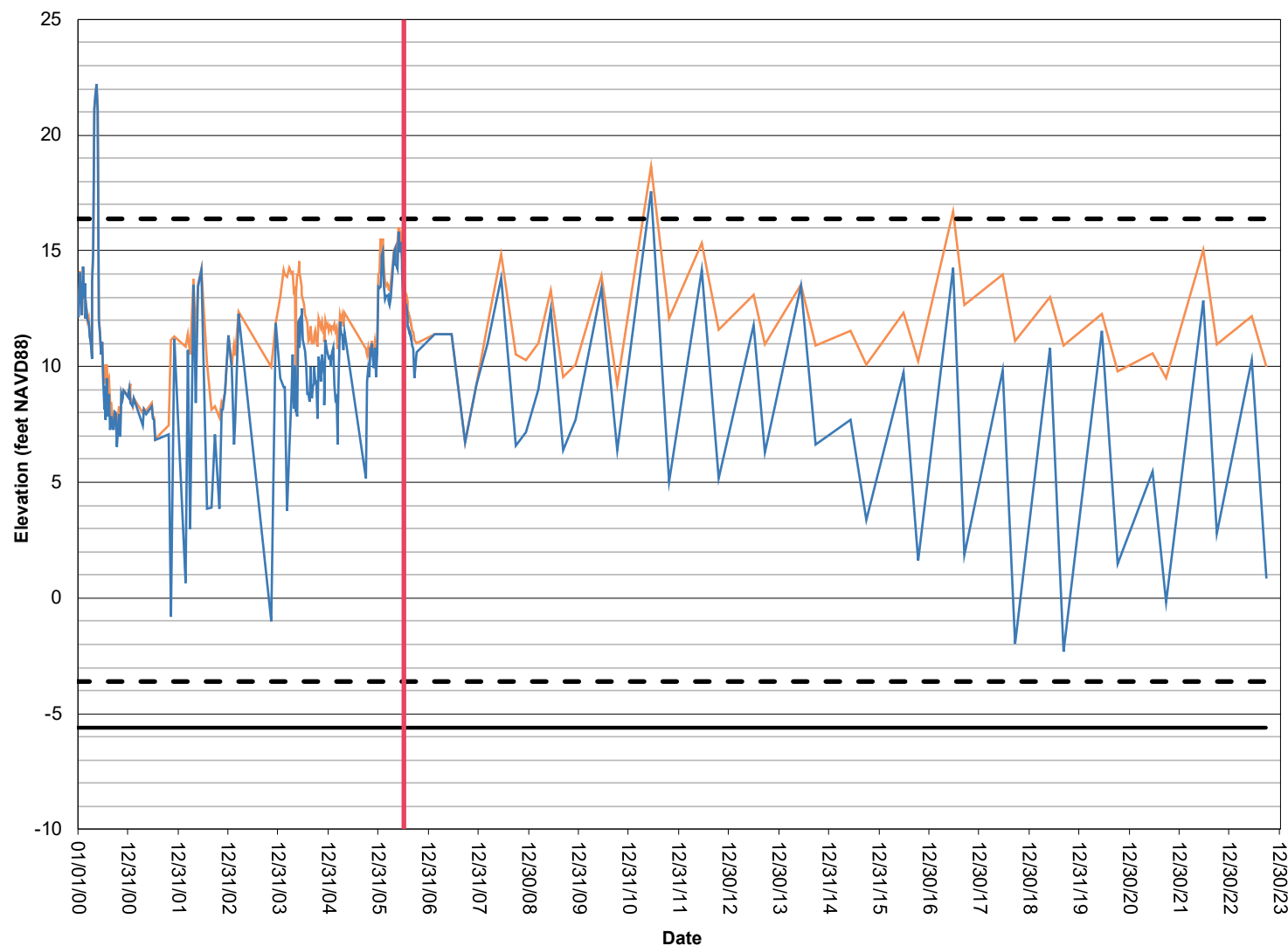
The plotted well screen interval and well bottom elevations are referenced to the most recent land survey from August 2019 and available well construction logs. The elevations shown are approximate.



FIGURE 4-16

**1999 to 2023 NAPL Thickness Plot
for Well EW-15s**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report



LEGEND

- LNAPL
- Groundwater
- - - Well Screen (Top and Bottom)¹
- Well Bottom²
- End of NAPL Recovery³



NOTES

- Barrier wall completed on 06/30/03.
- Grouting completed on 7/2004.

1. Top of well screen to 16.4 ft NAVD88 and change bottom of well screen to -3.60 ft NAVD88
2. Existing well depth to -5.60 ft NAVD88
3. NAPL recovery terminated mid-2006

The plotted well screen interval and well bottom elevations are referenced to the most recent land survey from August 2019 and available well construction logs. The elevations shown are approximate.



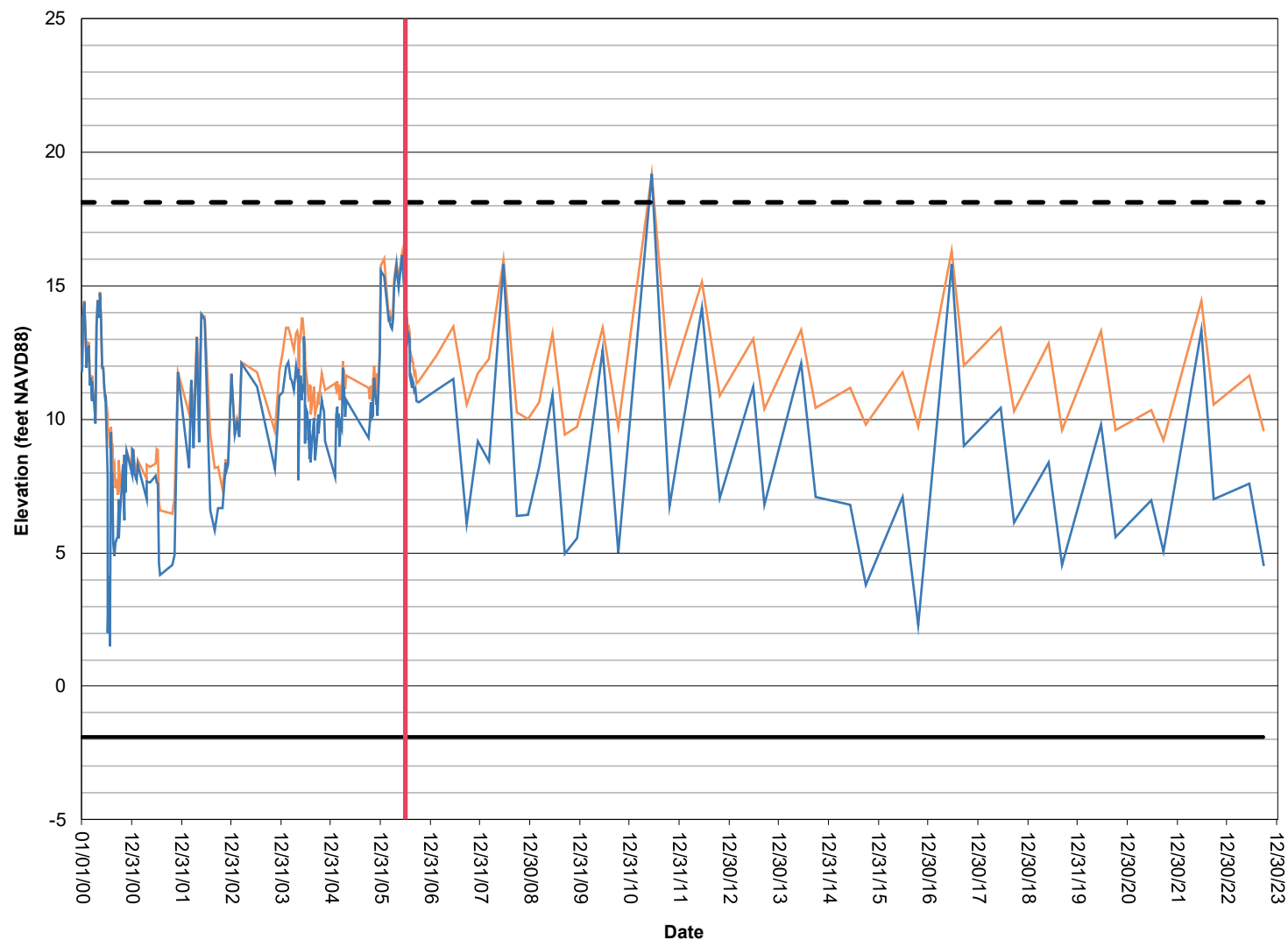
FIGURE 4-17

1999 to 2023 NAPL Thickness Plot for Well EW-23s

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

- LNAPL
- Groundwater
- - - Well Screen (Top)¹
- Well and Well Screen Bottom²
- End of NAPL Recovery³



NOTES

- Barrier wall completed on 06/30/03.
- Grouting completed on 7/2004.

1. Top of well screen to 18.1 ft NAVD88
2. Existing well depth to -1.90 ft NAVD88
3. NAPL recovery terminated mid-2006

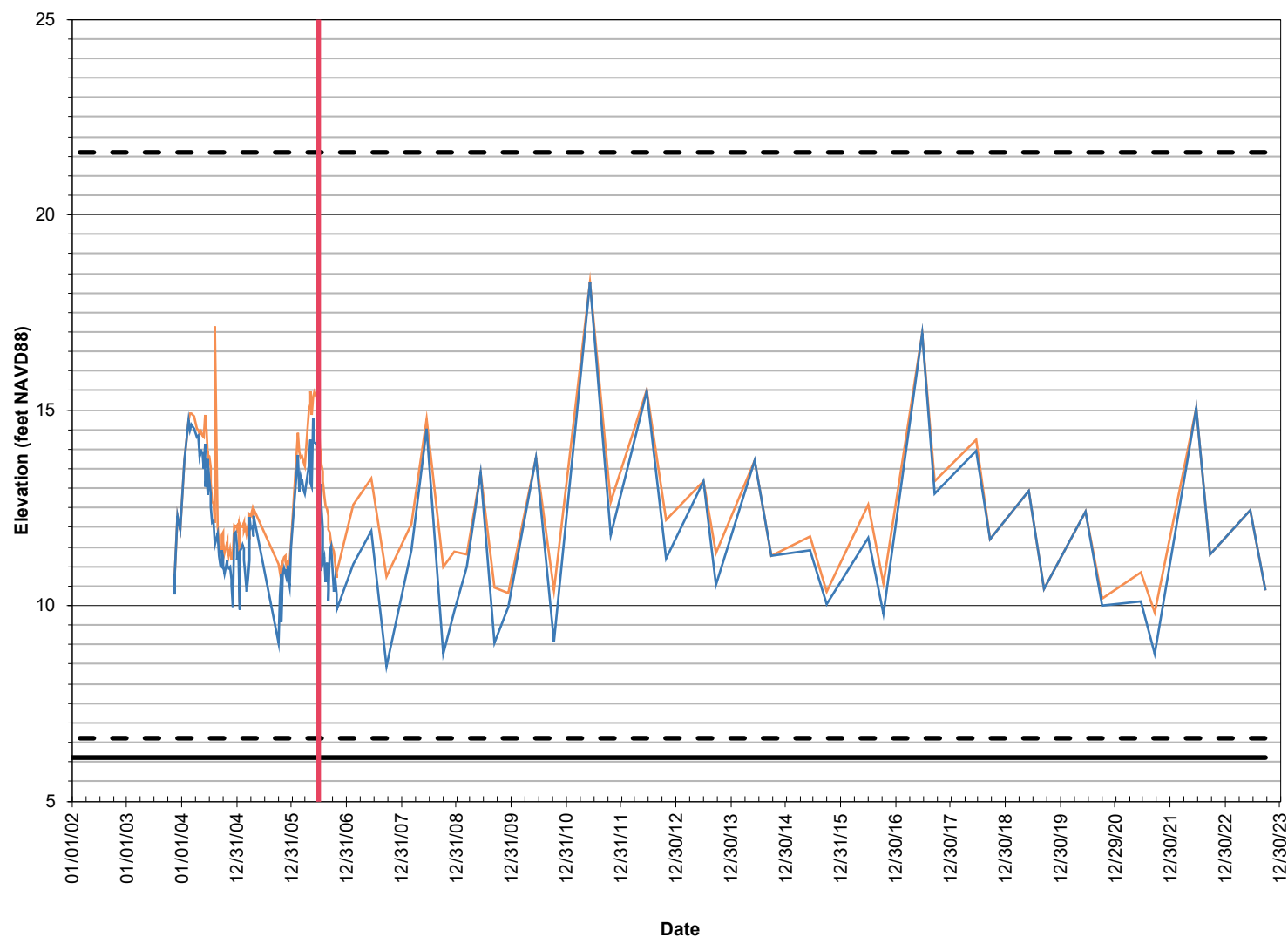
The plotted well screen interval and well bottom elevations are referenced to the most recent land survey from August 2019 and available well construction logs. The elevations shown are approximate.



FIGURE 4-18

2003 to 2023 NAPL Thickness Plot for Well MW-56s

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report



LEGEND

- LNAPL
- Groundwater
- - - Well Screen (Top and Bottom)¹
- Well Bottom²
- End of NAPL Recovery³



NOTES

- Barrier wall completed on 06/30/03.
- Grouting completed on 7/2004.

1. Top of well screen to 21.60 ft NAVD88 and bottom of screen to 6.60 ft
2. Existing well depth to 6.1 ft NAVD88
3. NAPL recovery terminated mid-2006

The plotted well screen interval and well bottom elevations are referenced to the most recent land survey from August 2019 and available well construction logs. The elevations shown are approximate.



FIGURE 4-19

2009 to 2023 NAPL Thickness Plot for Well EW-1s

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

LEGEND

- LNAPL
- Groundwater
- DNAPL
- - - Well Screen (Top)¹
- Well and Well Screen Bottom²
- End of NAPL Recovery³



NOTES

1. Top of well screen to 16.42 ft NAVD88
2. Existing well depth to -8.58 ft NAVD88
3. NAPL recovery terminated 4/21/11.

Ground subsidence has been observed in the vicinity of EW-1s and the well casing has sunk over time. The screened interval and total well depth have been referenced to the most recent ground survey from August 2019 and available well construction logs. Given that the elevations are changing with time, the elevations shown are approximate.

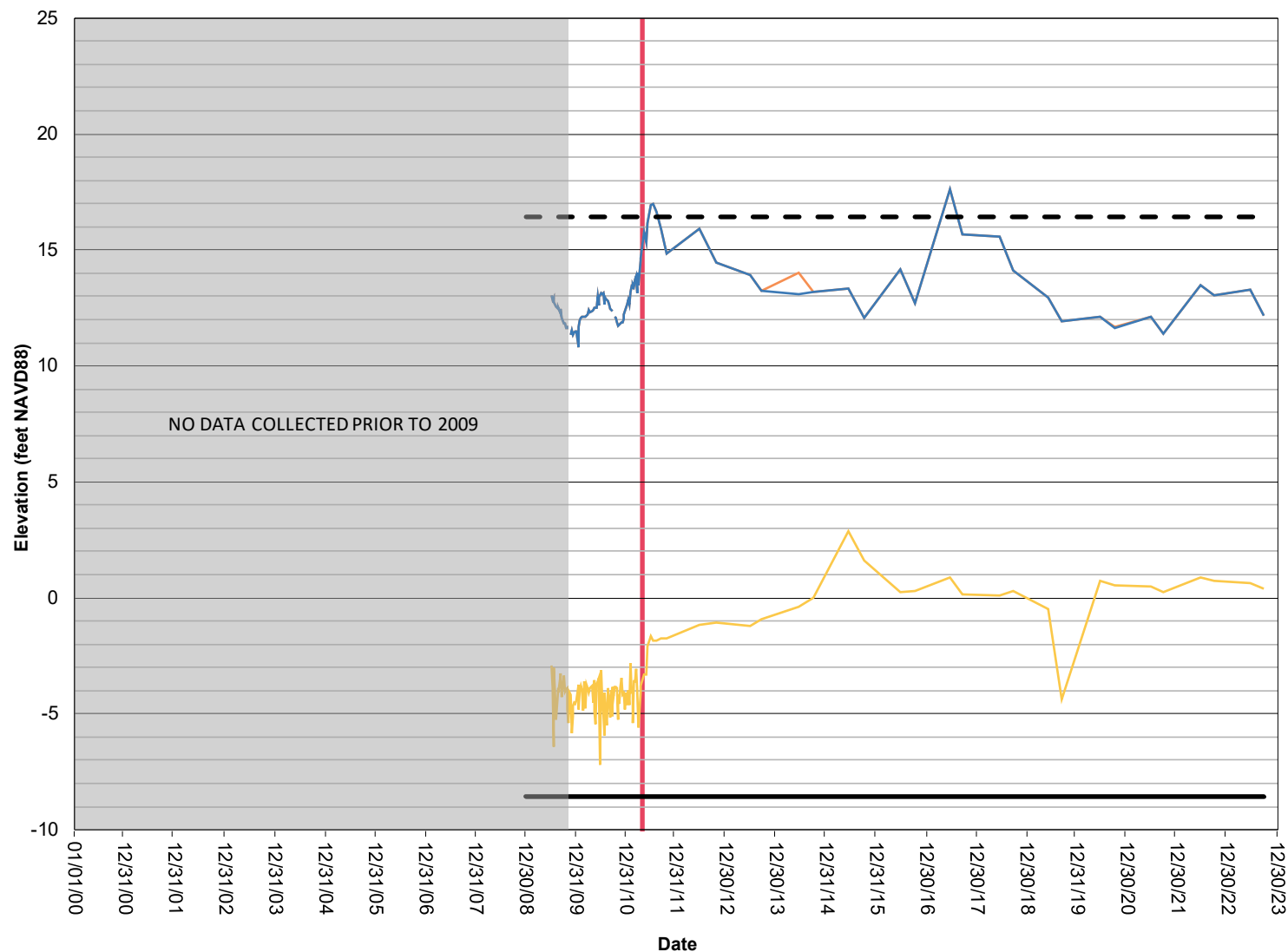
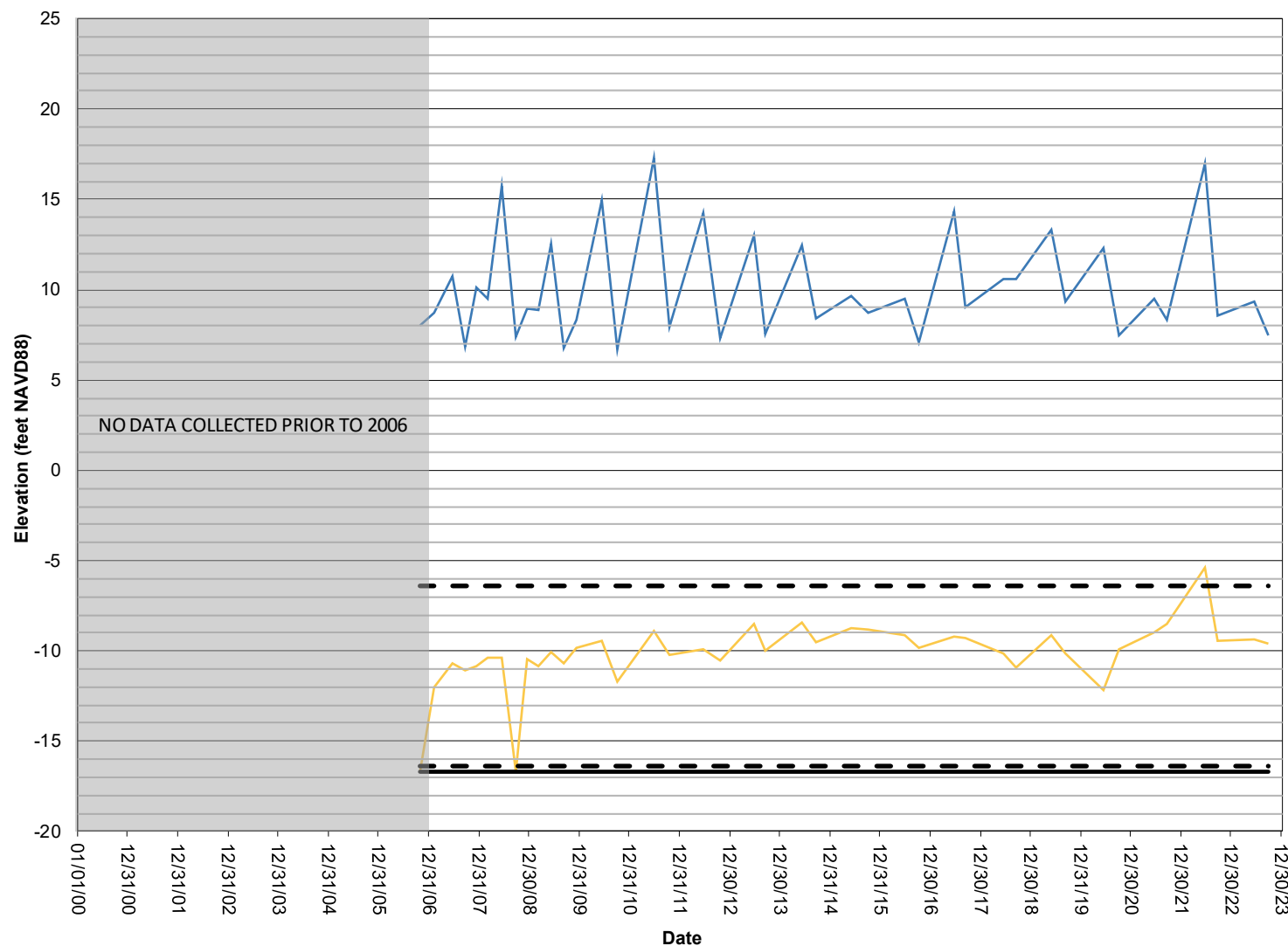


FIGURE 4-20

**2006 to 2023 NAPL Thickness Plot
for Well MW-22i**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report



LEGEND

- Groundwater
- DNAPL
- - - Well Screen (Top and Bottom)¹
- Well Bottom²



NOTES

1. Top of well screen to -6.40 ft NAVD88 and bottom of well screen to -16.40 NAVD88
2. Existing well depth to -16.70 ft NAVD88

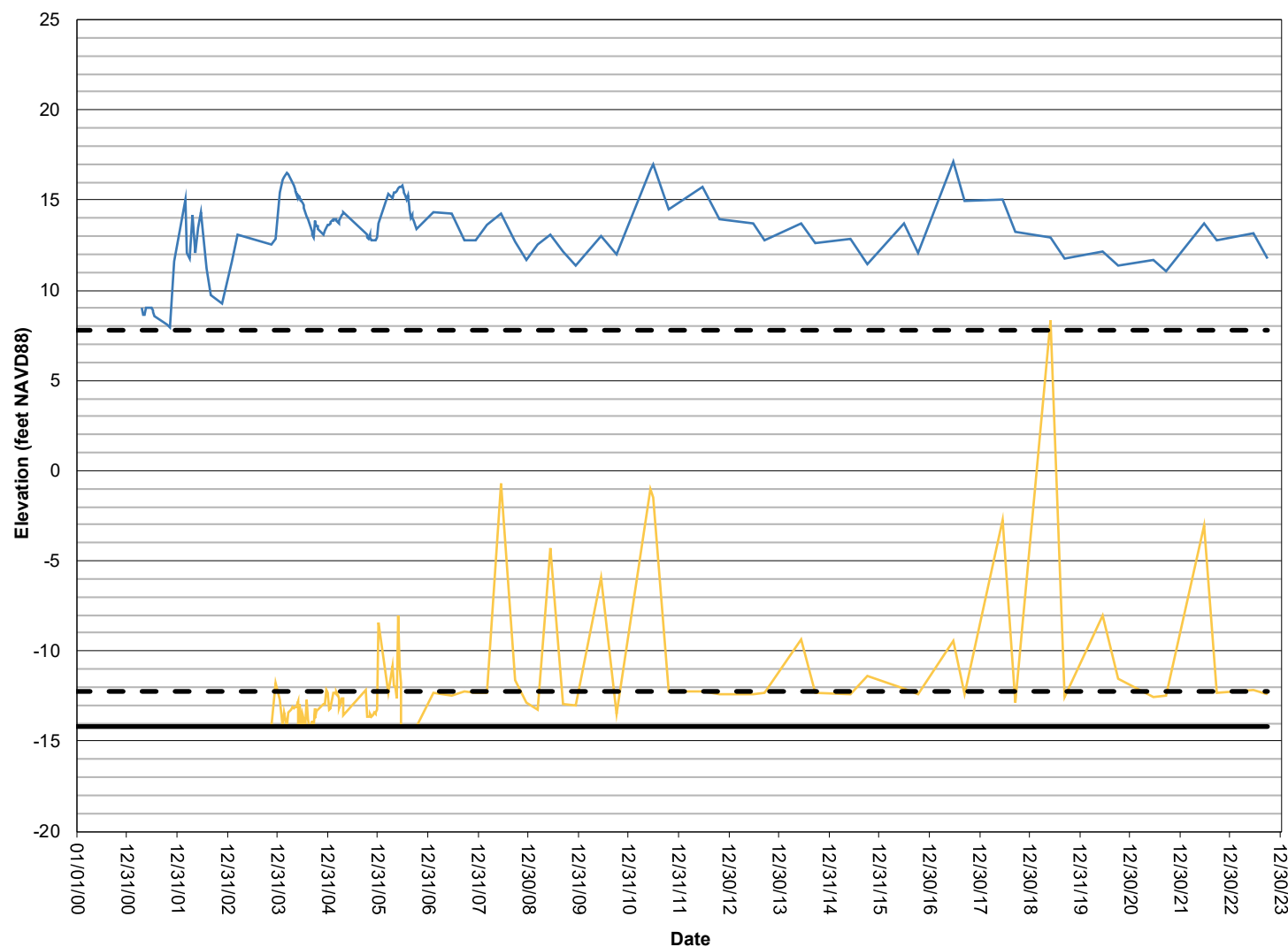
The plotted well screen interval and well bottom elevations are referenced to the most recent land survey from August 2019 and available well construction logs. The elevations shown are approximate.



FIGURE 4-21

**2001 to 2023 NAPL Thickness Plot
for Well EW-8s**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report



LEGEND

- Groundwater
- DNAPL
- - - Well Screen (Top and Bottom)¹
- Well Bottom²



NOTES

- Barrier wall completed on 06/30/03.
- Grouting completed on 7/2004.

1. Top of well screen to 7.80 ft NAVD88 and bottom of screen to -12.20 ft
2. Existing well depth to -14.20 ft NAVD88

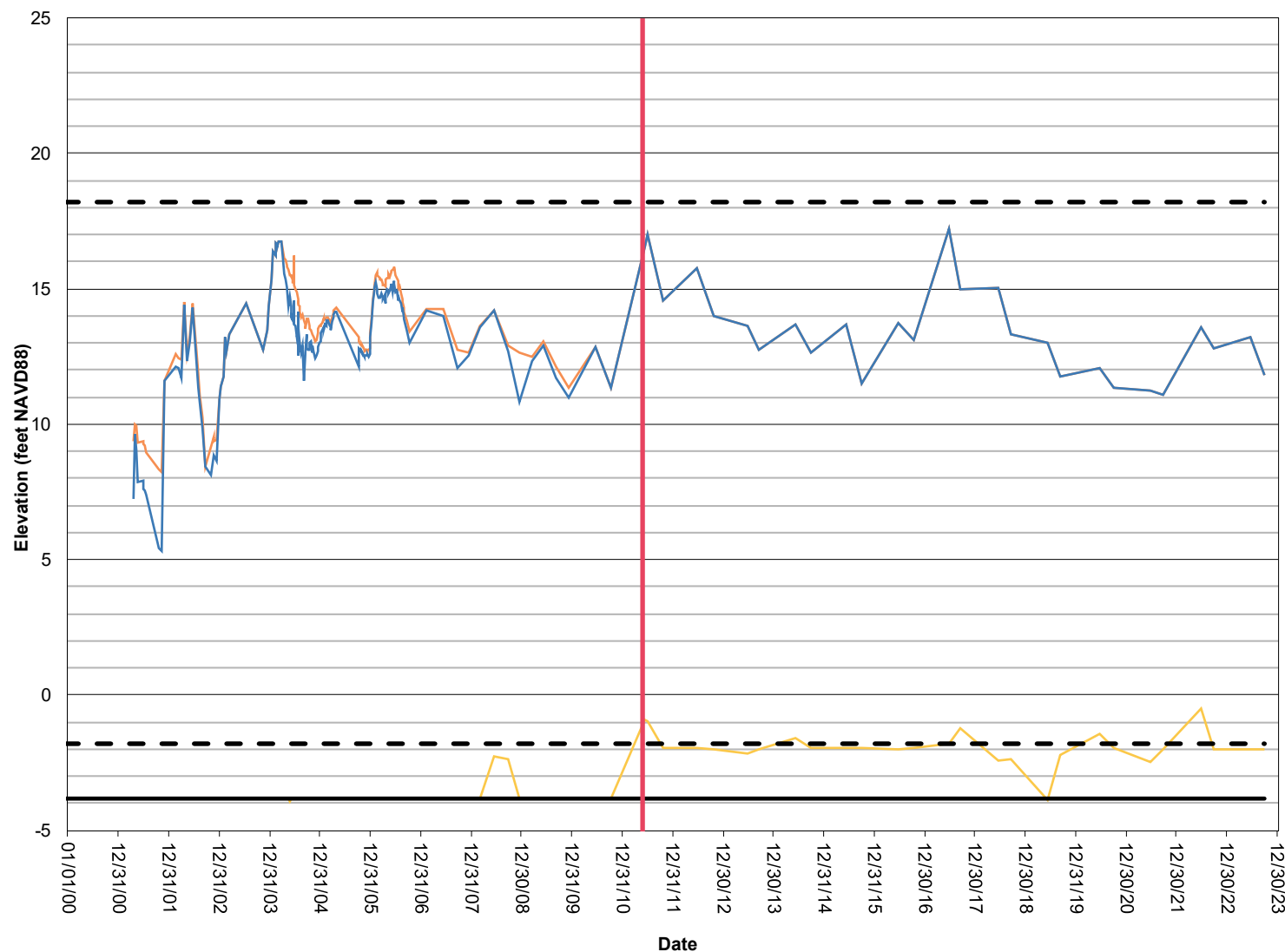
The plotted well screen interval and well bottom elevations are referenced to the most recent land survey from August 2019 and available well construction logs. The elevations shown are approximate.



FIGURE 4-22

**2001 to 2023 NAPL Thickness Plot
for Well EW-18s**

McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report



LEGEND

- LNAPL
- Groundwater
- DNAPL
- - - Well Screen (Top and Bottom)¹
- Well Bottom²
- End of NAPL Recovery³



NOTES

1. Top of well screen to 18.20 ft NAVD88 and bottom of well screen to -1.80 ft
2. Existing well depth to -3.80 ft NAVD88
3. NAPL recovery terminated 4/21/11.

The plotted well screen interval and well bottom elevations are referenced to the most recent land survey from August 2019 and available well construction logs. The elevations shown are approximate.

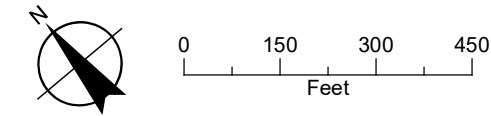




FIGURE 5-1
Vegetation Survey Photo
Station Location Map
McCormick & Baxter Superfund Site
Portland, Oregon
2023 Operations and Maintenance
Report

- LEGEND**
- Photograph Station, Number, and Direction Taken
 - Fence
 - Rock
 - Sand
 - Turf Reinforcement Mat over Earthen Cap
 - Subsurface Barrier Wall
 - Earthen Soil Cap Boundary
 - Sediment Cap Boundary
 - Impermeable Cap
 - Property Line

NOTES
1. All features are approximate.
2. Aerial Imagery source: Nearmap, 4/13/21
Date: March 21, 2024
Data Sources: City of Portland Imagery (Summer 2022)



APPENDIX A

Site Activity Documentation

McCormick & Baxter Operational & Functional Determination Period Status Meeting Summary

Thursday, March 16, 2023, 09:00
6900 N. Edgewater Street
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Sarah Miller	Note Taker:	Kevin Woodhouse
Attendees:	Sarah Miller Ken Thiessen Kevin Woodhouse Chris Rhea	Project Officer Hydrogeologist Site Manager Hydrogeologist	DEQ DEQ Haley & Aldrich (H&A) GSI Water Solutions, Inc. (GSI).

Meeting Summary

Site Walk and Inspection

Kevin Woodhouse, Sarah Miller, Ken Thiessen, and Chris Rhea arrived onsite at 09:00 at the paved parking and storage building area at the site. Attendees discussed project related items in the parking area from 09:10 to approximately 09:45.

The secondary containment area was flooded upon arrival. Prior to the start of discussion, Kevin Woodhouse attempted to start pumping the water out but the sump pump was inoperable when plugged in. The sump pump in the secondary containment will need to be replaced.

The following items were discussed before starting the inspection.

- EPA groundwater sampling will be performed the week of April 3, 2023. DEQ and EPA will have an upcoming conference call to discuss logistics prior to the event.
- Sarah updated the group on the status of the Prospective Purchasers Agreement. Negotiations are still ongoing but the process is looking to be completed soon.
- Team members discussed the status of the Budget and Assumptions Proposal (BAP) for O&F work that was submitted by GSI on March 6, 2023. The BAP needs to receive approvals from DEQ management and have a Task Order issued. DEQ expects the Task Order to be issued next week (week of March 20, 2023).
- H&A provided an update on the O&M manual that it will be submitted next week.
- Haley & Aldrich briefly discussed activities that have been performed at the site since the last site inspection: responding to the cut locks and providing PGE access to the site to perform repairs on a power pole (which ultimately was not performed).

Following the discussion, the project team performed the inspection from 09:45 to 11:30. DEQ personnel left the site at 11:40. Kevin Woodhouse and Chris Rhea stayed onsite until approximately 12:10 to do some cleanup in the storage area.

The weather during the inspection was sunny and cold. The temperature was in the low 40's to start and in the 50's at the end.

Shoreline Inspection

The following items were inspected along the shoreline:

Shoreline:

- Willamette River and Willamette Cove shoreline conditions
- ACB condition
- Gravel overlay on ACB
- Ebullition from sediment cap

- Buoy locations
- Stormwater discharge
- Shoreline vegetation

The Willamette River tides at the time of inspection (between 09:00 and 10:45) were at 7.14 feet NAVD88/ 2.07 feet Portland River Datum (PRD) and 7.34 feet NAVD88/ 2.24 feet PRD. The river level was at low tide during the inspection.

Very little trash and debris was observed in Willamette Cove (Photograph 1). No homeless encampments were observed; however, there was one boat anchored in the cove that was also present during the last site inspection in December 2022. The boat did not appear to be anchored on the sediment cap.

Shoreline repairs to ACB voids completed in 2017 and 2020 were not able to be observed during this inspection. The ACB will continue to be monitored during quarterly inspections.

Ebullition was not observed along the shoreline in Willamette Cove or along the Willamette River.

All buoys were observed to be present during this site inspection.

Due to the winter rain storms, there have been repeated high river level events that have deposited a lot of trash and debris along the shoreline of the Willamette River. Debris included items such as pieces from a small vessel (Photograph 2), a derelict paddleboat (Photograph 3), and various empty tanks or drums (Photograph 4) that are waterlogged.

Stormwater discharge from the outfall occurred at an approximate rate of approximately 20 gpm during the site inspection (Photograph 5). This was estimated by measuring the flow with a 5-gallon bucket at a rate of approximately 1 gallon every 3 seconds.

Upland Inspection

The following items were inspected during the upland site walk and inspection:

- Site perimeter and fence, and drainage basin
- Subsurface drainage – Manholes and drainage
- Soil cap integrity (burrows, erosion, etc.) and filled burrows
- EW-1s and MW-23d area of subsidence
- Fence integrity
- Weeds and invasive vegetation.

The locks on all gates were intact and functioning during the inspection.

The drainage basin was functioning properly during the site inspection and no standing water was observed in the basin.

The distance between the inner and outer casing of MW-23d was measured and remains at 2.75 inches.

While at the end of N. Van Houten Place near the shoreline, the group discussed the upcoming construction/improvements to the road that will be done by University of Portland. The plans call for raising the roadway approximately 3 feet. The group discussed how that would affect the site as the perimeter fence is next to the roadway (Photograph 6). If the roadway is raised immediately next to the property line, then the fence would need to be raised and some sloping down to the site elevation would need to occur. DEQ will communicate with University of Portland regarding the construction activities and the impact to the site.

While walking along the perimeter fence on N. Van Houten Place, the pole mounted warning signs were observed to be very faded and no longer legible (Photograph 7). They will need to be replaced.

The impermeable cap and soil cap were in good condition (Photograph 8).

Action Items and Schedule:	Person Responsible	Deadline
■ Site Maintenance – Replace locks if any found to be cut, fill-in burrows along the fence line, perform shop maintenance (e.g. mouse traps, check equipment).	Chris Rhea	Quarterly
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Rhea	Quarterly
■ Quarterly Site Inspections	Chris Rhea	Quarterly
■ Prepare draft 2022 Annual O&M Report	Kevin Woodhouse/Chris Rhea	April/May 2022
Site Activities / Miscellaneous Field Activities Performed Since Last Inspection		
■ Replaced cut lock/chain on February 21, 2023. ■ O&M-Provide access for PGE to repair power pole on March 14, 2023. Event was ultimately cancelled as PGE crew had to respond to down tree elsewhere.		
Deliverables		
■ No deliverables have been submitted during the reporting period.		
Budget Status:		
O&M task order is within anticipated budget. O&F Task Order under H&A expired on December 31, 2023. DEQ executed cooperative agreement with EPA to provide funding for continued O&F activities. GSI submitted a BAP on March 6, 2023, under Price Agreement No. 065-23 for a new Task Order for O&F activities. DEQ anticipates issuance of the Task Order week of March 13 or March 20, 2023.		

Photos:



Photograph 1: Shoreline condition of the sediment cap in Willamette Cove. View facing west.



Photograph 2: Debris pieces from a small vessel on the Willamette River shoreline.



Photograph 3: A derelict paddleboat on the Willamette River shoreline.



Photograph 4: An old propane tank that had hole punctures and partly filled with water.



Photograph 5: Estimated 20 gpm flow from the stormwater outfall.



Photograph 6: Western end of N. Van Houten Place that will be raised approximately 3 feet during upcoming University of Portland improvements to the road. View facing east.



Photograph 7: Perimeter warning sign along fence on N. Van Houten that is faded and illegible and will require replacement.



Photograph 8: Impermeable cap condition. View from center of cap facing south.

Meeting Summary

McCormick & Baxter Site

Quarterly Status Meeting and Inspection

Friday, June 9, 2023, 09:00
6900 N. Edgewater Avenue
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Sarah Miller	Note Taker:	Chris Rhea
Attendees:	Kevin Parrett Sarah Miller Chris Rhea Kevin Woodhouse	Manager, NWR Cleanup Project Officer Task Order Manager Site Manager	DEQ DEQ GSI Water Solutions, Inc (GSI) Haley & Aldrich, Inc. (H&A)

Meeting Summary

Status Update

Meeting attendees met at Cathedral Coffee at 09:00 and discussed site status and quarterly inspection items, as summarized below.

- Site Activities Since Last Inspection:
 - EPA groundwater sampling event in early April. While GSI was onsite to support EPA, GSI checked groundwater transducers.
- Site Inspection Items:
 - Same as usual; see next section of agenda.
- Site Maintenance performed since last inspection
 - None at this time.
- Planned Activities:
 - Low-tide groundwater monitoring event – planned for Wednesday 6/14
 - EPA sign installation – planned for Wednesday 6/14
 - EPA IDW from groundwater sampling event is ready for disposal. Next steps include sampling, solicitation, and disposal.
- Deliverables:
 - O&M Manual submitted to DEQ on April 28, 2023
 - No other deliverables have been submitted since the first quarter site inspection.
 - 2022 Annual Report: H&A plans to submit it in June.
- Budget:
 - O&M Task Order is within the anticipated budget. Task Order expires on June 30, so a new BAP is being prepared by GSI, and will be submitted to DEQ shortly.
 - O&F Task Order for GSI approved by DEQ on March 17, 2023. Task Order is within anticipated budget.

After meeting, the site was accessed for the inspection.

Site Walk and Inspection

The Willamette River tides at the time of inspection (between approximately 10:30 and 12:00) were at 6.62 feet NAD83 at the USGS Morrison Bridge gauge at 10:00 and a low tide of 4.15 feet NAV83 at 20:00.

The attendees inspected the following:

Shoreline:

- Willamette River and Willamette Cove shoreline conditions: Abundant amounts of wood debris (trunks, branches, and small sticks) are present on the shoreline following the winter high river levels (photograph 1 and 2). Minor amounts of washed up or pedestrian deposited trash are present along the shoreline.
- ACB Condition: Shoreline repairs to ACB voids completed in 2017 and 2020 continue to be in good condition and functioning as intended. The ACB will continue to be monitored during quarterly inspections. Patches of river rock were present along the waterline along the riparian area while sand was present in other patches.
- Buoy locations: All five buoys were observed except the middle buoy. This will be further monitored during the next quarterly inspection.
- Stormwater discharge: Stormwater discharge was observed to be approximately 3-5 gallons per minute. The outfall is in good condition.
- Ebullition from sediment cap: No ebullition was observed from the organoclay layers in Willamette Cove or in Willamette River.

Upland Area:

- Site perimeter, fence signs, and drainage basin: Perimeter and fence were in good condition.
- Subsurface drainage – Manholes and drainage: The drainage basin was functioning properly during the site inspection and no standing water was observed in the basin.
- Soil cap integrity (burrows, erosion, etc.): The impermeable cap and soil cap were in good condition. Similar to conditions observed during the first quarter inspection in March, the ground surface (top 1-2 inches of soil) in the northern portion of the cap showed more signs of bird foraging than the southern portion of the site, though no wildlife was observed on the cap during the inspection. Grasses and plant species on the impermeable cap were approximately 1 to 2 feet high (approximately knee high) at the time of inspection. Additionally, an animal burrow was identified at the western side of site (photograph 4). The animal burrow appears to
- be less than 1 foot deep, but as a preventative measure, it will be filled before the CAG meeting scheduled for June 14.
- EW-1s and MW-23d area of subsidence: The distance between the inner and outer casing of MW-23d was 2.75 inches, which is the same as recent measurements.
- Fence integrity: The locks on all gates were intact and functioning during the inspection, except for the lock at the west side of the site, which needed replacement. The lock was replaced by Kevin Woodhouse during the site visit.
- Vegetation, check for invasive species or weeds: Invasive species were not specifically observed, and an inspection is scheduled to be conducted by Haley & Aldrich in the next quarter.

Action Items		
Task	Responsible Person	Schedule
Site Maintenance – Replace locks if any found to be cut, fill-in burrows along the fence line, perform shop maintenance (e.g. Kubota maintenance, check equipment).	Kevin Woodhouse	Quarterly
Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Rhea	Quarterly
Quarterly Site Inspections	Chris Rhea	Quarterly
Maintenance activities	Kevin Woodhouse	As needed
Fence Repair	Kevin Woodhouse	Fall 2023
Low-tide monitoring and transducer data download	Rodrigo Prugue Alex McCarthy Braedon Warner	June 2023
Install EPA sign	Braedon Warner	June 2023



Photograph 1: Willamette River shoreline conditions south of the Burlington Northern Santa Fe Railroad lines. View facing north.



Photograph 2: Willamette River shoreline conditions with intact ACB. View facing south.



Photograph 3: Animal burrow at western fence. View facing west.



Photograph 4: Damaged barbed wire fence at northwest corner of site. View facing northeast.



Photograph 5: Typical graffiti covering site sign at southwest corner of site. View facing east.



Photograph 6: Fence missing lock (replaced during site visit). View facing west.



Photograph 7: Main site entry gate at southern side of site, blocked during road construction.
View facing south.



Photograph 8: Main site entry gate seen in Photo 7. Materials surrounding fence posts removed, potentially undermining fence posts. View facing east.

Meeting Summary

McCormick & Baxter Site

Quarterly Status Meeting and Inspection

Tuesday, September 19, 2023, 09:00
6900 N. Edgewater Avenue
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Sarah Miller	Note Taker:	Chris Rhea
Attendees:	Sarah Miller Chris Rhea Kevin Woodhouse	Project Officer Task Order Manager Site Manager	DEQ GSI Water Solutions, Inc (GSI) Haley & Aldrich, Inc. (H&A)

Meeting Summary

Status Update

Meeting attendees met at Cathedral Coffee at 09:00 and discussed site status and quarterly inspection items, as summarized below.

- Site Activities Since Last Inspection:
 - o Low-tide groundwater monitoring event – GSI completed June 14-15, 2023.
 - o EPA sign installation – GSI oversaw on June 14, 2023.
- Site Inspection Items:
 - o Same as usual; see next section of agenda.
- Site Maintenance performed since last inspection:
 - o Vegetation inspection was performed by Haley & Aldrich on September 15.
- Planned Activities:
 - o M&B Portland Harbor Community Coalition (PHCC) Meeting – planned for September 25.
 - o GSI will replace the transducer at well MW-52s, subject to transducer arrival from supplier.
 - o Low-tide groundwater monitoring event is planned for September 26-27, 2023.
 - o EPA groundwater IDW disposal in September-October (date TBD).
 - o Cap survey is planned for October-November timeframe.
- Deliverables:
 - o O&M Manual was revised to include subsidence monitoring items.
 - o 2022 Annual Report: Haley & Aldrich submitted the final report to DEQ on August 31.
 - o EPA Barrier Wall Analysis: GSI provided comments on September 11.
- Budget:
 - o O&M Task Order for GSI approved by DEQ on August 9, 2023, and ends on June 29, 2024. Task order is within budget.
 - o O&F Task Order for GSI approved by DEQ on March 17, 2023, and ends on November 30, 2023. Task Order is within budget. A new BAP is being prepared.

After meeting, the site inspection was performed.

Site Walk and Inspection

The Willamette River tides at the time of inspection (between approximately 10:00 and 12:00) were at 3.41 feet NAD83 at the USGS Morrison Bridge gauge at 08:50 and a low tide of 0.22 feet NAD83 at 16:05.

The attendees observed the following:

Shoreline:

- Willamette River and Willamette Cove shoreline conditions: Minor amounts of trash and debris were observed in Willamette Cove, but none were observed at other portions of the Site along the Willamette River shoreline. See Photo 1.
- ACB Condition: Shoreline repairs to ACB voids completed in 2017 and 2020 continue to be in good condition and functioning as intended. The ACB will continue to be monitored during quarterly inspections. Patches of river rock were present along the waterline along the riparian area while sand was present in other patches. See Photo 2.
- Buoy locations: All five buoys were observed except the middle buoy (#2). This will be further monitored during the next quarterly inspection, and if absent, a new buoy will be installed.
- Stormwater discharge: No stormwater discharge was observed at the Site outfall. The outfall is in good condition. See Photo 3.
- Ebullition from sediment cap: No ebullition was observed from the organoclay layers in Willamette Cove. Potential minor ebullition was observed in a central portion of the Site along the Willamette River.
- Tire tracks were observed along the southern portion of the Site, originating from the southern adjoining University of Portland property. See Photo 4.

Upland Area:

- Site perimeter, fence signs, and drainage basin: These were in good condition except the fence post for a notification in the southern portion of the Site was broken due to dry rot. See Photo 5.
- Subsurface drainage – Manholes and drainage: The drainage basin was functioning properly during the site inspection and no standing water was observed in the basin.
- Soil cap integrity (burrows, erosion, etc.): The impermeable cap and soil cap were in good condition.
- EW-1s and MW-23d area of subsidence: The distance between the inner and outer casing of MW-23d was 2.6 inches, which is similar to recent measurements. Previous measurements indicated a difference of 2.75 inches. The difference will be checked during the next inspection.
- Fence integrity: The locks on all gates were intact and functioning during the inspection, except for the lock at the west side of the site, which was open upon arrival. The lock was closed by Kevin Woodhouse during the site visit. Other fence observations:
 - The lock and chain were missing at the south gate, and was replaced with a zip-tie. See Photo 6.
 - A portion of fence in the southeast corner was cut, fence panel removed, and chain added to create Site access. See Photo 7. The gate modification was not approved by DEQ.
 - Further south of where the fence panel was removed, a fence post was bent and damaged. The fence post appears to have been damaged by widening of the gravel road. See Photo 8.
 - Barbed wire above fence at northeast corner of Site is damaged. See Photo 9.
- Vegetation, check for invasive species or weeds: No invasive species were observed during the inspection.

Action Items		
Task	Responsible Person	Schedule
Site Maintenance – Replace locks if any found to be cut, fill-in burrows along the fence line, perform shop maintenance (e.g. Kubota maintenance, check equipment).	Kevin Woodhouse	Quarterly
Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Rhea	Quarterly
Quarterly Site Inspections	Chris Rhea	Quarterly
Maintenance activities	Kevin Woodhouse	As needed
Storage Warehouse Cleanout	Kevin Woodhouse	Winter 2023
Low-tide monitoring and transducer data download	Rodrigo Prugue Alex McCarthy Braedon Warner	June 2024



Photograph 1: Willamette Cove shoreline conditions. View facing west.



Photograph 2: Willamette River shoreline conditions with intact ACB. View facing south.



Photograph 3: Stormwater outfall was dry during inspection. View facing east.



Photograph 4: Tire tracks were observed along the southern portion of the Site, originating from the southern adjoining University of Portland property. View facing south.



Photograph 5: Broken notification signpost. View facing east.



Photograph 6: Fence missing lock and chain. View facing south.



Photograph 7: Fence panel removed from southeast corner of Site. View facing south.



Photograph 8: Damaged fence post at southeast corner of Site. View facing east.



Photograph 9: Damaged barbed wire above fence at northwest corner of Site. View facing north.



Photograph 9: Sign indicating the project is funded by EPA. View facing southwest.

Meeting Summary

McCormick & Baxter Site

Quarterly Status Meeting and Inspection

Thursday, December 7, 2023, 09:00
6900 N. Edgewater Avenue
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Sarah Miller	Note Taker:	Chris Rhea
Attendees:	Sarah Miller Chris Rhea Kevin Woodhouse	Project Officer Task Order Manager Site Manager	DEQ GSI Water Solutions, Inc (GSI) Haley & Aldrich, Inc. (H&A)

Meeting Summary

Status Update

Meeting attendees met at the McCormick and Baxter shop building at 09:00 and discussed site status and quarterly inspection items, as summarized below.

- Site Activities Since Last Inspection:
 - Fall Vegetation Inspection – Some areas will require herbicide application or removal. Tim recommends herbicide application in spring.
 - Cap Survey – Awaiting data from surveyor.
- Site Inspection Items:
 - Same as usual; see next section of agenda.
 - Also inspect southeast corner fence, fencepost, and southern gate.
- Site Maintenance performed since last inspection:
 - Herbicide application is being coordinated by H&A. Planned schedule is in spring 2024, during the growing season for optimal plant uptake.
 - Need to replace fence post of notification sign at southeast corner of site.
 - Storage warehouse cleanout. To be conducted during site inspection.
- Planned Activities:
 - All site transducers are being replaced. Replacement transducers have been ordered, and are scheduled for arrival in a few weeks. New transducer deployment is planned for early January.
 - Quarterly transducer check is planned for early March 2024.
 - Low-tide groundwater monitoring event – planned for June 2024.
- Deliverables:
 - Draft Annual Report submittal to DEQ is planned for late January 2024.
- Budget:
 - O&M Task Order for GSI approved by DEQ on 8/9/2023, and ends on 6/29/2024. Task order is within anticipated budget.
 - O&F Task Order for GSI approved by DEQ on 11/29/2023, and ends on 3/31/2023. Task Order is within anticipated budget.

After meeting, the site inspection was performed.

Site Walk and Inspection

The Willamette River tides at the time of inspection (between approximately 10:00 and 12:00) were at a low tide of 6.55 feet NAD83 at the USGS Morrison Bridge gauge at 09:05 and a high tide of 7.61 feet NAD83 at 13:05.

The attendees observed the following:

General Site Conditions:

- Temperature: 45 degrees F
- Precipitation: none

Shoreline:

- Willamette River and Willamette Cove shoreline conditions: Minor amounts of trash and debris were observed in Willamette Cove, but none were observed at other portions of the Site along the Willamette River shoreline. See Photos 1 through 3.
- ACB Condition: Shoreline repairs to ACB voids completed in 2017 and 2020 continue to be in good condition and functioning as intended. The ACB will continue to be monitored during quarterly inspections. Some ACB stabilization cables were damaged along the Willamette River between the Former Waste Disposal Area and the Tank Farm Area. See Photo 4.
- Buoy locations: All five buoys were observed except the middle buoy (#2). Installation of a new buoy is being coordinated.
- Stormwater discharge: Approximately 30-40 gallons per minute were observed to discharge at the Site outfall. The outfall is in good condition.
- Ebullition from sediment cap: No ebullition was observed from the sediment cap.
- Trespassers: one tent (apparent homeless encampment) was observed on the Willamette River shoreline between the Former Waste Disposal Area and the Tank Farm Area. See Photo 5.

Upland Area:

- Site perimeter, fence signs, and drainage basin: These were in good condition except the fence post for a notification in the southern portion of the Site was broken due to dry rot. The notification sign will not be repaired or replaced because other signs are present nearby.
- Subsurface drainage – Manholes and drainage: The drainage basin was functioning properly during the site inspection and no standing water was observed in the basin.
- Soil cap integrity (burrows, erosion, etc.): The impermeable cap and soil cap were in good condition. A minor animal burrow was observed in gravel at one of the western gates. See Photo 6.
- EW-1s and MW-23d area of subsidence: The distance between the inner and outer casing of MW-23d was 2.75 inches, which is similar to recent measurements. See Photo 7.
- Fence integrity: The locks on all gates were intact and functioning during the inspection. Other fence observations:
 - o The lock and chain were missing at the south gate, and was replaced with a zip-tie. This was observed during the previous site inspection.
 - o A portion of fence in the southeast corner was cut, fence panel removed, and chain added to create Site access. The gate modification was not approved by DEQ. This was observed during the previous site inspection.
 - o Further south of where the fence panel was removed, a fence post was bent and damaged. The fence post appears to have been damaged by widening of the gravel road. This was observed during the previous site inspection.
 - o Barbed wire above fence at northeast corner of Site is damaged. This was observed during the previous site inspection, and it will be repaired by H&A. See Photo 8.

- Vegetation, check for invasive species or weeds: No invasive species were observed during the inspection.

Action Items		
Task	Responsible Person	Schedule
Site Maintenance – Replace locks if any found to be cut, fill-in burrows along the fence line, perform shop maintenance (e.g. Kubota maintenance, check equipment).	Kevin Woodhouse	Quarterly
Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Rhea	Quarterly
Quarterly Site Inspections	Chris Rhea	Quarterly
Maintenance activities	Kevin Woodhouse	As needed
Storage Warehouse Cleanout	Kevin Woodhouse	Winter 2023
Low-tide monitoring and transducer data download	Rodrigo Prugue Alex McCarthy Braedon Warner	June 2024



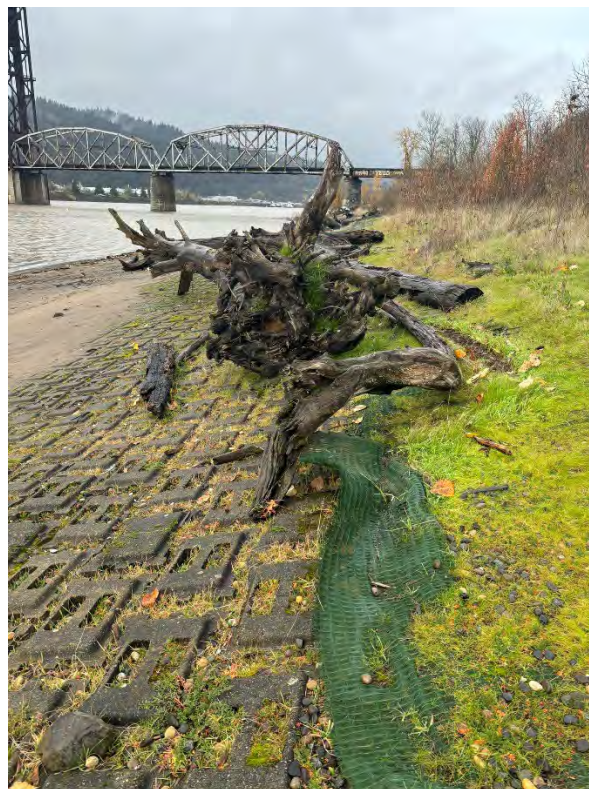
Photograph 1: Willamette Cove shoreline conditions. View facing west.



Photograph 2: Willamette River shoreline conditions with intact ACB. View facing south.



Photograph 3: Typical minor trash and debris observed along the Willamette River shoreline.
View facing north.



Photograph 4: Area with minor separation of vegetation mat due missing or damaged anchors as a result of mobile driftwood. View facing north.



Photograph 5: Homeless encampment observed along the Willamette River shoreline between the on the Willamette River shoreline between the Former Waste Disposal Area and the Tank Farm Area. View facing east.



Photograph 6: Measured distance between the inner and outer casing of MW-23d was 2.75 inches, which is similar to recent observations. View facing east.



Photograph 7: Measured distance between the inner and outer casing of MW-23d was 2.75 inches, which is similar to recent observations. View facing east.



Photograph 8: Northwest corner fence requiring barbwire repair. View facing north.

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	Time OUT	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
3/16/2023	0900	1140	Kevin Woodhouse	H&A	Site inspection
3/16/2023	0900	1140	Chris Rhea	GSI	" "
3/16/2023	0900	1140	Sarah Miller	DEQ	" "
3/16/2023	0900	1140	Ken Thiessen	DEQ	" "
4/3/23	10:00		Kevin Woodhouse	H&A	EPA Sampling / Transducer
4/3/23	1000		CHRIS RHEA	GSI	"
4/3/23	12:00	6pm	Anne Christopher	EPA	"
4/3/23	12:30	6pm	Jed Januch	EPA	"
4/3/23	12:30	6pm	Meghan Dunn	EPA	"
4/3/23	12:30	6pm	Brent Richmond	EPA	"
4/4/23	11am	6:30 am	Anne Christopher	EPA	EPA GW sampling
4/4/23	7:30 am	6:30 pm	Brent Richmond, Jed Januch, Meghan Dunn	EPA	"
4/4/23	12:30 pm	6:30 pm	Kathleen Postek	EPA	"
4/5/23	7:30 am	3:45 pm	Jed Januch	EPA	"
4/5/23	7:30 am	3:45 pm	Brent Richmond	EPA	"
4/5/23	7:30 am	3:45 pm	Meghan Dunn	EPA	"
4/5/23	7:30 am	3:45 pm	Kathleen Postek	EPA	"
4/5/23	1:30 pm	3:45 pm	Anne Christopher	EPA	"
4/5/23		3:45 pm			"

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	Time OUT	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
6/9	1025		CHRIS RHEA	GSI	Q - INSPECTION
"	"		KEVIN PARRETT	DEQ	"
"	"		SARAH MILLER	DEQ	"
"	"		KEVIN WOODHOUSE	HALEY + ALDRIDGE	"
6/14	8:00	1730	GRAEDON WATKIN	GSI	WL/NAPL TAGGING
"	"	1730	HOLLY NORMAN	GSI	"
"	"	1600	DONALD PRIBUNE	GSI	"
"	"	1730	ALEX McLAUGHLIN	GSI	"
6/15	8:00	1330	GRAEDON WATKIN	GSI	TRANSDUCER DOWNDROPS
6/15	8:00	1330	ALEX McLAUGHLIN	GSI	" "
6/21	12:55		Kevin Woodhouse	H+A	O+M / TOUR
6/21	1815		CHRIS RHEA	GSI	SITE TOUR
6/21	1815		DONALD PRIBUNE	PORT	SITE TOUR
"	"		Alison Clement	Metro	"
6-21	1815		Doug Larson	PHACG	Site tour
6-21	1815		Thomas Karvaki	UPNA	Site tour
6/21	18:15		Donald Larson	—	Site Tour
6/21	18:16		Michael Pouncil	PHACG	Site Tour
6/21	1818		PAUL GLYMAN	Metro	Site tour

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	Time OUT	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
6/21/23	6:00pm		James McKenna	ODEQ/Gov's Office	Tour
6/21/23	18:00		Sarah Miller	DEQ	" "
6/21/23	18:00		Kevin Parrett	DEQ	" "
9/19/23	08:25	11:25	Kevin Woodhouse	H&A	Site inspection
9/19/23	08:53	09:21	Joey Galati	ABS	Backflow test
9/19/23	09:45	11:25	Chris Rhae	GSI	Site inspection
9/19/23	09:45	11:25	Sarah Miller	DEQ	" "
9/25/23	0815	1130	Kevin Woodhouse	H&A	Site tour
9/25/23	0830	1130	Chris Rhae	GSI	" "
9/25/23	0845	1130	Sarah Miller	DEQ	" "
9/25/23	0920	11:00	PHCC Tour Group	—	" "
9/27/23	0800	17:30	GSI GW MONITORS	GSI	NAPL & GW MONITORING
9/27/23	0800	17:30	Alex McLaughlin	GSI	"
9/27/23	0800	17:30	Braedon Warner	GSI	"
9/27/23	0800	17:30	Holly Norcom	GSI	"
9/27/23	0800	13:30	Jenna DeMauro	GSI	"
9/28/23	0900	1400	Holly Norcom	GSI	Transducer Downloads
9/28/23	0900	1400	Braedon Warner	GSI	"
10/31/23	1200	1445	Kevin Woodhouse	H&A	Survey

APPENDIX B

Photograph Log – Vegetation Inspection

B1



B2



B1: Earthen cap and drainage swale in the foreground with impermeable cap in the background. Taken looking south from Photograph Station 1 comparing baseline and conditions in 2014. (Left – June 2011, Right – June – 2014)

B2: Tree and shrub plantings on the earthen cap. Taken looking southeast from Photograph Station 1 (September 2023).

Appendix B
Photograph Log
Vegetation Inspection

B3



B4



B3: Tree and shrub plantings on the earthen cap are healthy and spreading. Taken from Photograph Station 2 looking southeast (October 2012).

B4: Tree and shrub plantings on the earthen cap are healthy and spreading. Taken from Photograph Station 2 looking southeast (September 2023).

Appendix B
Photograph Log
Vegetation Inspection

B5



B6



B5: Eastern edge of the earthen cap with perimeter road in foreground. Taken from Photograph Station 3 looking west (October 2012).

B6: Eastern edge of the earthen cap with perimeter road in foreground. Taken from Photograph Station 3 looking west (September 2023).

Appendix B
Photograph Log
Vegetation Inspection

B7



B8



B7: Stormwater pond dominated by willow and alder. Taken from Photograph Station 4 looking northeast (October 2012).

B8: Stormwater pond dominated by willow and alder. Taken from Photograph Station 4 looking northeast (September 2023).

Appendix B
Photograph Log
Vegetation Inspection

B9



B10



B9: Willow plantings on the earthen cap. Taken from Photograph Station 5 looking northeast (October 2012).

B10: Willow plantings on the earthen cap. Taken from Photograph Station 5 looking northeast (September 2023).

Appendix B
Photograph Log
Vegetation Inspection

B11



B12



B11: Impermeable cap dominated by grasses and herbaceous vegetation in the early summer (left) and fall (right). Taken from Photograph Station 6 looking east (Left – May 2012; right – October 2012).

B12: Impermeable cap dominated by grasses and herbaceous vegetation. Taken from Photograph Station 6 looking east (September 2023).

Appendix B
Photograph Log
Vegetation Inspection

B13



B14

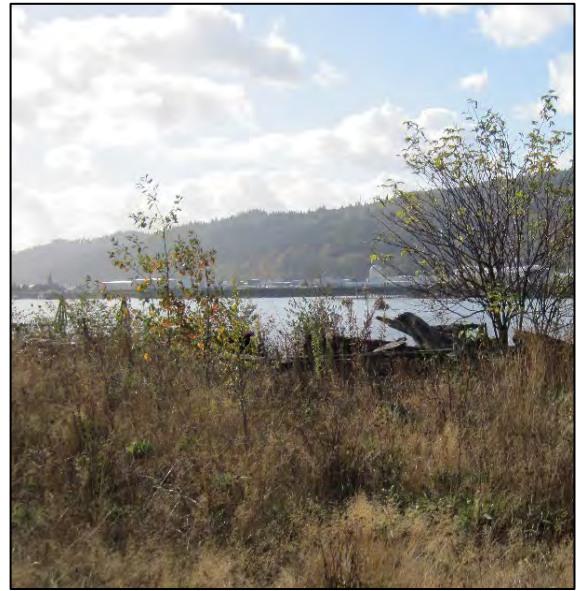


B13: Vegetation growth within the lower riparian component. Taken from Photograph Station 7 looking south (May 2012).

B14: Vegetation growth and wood debris within the lower riparian component and along the shoreline. Taken from Photograph Station 7 looking southeast (September 2023).

Appendix B
Photograph Log
Vegetation Inspection

B15



B16



B15: Upper riparian component with trees, shrubs, and herbaceous plants. Taken from Photograph Station 8 looking southwest (Left – May 2012; right – October 2012).

B16: Upper riparian component with trees, shrubs, and herbaceous plants. Taken from Photograph Station 8 looking southwest (September 2023).

Appendix B
Photograph Log
Vegetation Inspection

B17



B18



B17: Lower riparian component with large wood along the edge. Taken from Photograph Station 9 looking northwest (Left – May 2012; right – October 2012).

B18: Lower riparian component with large wood along the edge. Taken from Photograph Station 9 looking northwest (September 2023).

Appendix B
Photograph Log
Vegetation Inspection

APPENDIX C

Access Agreement between University of Portland and Oregon
Department of Environmental Quality

ACCESS AGREEMENT BETWEEN
UNIVERSITY OF PORTLAND
AND
OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

1. The University of Portland (the “University”) and the Oregon Department of Environmental Quality (“DEQ”) enter into this Access Agreement (“Agreement”) to facilitate the environmental investigation of, and the performance of removal or remedial actions (as those terms are defined in ORS 465.200 and implementing regulations) at certain real property owned by McCormick & Baxter Creosoting Co. (“Owner”) known as 6900 N. Edgewater Street, Portland, Oregon 97203, and more fully described on Exhibit A-1 and depicted on attached Exhibit A-2 (the “Subject Property”). The Subject Property is also known as McCormick & Baxter Creosoting Co. Superfund site with information found under ECSI#74 in DEQ Environmental Cleanup Program files. Remedial actions included hotspot soil removal, extraction of non-aqueous phase liquid, installation groundwater barrier wall, soil and sediment caps. Remedial work was completed by 2005. The remedy remains protective so long as caps remain intact. The University owns real property abutting the Subject Property to the southeast known as 5828 N. Van Houten Place, Portland, Oregon 97203, Multnomah County APN R315775 (the “University Property”).
2. DEQ gives permission, to the extent of its possessory interest in the Subject Property and premises and appurtenances at the Subject Property, to University and its officers, agents, authorized representatives, employees, and contractors to enter the Subject Property for the purpose of carrying out actions authorized by ORS 465.200 through 465.992, in accordance with the terms of this Agreement.
3. The University is improving N. Van Houten Place, a public right-of-way, as a part of redeveloping the University Property (the “Project”). Improvements to N. Van Houten Place will raise the road bed by approximately 3-4 feet. This will eliminate access to the Subject Property unless improvements are made to the Subject Property. University will submit draft and final engineering drawings to DEQ for review and approval before commencing work at the Subject property. All expected activities are to occur on top of the Subject property’s approximate 2ft soil cap. University’s actions at the Subject property are described in Exhibit A and include:
 - A. Install new gravel ramp entrance from the Subject property to N. Van Houten Place;
 - B. Adjust or install new fence line and install new gated entrance at N. Van Houten Place equivalent or better than existing fence. Reconstruct the existing fence at Temporary Access Point;

- C. Photographing or videotaping portions of the Subject Property and structures, objects, and materials at the Subject Property as necessary to facilitate environmental investigations or remedial measures.
4. All tools, equipment, and/or other property brought upon the Subject Property by or at University's direction remain University's property. DEQ will provide to the University keys or access codes for current gates, including promptly providing new keys after changing the locks, or new codes. The University will manage access consistent with this Agreement, keeping the access gates locked except at such times as the N. Van Houten Place Entrance is being used pursuant to this Agreement. University security will confirm the gate is locked each night and will inform DEQ if the University notices any indications of continuing trespass upon the M&B Property. Notwithstanding the foregoing, University will have no liability for failing to observe or report any signs of trespass. DEQ is not responsible for providing access through the upper N. Edgewater gate, which is maintained by Metro.
 5. When DEQ determines that continued access to the Subject Property is unnecessary, or upon expiration of this Agreement, whichever is earlier, University will remove all tools and equipment brought upon the Subject Property. If University or its contractors executing the Project causes any damage to Subject Property or breach the 2 ft soil cap during Access improvements, the University will immediately notify DEQ and USEPA and repair the damage consistent with the DEQ M&B Soil Cap and Support Facility Record Drawings and fully restore the Property to substantially the same condition as existed prior to the damage, subject to DEQ review and approval under the DEQ Voluntary Cleanup Program.
 6. University will coordinate its activities with DEQ and, if applicable, Owner, to prevent, to the maximum extent reasonably practicable, any impairment of access by invitees of DEQ and Owner on the Subject Property and any inconvenience to or disruption of DEQ's or Owner's or their officers', agents', authorized representatives', employees', and contractors' activities on the Subject Property due to University's activities.
 7. University will provide DEQ and, if applicable, Owner, at least 72 hours verbal notice before undertaking any investigation activity at the Subject Property. Except in an emergency, University will provide DEQ and, if applicable, Owner, at least 7 calendar days' written notice before commencing any construction, or implementation of a removal or remedial action at the Subject Property. The University's designated point of contact will coordinate and schedule all activities authorized under this Agreement that might disrupt or interfere with the use of the Subject Property, through:

<u>DEQ:</u>	Name:	Sarah Miller
	Address:	700 NE Multnomah St. Suite 600 Portland, OR 97232
	Telephone:	503-229-5040
	E-mail:	sarah.miller@deq.oregon.gov

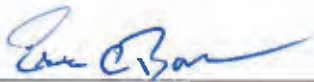
University: Name: Jennie Cambier
 Address: 5000 N. Willamette Blvd.
 Portland, OR 97203
 Telephone: 503-943-7331
 E-mail: cambier@up.edu

Owner: Name: Charles McCormick III
 Address: PO Box 3048
 Portland OR 97203
 Telephone: 503.502.3448
 E-mail: gfmng1@teleport.com

8. University will comply with all applicable federal, state, and local laws at all times while on the Subject Property and, subject to ORS 465.315(3), secure all necessary permits and authorizations in connection with the activities conducted on the Subject Property under this Agreement. DEQ agrees to cooperate fully with University as necessary for University to obtain necessary permits and authorizations. University will perform all activities under this Agreement in a manner that will not cause contamination or exacerbate contamination existing at the Subject Property.
9. DEQ may observe University while University is undertaking activities at the Subject Property; provided that any observer must have health and safety training consistent with the requirements of the Health and Safety Plan for University's activities. University will provide DEQ and, if applicable, Owner a copy of available test data, final sample results and analysis reports, and other engineering drawings, written reports of any description that arise from University's activities at the Subject Property, unless the record is exempt from disclosure under the Oregon Public Records Law.
10. This Agreement represents the complete Agreement between the Parties with respect to the subject matter hereof. No modification or waiver of any provision of this Agreement is binding unless made in writing and signed by both parties.
11. The term of this Agreement is one year from the date of the last signature below. DEQ shall, have the right to cancel this Agreement effective immediately. If so canceled, the University shall promptly return to DEQ any keys to access gates in its possession and this Agreement is void.
12. This Agreement may be executed in two or more counterparts, by facsimile or otherwise, each of which is an original, and all of which together are deemed one and the same instrument, notwithstanding that all Parties are not signatories to the same counterpart.

13. The University agrees to hold harmless, defend and indemnify DEQ, its officers, employees, and agents of and from any liability, claims, causes of action, damages, compensation, suits, actions and expenses, including reasonable attorney's fees, occasioned by the negligent acts, errors or omissions of the University or its officers, agents, authorized representatives, employees, and contractors that arise out of the construction of the Project, except to the extent contributed to by the negligence or intentional acts or omission of DEQ, its officers, employees, agents, or invitees, or Owner its officers, employees, agents or invitees.

University:



Name: Eric Barger
Title: V.P. Financial Affairs & Operations

Date: ^{ECB} 11/6/23

Oregon Department of Environmental Quality:

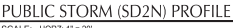


Name: Kevin Parrett
Title: Manager, NWR Cleanup & Tanks

Date: 11/6/23

SCALE: 1" = 10'

2	PROTECT EXISTING UTILITY (TYPE AS NOTED). ADJUST STRUCTURES TO FINISHED GRADE AS NECESSARY.
4	PROTECT EXISTING TREE. TREE ID PER ARBORIST REPORT AS SHOWN.
5	PROTECT EXISTING FENCE
7	CROSSING OF EXISTING UTILITY. POTHOLE EXISTING UTILITY TO VERIFY DEPTH/ RADIUS TO CONSTRUCTION.
7A	POTHOLE EXISTING 30" SD TO VERIFY LOCATION FOR POLE CONSTRUCTION OF LIGHT POLE BASE
8	REMOVE EXISTING CURB
11	REMOVE EXISTING PAVEMENT AND ROCK SUBGRADE.
12A	REMOVE EXISTING CATCH BASIN AND LEAD, PLUG EXISTING LEAD AT MAIN
14	REMOVE EXISTING TREE. TREE ID PER ARBORIST REPORT AS SHOWN.
15	REMOVE EXISTING FENCE. COORDINATE EXISTENCE OF REMOVAL WITH PROPERTY OWNER. UNIV. OF PORTLAND
16	REMOVE SIGNALS. REMOVE STOP. SEE SIGNING & STRIPING PLAN ON SHEET 1.
20	CONSTRUCT STANDARD CURB PER PRO7 STANDARD DWG P-440
21	CONSTRUCT 18" STANDARD CURB AND GUTTER PER STANDARD STANDARD DWG C-440. CONSTRUCT KERBY PER PRO7 STANDARD DWG P-446 WHEN SIDEWALK IS ATTACHED.
23	CONSTRUCT STANDARD SIDEWALK PER PRO7 STANDARD DWG P-451.
24	CONSTRUCT THICKENED EDGE WHEN SIDEWALK IS ATTACHED AS SHOWN ON PRO7 STANDARD DWG P-446.



SCALE: HORIZ: 1" = 20'
VERT: 1" = 10'

- | | |
|-----|---|
| 24 | AC PAVEMENT WITH 4" OF LEVEL 2, 12" DENSE GRADED (MMA G) LIFTS) OVER 1/2" OF 3/4" AGGREGATE BASE. NONWOVEN GEOTEXTILE OVER EXISTING SUBGRADE. |
| 27 | CONSTRUCT ALTERNATE DEPRESSION SEPARATED DRIVEWAY PER PILOT STANDARD PWD P-529 |
| 29 | CURB ENDING PER PILOT STANDARD PWD P-544 |
| 30 | INSTALL CG-2 INLET PER ODOT STANDARD PWD RD-364 |
| 31 | INSTALL CG-2 INLET PER ODOT STANDARD PWD RD-366 |
| 32A | EXISTING MANHOLE TO A4670 TO BE REPLACED WITH NEW MANHOLE PER BES PERMIT NO. EP375. |
| 33A | PRIVATE STORM PIPE INSTALLED UNDER BIDS PERMIT #19-27238-000-00-CO. |
| 39 | INSTALL DETECTABLE WARNING SURFACE PER ODOT STANDARD DRAWING R001 |
| 40 | RAILROAD CROSSING AND APPURTENANCES, BY OTHERS, COORDINATE RAILROAD WORK WITH UPRRR. |
| 41 | PROPOSED STORM, SEE SIGNING & STRIPING PLAN ON ST7.1. |
| 41A | PROPOSED SIGN(S) AND POST, SEE SIGNING & STRIPING PLAN ON ST7.1. |
| 41A | INSTALL COBRAHEAD STREET LIGHT POLE, SEE ILLUMINATION PLANS. |
| 44A | INSTALL STREET LIGHTING JUNCTION BOX, SEE ILLUMINATION PLANS. |
| 44B | INSTALL STREET LIGHT SERVICE PANEL, SEE ILLUMINATION PLANS. |
| 44C | INSTALL UTILITY JUNCTION BOX, SEE ILLUMINATION PLANS. |
| 45 | REMOVE EXISTING DISCONNECTED FIRE HYDRANT AND WATER VAULT |

- 48E INSTALL STREET TREE PER PBOT STANDARD DWG P-581. TREE SHALL BE CARPINUS CAROLINIANA 'IN UPRIGHT' (AMERICAN FIRESPIRE HORNBEAM), 2.5" CALIPER.
- 52 [INSTALL GRAVITY BLOCK RETAINING WALL. SEE DETAILS ON ST5.1.
- 58 CONTRACTOR TO COORDINATE WITH FIBER OPTIC COMPANY TO RELOCATE MARKER OUT OF PROPOSED SIDEWALK

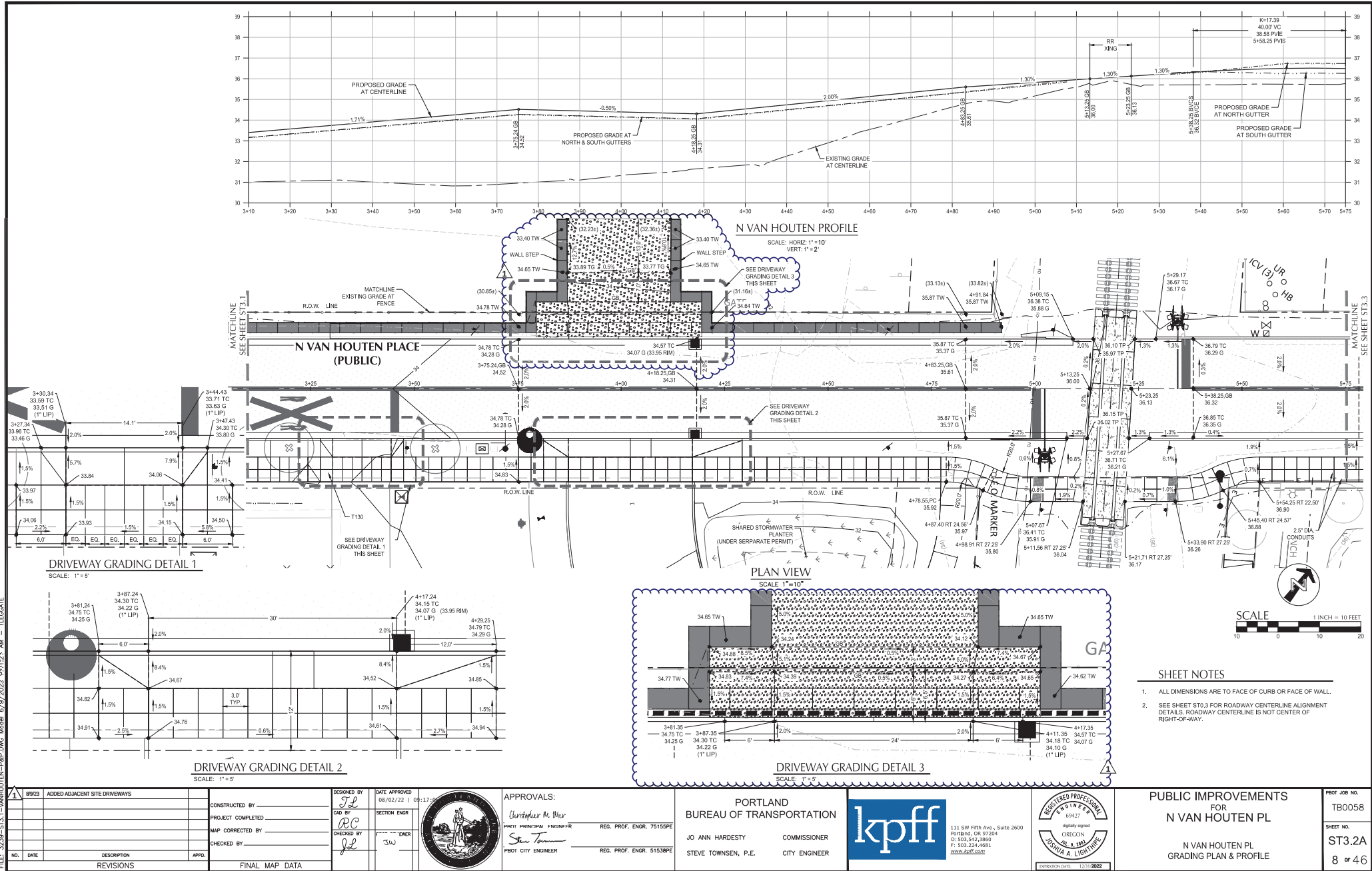
1. ALL DIMENSIONS ARE TO FACE OF CURB OR FACE OF WALL.
2. ALL WORK IN THE RIGHT-OF-WAY SHALL BE IN COMPLIANCE WITH THE CURRENT 2020 CITY OF PORTLAND STANDARD SPECIFICATIONS AND SPECIAL PROVISION.
3. SEE SHEET ST0.3 FOR ROADWAY CENTERLINE ALIGNMENT DETAILS. ROADWAY CENTERLINE IS NOT CENTER OF RIGHT-OF-WAY.
4. EXISTING SIGNS FOR RAILROAD CROSSING TO REMAIN IN PLACE UNTIL DIRECTED TO BE REMOVED BY UPRR. SEE ALSO KEY NOTE 40.



SCALE 1 INCH = 10 FEET

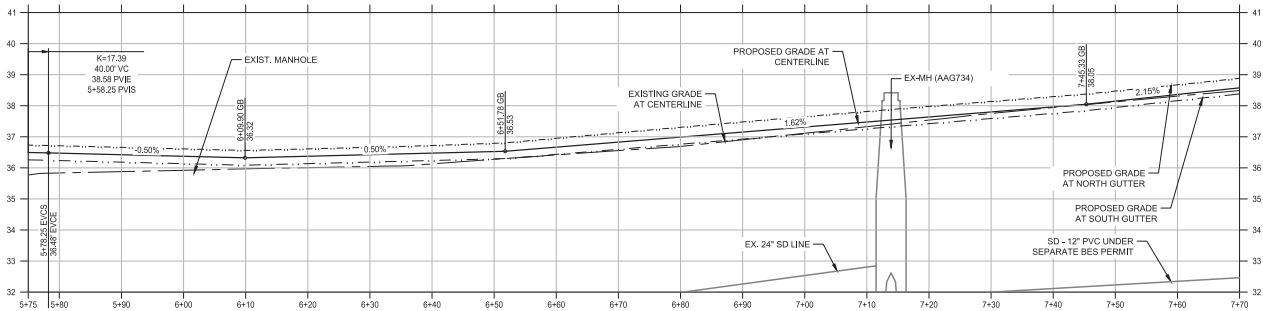


B9923		ADDED ADJACENT SITE DRIVEWAYS		CONSTRUCTED BY <i>JL</i>		DESIGNED BY <i>JL</i>		DATE APPROVED 08/02/22 @ 05:17				APPROVALS:		PORTLAND BUREAU OF TRANSPORTATION						PUBLIC IMPROVEMENTS FOR N VAN HOUTEN PL		PROJECT JOB NO. TB0058	
				PROJECT COMPLETED		CAD BY <i>RC</i>		SECTION ENGR				Christopher M. Rye REG. PROF. ENGR. 75155PE				111 SW Fifth Ave., Suite 2600 Portland, OR 97204 P: 503.242.3860 F: 503.224.4881 www.kpff.com		65437 digitally signed OREGON JOSHUA A. LIGHTHOUSE EXPIRATION DATE: 12/31/2022		N VAN HOUTEN PL CIVIL PLAN		SHEET NO. ST3.2	
				MAP CORRECTED BY		CHECKED BY <i>JL</i>		DRAWN BY <i>SW</i>				Steve Townsend REG. PROF. ENGR. 51538PE		JO ANN HARDESTY COMMISSIONER								7 of 46	
NO.		DATE		DESCRIPTION		APPRO.								STEVE TOWNSEN, P.E. CITY ENGINEER									
				REVISIONS																			
				FINAL MAP DATA																			



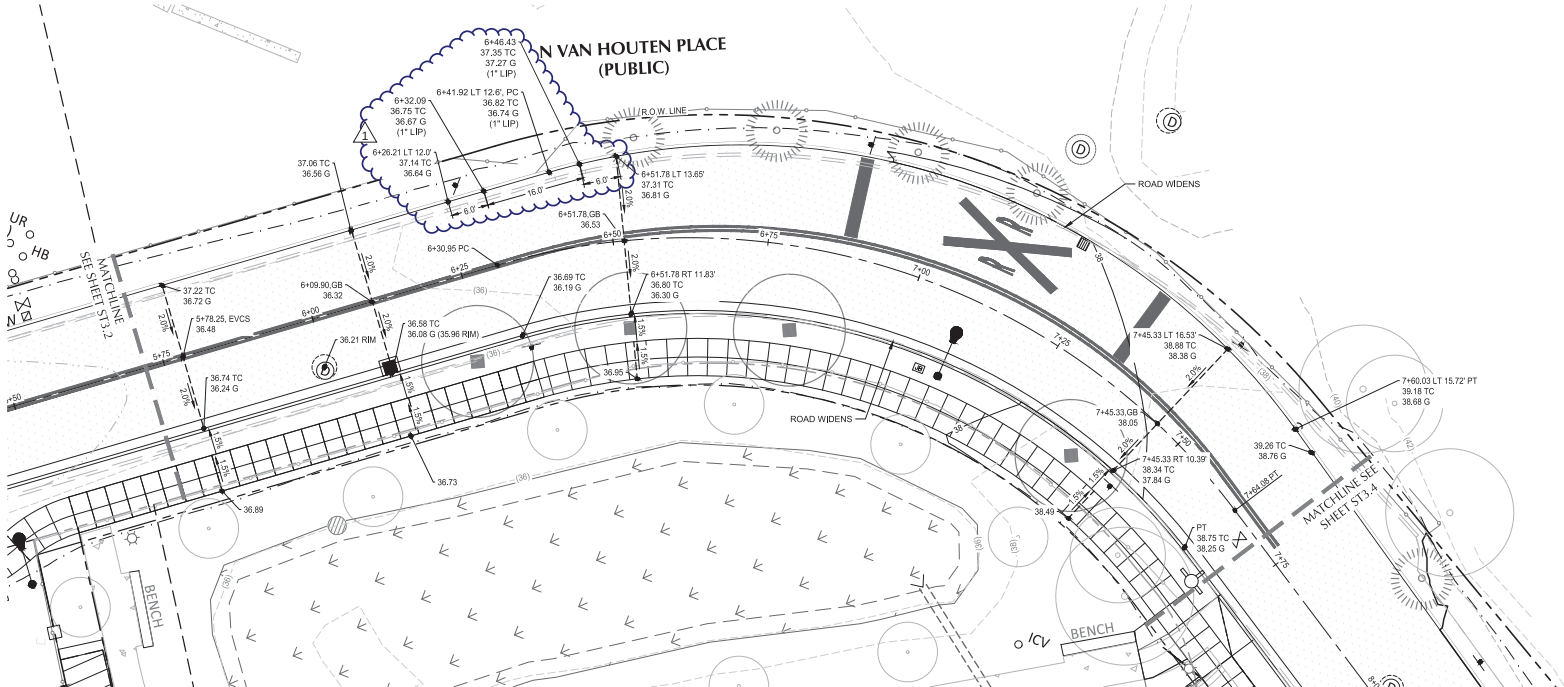
SHEET NOTES

1. ALL WORK IN THE RIGHT-OF-WAY SHALL BE IN COMPLIANCE WITH THE CURRENT 2020 CITY OF PORTLAND STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS.
2. SLOPES PROVIDED ON SLOPE ARROW ARE FOR REFERENCE ONLY.



N VAN HOUTEN PROFILE

SCALE: HORIZ. 1"=10'
VERT. 1"=2'



PLAN VIEW

SCALE 1"=10'



1 8/23 ADDED ADJACENT SITE DRIVEWAYS		DESIGNED BY JL		DATE APPROVED 08/02/22 09:17:55		APPROVALS: Christopher McWier REG. PROF. ENGR. 75155PE		PORTLAND BUREAU OF TRANSPORTATION		kpff		REGISTERED PROFESSIONAL ENGINEER 69427 JOSHUA A. LIGHTWYRE OREGON 111 SW Fifth Ave., Suite 2600 Portland, OR 97204 O: 503.542.3860 F: 503.224.4681 www.kpff.com		PUBLIC IMPROVEMENTS FOR N VAN HOUTEN PL		PUBLIC JOB NO. TB0058	
CONSTRUCTED BY		CHECKED BY JL		SECTION ENGR JW		REG. PROF. ENGR. 51538PE		JO ANN HARDESTY COMMISSIONER		STEVE TOWNSEN, P.E. CITY ENGINEER		111 SW Fifth Ave., Suite 2600 Portland, OR 97204 O: 503.542.3860 F: 503.224.4681 www.kpff.com		N VAN HOUTEN PL GRADING PLAN & PROFILE		SHEET NO. ST3.3A	
NO. DATE DESCRIPTION		APPRO. FINAL MAP DATA														10 of 46	



11/9/23		ADDED ADJACENT SITE DRIVEWAYS				DESIGNED BY <i>RL</i>		DATE APPROVED 08/02/22 1 10:35				APPROVALS: Steve Townsen REG. PROF. ENGR. 50798PE Steve Townsen REG. PROF. ENGR. 51538PE		PORTLAND BUREAU OF TRANSPORTATION						PUBLIC IMPROVEMENTS FOR N VAN HOUTEN PL		PROJECT JOB NO. TB0058																	
CONSTRUCTED BY				PROJECT COMPLETED				MAP CORRECTED BY				CHECKED BY				JO ANN HARDESTY COMMISSIONER				STEVE TOWNSEN, P.E. CITY ENGINEER				111 SW Fifth Ave., Suite 2600 Portland, OR 97204 P: 503.542.3860 F: 503.254.4661 www.kpff.com				JOSHUA A. LIGHTNER OREGON PE # 92392 EXPIRATION DATE: 12/31/2022				BLOCK RETAINING WALL LAYOUT				SHEET NO. ST5.1 19 of 46			
NO.		DATE		DESCRIPTION		REVISIONS		APPROD.		FINAL MAP DATA																													

From: [Cambier, Jennie](#)
To: [MILLER Sarah * DEQ](#)
Subject: FW: M&B Van Houten Access
Date: Monday, October 30, 2023 1:24:06 PM
Attachments: [McCormick & Baxter - Access Gate Product Data.pdf](#)

Hi Sarah,

Here are responses to DEQ's concerns:

DEQ Comment	UP Contractor Response
DEQ understands the Site ramp will consist of gravel over a geotextile. Please provide details of the geotextile and gravel materials including gravel type and material source. Any material that is not from native quarry will require submitting a work plan to demonstrate materials meet clean fill requirements.	The Geotextile Fabric product is attached and is what is currently being used on the N Van Houten Project. The Aggregate is from a native source (St Helens, OR) and is has been used at the Physical Plant, Boathouse, and N Van Houten projects.
Please discuss how the Site fence will be restored and constructed at the new entrance, including drawings, fence materials and fence post depth. A two-foot clean soil cap extends across the Site; an orange plastic construction fence demarcation layer is placed between the clean fill and impacted subsurface soils. If material will be excavated below the clean cap, a Contaminated Medial Management Plan (CMMP) will need to be submitted to DEQ for review and approval. McCormick & Baxter Operations and Maintenance Manual Appendix K Investigation Derived Waste Management Plan may provide additional information if a CMMP is needed.	The fence and gate post footings will 24" Deep x 24"+ Wide for ballast. Footings will not penetrate the clean cap. All material used for the new fencing will match the existing galvanized material, with same diameter and thickness. See attached for layout.
UP established a temporary emergency access route in approximately June 2023 by cutting the Site's existing eastern fence line adjacent to the Union Pacific Railroad right of way. Please provide a description of how the fence will be restored after the Site access ramp is installed.	For the reconstruction of the existing fence Temp Access, all existing parts have been salvaged to be reinstalled to the original condition. The wire mesh and barbwire will be re-stretched and reattached. Lewis will photo document the finished condition.

Please let me know if additional follow up is required or if this suffices to execute the access agreement. Thank you!

JENNIE CAMBIER RA, LEED BD+C (she/her)
Associate VP Campus Planning & Construction
University Architect

University of Portland
cambier@up.edu
o: 503.943.7331

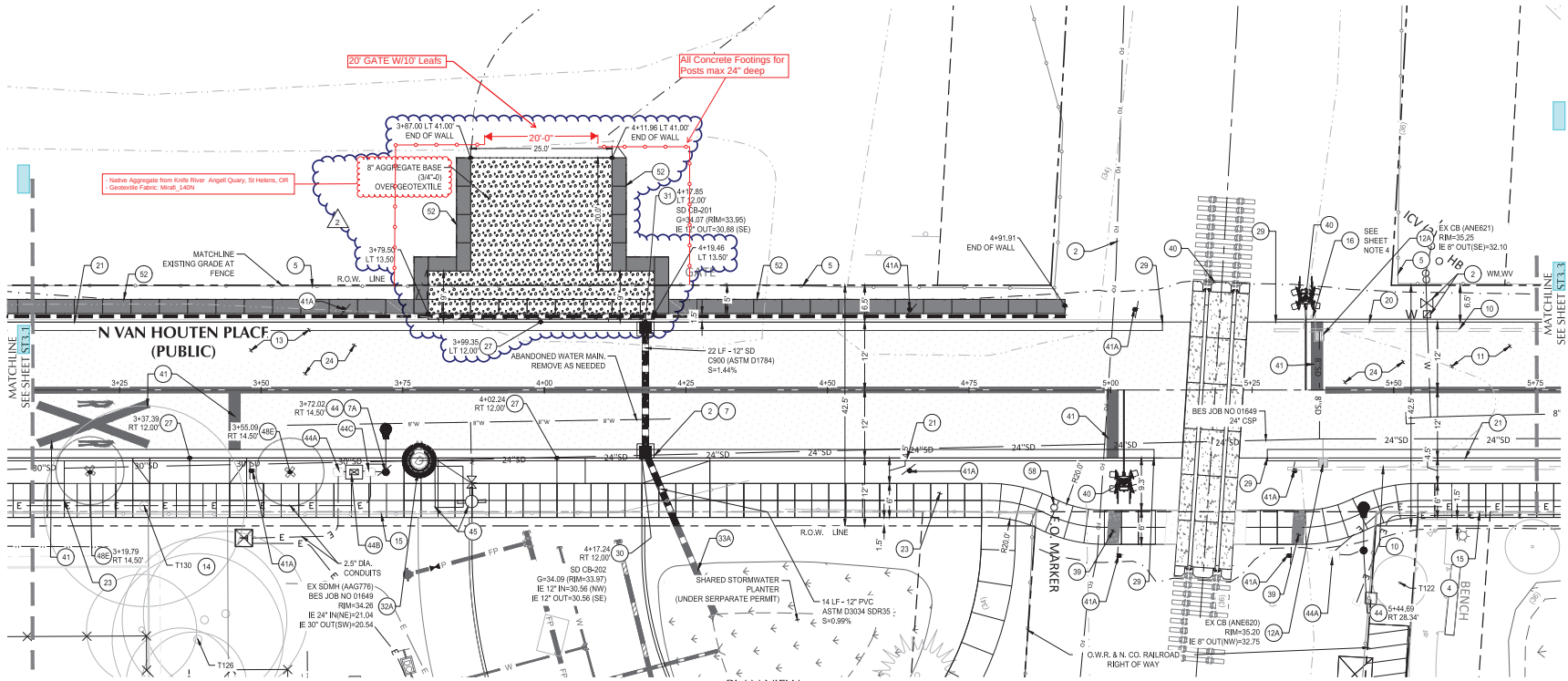


SUBMITTAL FOR REVIEW

McCormick & Baxter - Access Gate and
Fencing

Submittal Includes:

Fence Routing and Gate Layout
Geo textile Fabric and Gravel Base
Fence Materials Product Data



PLAN VIEW

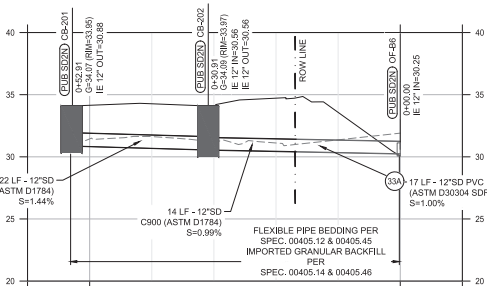
SCALE: 1" = 10'

KEY NOTES

- PROTECT EXISTING UTILITY (TYPE AS NOTED), ADJUST STRUCTURES TO FINISHED GRADE AS NECESSARY.
- PROTECT EXISTING TREE, TREE ID PER ARBORIST REPORT AS SHOWN.
- PROTECT EXISTING FENCE
- CROSSING OF EXISTING UTILITY, POTHOLE EXISTING UTILITY TO VERIFY DEPTH PRIOR TO CONSTRUCTION.
- REMOVE EXISTING CURB
- REMOVE EXISTING PAVEMENT AND ROCK SUBGRADE.
- REMOVE EXISTING CATCH BASIN AND LEAD, PLUG EXISTING LEAD AT MAIN
- REMOVE EXISTING TREE, TREE ID PER ARBORIST REPORT AS SHOWN.
- REMOVE EXISTING FENCE, COORDINATE EXTENT OF REMOVAL WITH ADJACENT PROPERTY OWNER, LINK, OF PORTLAND.
- REMOVE SIGN(S), REMOVE POST, SEE SIGNING & STRIPING PLAN ON ST7.1.
- CONSTRUCT STANDARD CURB PER PBOT STANDARD DWG P-440
- CONSTRUCT 18" STANDARD CURB AND GUTTER PER PBOT STANDARD DWG P-440, CONSTRUCT KEYWAY PER PBOT STANDARD DWG P-446 WHEN SIDEWALK IS ATTACHED.
- CONSTRUCT STANDARD SIDEWALK PER PBOT STANDARD DWG P-451, CONSTRUCT THICKENED EDGE WHEN SIDEWALK IS ATTACHED AS SHOWN ON PBOT STANDARD DWG P-446.
- AC PAVEMENT WITH 4" OF LEVEL 2, 1/2" DENSE GRADED WMAC (2 LIFTS) OVER 12" OF 3/4"-0 AGGREGATE BASE, NONWOVEN SUBGRADE GEOTEXTILE OVER COMPACTED SUBGRADE.
- CONSTRUCT ALTERNATE DEPRESSED SEPARATED DRIVEWAY PER PBOT STANDARD DWG P-509
- CURB ENDING PER PBOT STANDARD DWG P-544
- INSTALL G-2 INLET PER ODOT STANDARD DWG RD-364
- INSTALL CG-2 INLET PER ODOT STANDARD DWG RD-366
- EXISTING MANHOLE TO ADJ70 TO BE REPLACED WITH NEW MANHOLE PER BES PERMIT NO. EP375.
- PRIVATE STORM PIPE INSTALLED UNDER BOS PERMIT #19-247236-000-00-CO.
- INSTALL DETECTABLE WARNING SURFACE PER ODOT STANDARD DRAWING RD902.
- RAILROAD CROSSING AND APPURTENANCES, BY OTHERS, COORDINATE RAILROAD WORK WITH UPRR.
- PROPOSED STRIPING, SEE SIGNING & STRIPING PLAN ON ST7.1.
- PROPOSED SIGN(S) AND POST, SEE SIGNING & STRIPING PLAN ON ST7.1.
- INSTALL COBRAHEAD STREET LIGHT POLE, SEE ILLUMINATION PLANS.
- INSTALL STREET LIGHTING JUNCTION BOX, SEE ILLUMINATION PLANS.
- INSTALL STREET LIGHT SERVICE PANEL, SEE ILLUMINATION PLANS.
- INSTALL UTILITY JUNCTION BOX, SEE ILLUMINATION PLANS.
- REMOVE EXISTING DISCONNECTED FIRE HYDRANT AND WATER VAULT

SHEET NOTES

- ALL DIMENSIONS ARE TO FACE OF CURB OR FACE OF WALL.
- ALL WORK IN THE RIGHT-OF-WAY SHALL BE IN COMPLIANCE WITH THE CURRENT 2020 CITY OF PORTLAND STANDARD SPECIFICATIONS AND SPECIAL PROVISION.
- SEE SHEET ST3.3 FOR ROADWAY CENTERLINE ALIGNMENT DETAILS, ROADWAY CENTERLINE IS NOT CENTER OF RIGHT-OF-WAY.
- EXISTING SIGNS FOR RAILROAD CROSSING TO REMAIN IN PLACE UNTIL DIRECTED TO BE REMOVED BY UPRR. SEE ALSO KEY NOTE 40.



PUBLIC STORM (SD2N) PROFILE

SCALE: HORIZ. 1" = 20'
VERT. 1" = 10'

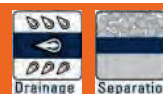
2/8/23		ADDED ADJACENT SITE DRIVEWAYS		DESIGNED BY <i>JL</i>	DATE APPROVED 08/02/22	SECTION ENGR <i>JW</i>		APPROVALS: PBOT PRINCIPAL ENGINEER REG. PROF. ENGR. 75155FE PBOT CITY ENGINEER REG. PROF. ENGR. 51538FE	PORTLAND BUREAU OF TRANSPORTATION JO ANN HARDESTY COMMISSIONER STEVE TOWNSEN, P.E. CITY ENGINEER		111 SW Fifth Ave., Suite 2600 Portland, OR 97204 O: 503.542.3860 F: 503.224.4681 www.kpff.com		PUBLIC IMPROVEMENTS FOR N VAN HOUTEN PL N VAN HOUTEN PL CIVIL PLAN	PBOT JOB NO. TB0058 SHEET NO. ST3.2 7 of 46	
NO.		DATE	DESCRIPTION												APPD.
REVISIONS															



Statistical Analysis 06/15/2023 - 06/15/2023 Acceptance
Knife River Corporation 242010-Angell Agg B00340009-3/4"-0 Base ODOT

Sample Id	Date	3/4" (%)	1/2" (%)	3/8" (%)	1/4" (%)	#4 (%)	#5 (%)	#6 (%)	#8 (%)	#10 (%)	PAN (%)	SE (%)	2.0mm/6.3mm
64938350/23b-564	06/15/2023 08:45	98	77	66	53	44	39	35	28	25	0.0	52	0.47
		3/4" (%)	1/2" (%)	3/8" (%)	1/4" (%)	#4 (%)	#5 (%)	#6 (%)	#8 (%)	#10 (%)	PAN (%)	SE (%)	2.0mm/6.3mm
	Count	1	1	1	1	1	1	1	1	1	1	1	1
	Mean	98	77	66	53	44	39	35	28	25	0.0	52	0.47
	St Dev												
	Pay Factor												
	Lower Spec (LSL)	90		55	40							30	0.4
	Upper Spec (USL)	100		75	60								0.6
Query	Query Selections Date Created 06/16/2023 Date Range 06/15/2023 - 06/15/2023 Plant 242010-Angell Agg Product B00340009-3/4"-0 Base ODOT Specification ODOT Base Dense 3/4 " Limit Auto-Compute Acceptance Number Of Tests 30 Passing: 1 Failures: 0 Conformance: 100.0 % Non-Conformance: 0.0 %												

Mirafi® 140N



Mirafi® 140N is a needlepunched nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. Mirafi® 140N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids. Mirafi® 140N meets AASHTO M288-06 Class 3 for Elongation > 50%.

TenCate Geosynthetics Americas Laboratories are accredited by [a2La](#) (The American Association for Laboratory Accreditation) and Geosynthetic Accreditation Institute – Laboratory Accreditation Program ([GAI-LAP](#)). **NTPEP Number: GTX-2012-01-009**

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D4632	lbs (N)	120 (534)	120 (534)
Grab Tensile Elongation	ASTM D4632	%	50	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	50 (223)	50 (223)
CBR Puncture Strength	ASTM D6241	lbs (N)	310 (1380)	
Apparent Opening Size (AOS) ¹	ASTM D4751	U.S. Sieve (mm)	70 (0.212)	
Permittivity	ASTM D4491	sec ⁻¹	1.7	
Flow Rate	ASTM D4491	gal/min/ft ² (l/min/m ²)	135 (5500)	
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	70	

¹ ASTM D4751: AOS is a Maximum Opening Diameter Value

Physical Properties	Unit	Typical Value	
Roll Dimensions (width x length)	ft (m)	12.5 x 360 (3.8 x 110)	15 x 360 (4.5 x 110)
Roll Area	yd ² (m ²)	500 (418)	600 (502)
Estimated Roll Weight	lb (kg)	139 (63)	167 (76)

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FGS000385
ETQR59



GAI-LAP-25-97

Testing Lab 1291.01 & 1291.02

**TOWN & COUNTRY FENCE CO.
OF OREGON**

8810 S.E. HERBERT COURT • P.O. BOX 443
CLACKAMAS, OREGON 97015-0443
PHONE: (503) 655-2055 • FAX: (503) 655-0353

Town & Country Fence Co. of Oregon

Chain Link Fences and Gates

Submittals

For

**Lease Crutcher Lewis
University of Portland
McCormick & Baxter Fence**

T&C Job # TBD



2" - 11 Gauge (0.120") GBW / 1.2 oz./ft.² Zinc Coating

Meets ASTM A 392, Class 1 • Feet Per Roll: 50

HEIGHT	KK PART NO.	KT PART NO.	WEIGHT PER FT.	NOTES
3'	055607	—	1.45	
42"	055608	—	1.70	
4'	055609	—	1.95	
5'	055610	—	2.45	
6'	055611	055612	2.80	
7'	055614	055615	3.40	
8'	055617	055618	3.80	
10'	055620	055621	4.85	
12'	055623	055624	5.80	

2" - 9 Gauge (0.148") GBW / 1.2 oz./ft.² Zinc Coating

Meets ASTM A 392, Class 1 • Feet Per Roll: 50

HEIGHT	KK PART NO.	KT PART NO.	WEIGHT PER FT.	NOTES
3'	055630	—	2.15	
42"	055631	—	2.51	
4'	055632	—	2.90	
5'	055633	—	3.60	
6'	055635	055636	4.30	
7'	055638	055639	5.05	
8'	055641	055642	5.80	
10'	055644	055645	7.20	
12'	055647	055648	8.70	

SPECIAL NOTE: KT or TT Selvage on 5' high fabric or less is **not recommended** for Residential Applications

Chain Link - Pipe and Tube

Import Full Weight (Schedule 40) • 1.8 oz. Galvanized Pipe

Import Full Weight (Schedule 40) / 1.8 oz.

DESCRIPTION	18'	PART NO. 21'	24'	PIECES PER BUNDLE	WEIGHT PER FT.	NOMINAL WALL THICKNESS	NOTES
1-3/8" O.D. - PE	033495	033500	033552	60	1.68	.133	
1-5/8" O.D. - PE	033554	033551	033553	42	2.27	.140	Top & Brace Rail - Gate Frame
1-7/8" O.D.	033711	033712	033714	36	2.72	.145	Line Posts
2-3/8" O.D.	033950	033952	033954	26	3.65	.154	Terminal Posts
2-7/8" O.D.	034280	034282	034284	18	5.79	.203	
3-1/2" O.D.	034286	034287	034289	14	7.58	.216	
4" O.D.	034469	034471	034473	12	9.11	.226	Gate Posts
4-1/2" O.D.	034475	034477	034479	10	10.79	.237	
6-5/8" O.D.	034503	034502	034504	5	18.97	.280	
8-5/8" O.D.	034509	034511	034513	1	28.55	.322	

1-5/8" O.D. Import Full Weight Posts (Schedule 40) / 1.8 oz. • Nominal wall thickness .140

DESCRIPTION	PART NO.	PIECES PER BUNDLE	WEIGHT EA.	NOTES
5'	033561	42	11.35	
5' 6"	033562	42	12.49	
6'	033563	42	13.62	
6' 6"	033564	42	14.75	
7'	033565	42	15.89	
7' 6"	033566	42	17.03	
8'	033567	42	18.16	
9'	033569	42	20.43	
10'	033570	42	22.70	

SPECIAL NOTE: Call us for all your special needs: Drilled Posts, Welded Plates, Post Bending, etc.

Chain Link - Pipe and Tube

Import Full Weight (Schedule 40) • 1.8 oz. Galvanized Pipe

1-7/8" O.D. Import Full Weight Posts (Schedule 40) / 1.8 oz. • Nominal wall thickness .145

DESCRIPTION	PART NO.	PIECES PER BUNDLE	WEIGHT EA.	NOTES
5'	033801	36	13.60	
5' 6"	033802	36	14.96	
6'	033803	36	16.32	
6' 6"	033814	36	17.68	
7'	033805	36	19.04	
8'	033807	36	21.76	
8' 8"	033808	36	23.58	
9'	033809	36	24.48	
10'	033810	36	27.20	
10' 6"	033813	36	28.56	
11'	033818	36	24.97	
12'	033820	36	32.64	

2-3/8" O.D. Import Full Weight Posts (Schedule 40) / 1.8 oz. • Nominal wall thickness .154

DESCRIPTION	PART NO.	PIECES PER BUNDLE	WEIGHT EA.	NOTES
5'	034101	26	18.25	
5' 6"	034102	26	20.08	
6'	034103	26	21.90	
6' 6"	034104	26	23.73	
7'	034105	26	25.55	
8'	034107	26	29.20	
8' 8"	034108	26	31.65	
9'	034109	26	32.85	
9' 8"	034111	26	35.28	
10'	034110	26	36.50	
10' 6"	034112	26	38.33	
11'	034114	26	40.15	
12'	034115	26	43.80	
13'	034117	26	47.45	
14'	034125	26	51.10	
15'	034119	26	54.75	

SPECIAL NOTE: Call us for all your special needs: Drilled Posts, Welded Plates, Post Bending, etc.

Chain Link - Pipe and Tube

Import Full Weight (Schedule 40) • 1.8 oz. Galvanized Pipe

2-7/8" O.D. Import Full Weight Posts (Schedule 40) / 1.8 oz. • Nominal wall thickness .203

DESCRIPTION	PART NO.	PIECES PER BUNDLE	WEIGHT EA.	NOTES
5'	034332	18	28.95	
6'	034333	18	34.74	
7'	034335	18	40.53	
8'	034337	18	46.32	
9'	034339	18	52.11	
10'	034340	18	57.90	
10' 6"	034342	18	60.80	
11'	034341	18	63.69	
12'	034345	18	69.48	
13'	034347	18	75.27	
15'	034349	18	86.85	

4" O.D. Import Full Weight Posts (Schedule 40) / 1.8 oz. • Nominal wall thickness .226

DESCRIPTION	PART NO.	PIECES PER BUNDLE	WEIGHT EA.	NOTES
5'	034431	12	45.50	
6'	034433	12	54.60	
7'	034435	12	63.70	
8'	034437	12	72.80	
9'	034439	12	81.90	
10'	034440	12	91.00	
10' 6"	034443	12	95.55	
11'	034441	12	100.10	
12'	034442	12	109.20	
13'	034447	12	118.30	
14'	034449	12	127.40	
15'	034450	12	136.50	

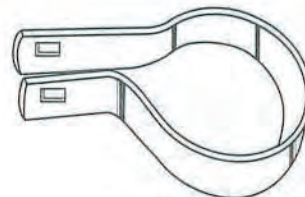
SPECIAL NOTE: Call us for all your special needs: Drilled Posts, Welded Plates, Post Bending, etc.

Chain Link - Fittings

Regular Tension Bands / 14 ga. x 3/4" Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	010101	250	.12	
1-5/8"	010102	250	.14	
1-7/8"	010103	250	.15	
2-3/8"	010104	250	.18	
2-7/8"	010105	100	.20	
3" Full	010106	100	.21	
3-1/2"	010107	100	.23	
4"	010108	100	.24	
4-1/2"	010109	100	.30	

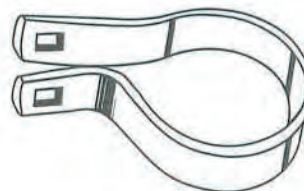
Use 5/16" x 1-1/4" Carriage Bolt – Pt. #010701



Medium Tension Bands / 12 ga. x 7/8" Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	010551	200	.21	
1-5/8"	010552	200	.25	
1-7/8"	010553	200	.26	
2-3/8"	010554	200	.31	
2-7/8"	010555	100	.35	
3-1/2"	010557	100	.41	
4"	010558	100	.46	
4-1/2"	010559	100	.52	
6-5/8"	010560	50	.68	

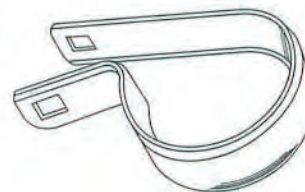
Use 5/16" x 1-1/4" Carriage Bolt – Pt. #010701



Beveled Tension Bands / 12 ga. x 7/8" Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	010251	250	.19	
1-5/8"	010252	250	.21	
1-7/8"	010253	250	.22	
2-3/8"	010254	250	.26	
2-7/8"	010255	100	.34	
4"	010258	100	.38	
6-5/8"	010260	50	.56	
8-5/8"	010261	50	.84	

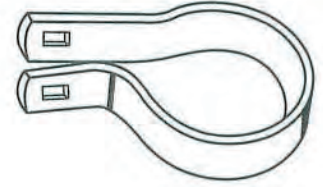
Use 5/16" x 1-1/4" Carriage Bolt – Pt. #010701



Heavy Tension Bands / 1/8" x 1" Pressed Steel – Galvanized

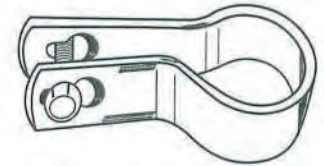
DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	010201	250	.26	
1-5/8"	010202	250	.30	
1-7/8"	010203	100	.33	
2-3/8"	010204	100	.39	
2-7/8"	010205	100	.42	
3-1/2"	010207	100	.50	
4"	010208	50	.59	
4-1/2"	010209	50	.66	
6-5/8"	010210	50	.85	
8-5/8"	010211	50	1.10	

Use 3/8" x 1-1/2" Carriage Bolt – Pt. #010704



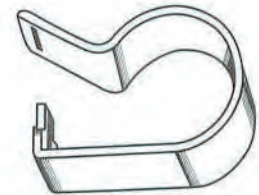
Snappy Tension Band / Pressed Steel – Galvanized with Aluminum Fastener

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	010121	100	.10	



Boltless Tension Band / Aluminum

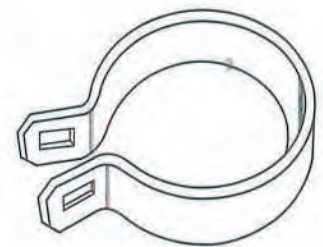
DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
2-3/8"	010164	250	.06	



Regular Brace Bands / 12 ga. x 3/4" Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	010301	250	.13	
1-5/8"	010302	250	.15	
1-7/8"	010303	250	.18	
2-3/8"	010304	250	.21	
2-7/8"	010305	100	.24	
3" Full	010306	100	.25	
3-1/2"	010307	100	.30	
4"	010308	100	.34	
4-1/2"	010309	100	.36	

Use 5/16" x 1-1/4" Carriage Bolt – Pt. #010701



Chain Link - Fittings

Caps, Heavy / Die-Cast Aluminum

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	011301	350	.06	
1-5/8"	011302	350	.09	
1-7/8"	011303	250	.10	
2-3/8"	011304	150	.14	
2-7/8"	011315	150	.20	
3-1/2"	011316	150	.20	
4"	011317	50	.22	
4-1/2"	011313	4	.56	
6-5/8"	011319	4	.56	



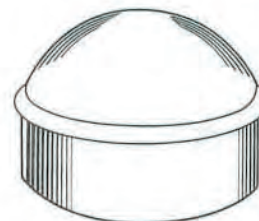
Acorn Caps / Die-Cast Aluminum

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	011321	350	.08	
1-5/8"	011322	350	.13	
1-7/8"	011323	250	.16	
2-3/8"	011324	150	.25	
2-7/8"	011325	100	.37	



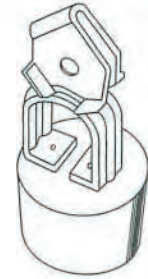
Caps / Pressed Steel - Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	011601	250	.10	
1-5/8"	011602	250	.13	
1-7/8"	011603	200	.16	
2-3/8"	011604	125	.23	
2-7/8"	011605	100	.31	
3" Full	011606	125	.42	
3-1/2"	011607	25	.49	
4"	011608	25	.59	
4-1/2"	011609	25	.89	
6-5/8"	011610	10	1.44	
8-5/8"	414W00	10	2.00	



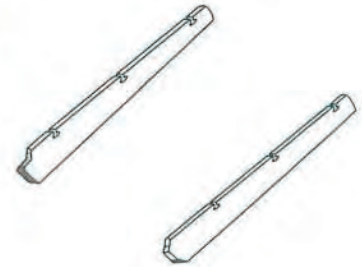
Barb Bases / Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-5/8" x 1-5/8"	012881	50	.71	
1-7/8" x 1-5/8"	012882	50	.74	
2-3/8" x 1-5/8"	012883	50	.87	
2-7/8" x 1-5/8"	012884	25	1.26	



Extension Arms / Pressed Steel – Galvanized

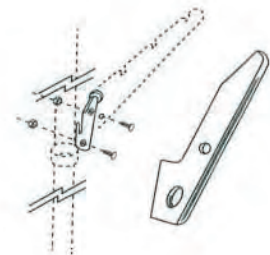
DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
With S Slot	013103	50	.89	
S Slot Notched for V-Arm	013104	50	.75	



Holding Bracket For Extension Arm / Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
Universal	013125	50	.24	

NOTE: Use with one 1/8" x 1" Brace Band (sold separately).



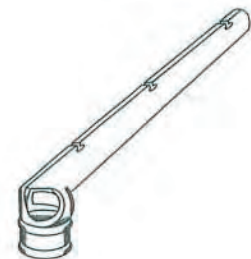
Barb Wire Arms Upright / Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-7/8" x 1-5/8"	013123	25	1.50	
2-3/8" x 1-5/8"	013124	25	1.60	



Barb Wire Arms 45° / One-Piece Line Arm • Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-5/8" x 1-5/8"	013107	25	1.65	
1-7/8" x 1-5/8"	013108	25	1.70	
2-3/8" x 1-5/8"	013109	25	1.80	
2-7/8" x 1-5/8"	013129	25	1.84	
4" x 1-5/8"	013141	25	2.60	
6-5/8" x 1-5/8"	005246	25	6.20	



E-Z Aluminum Ties

DESCRIPTION	PART NO.	PER CASE	CASE WEIGHT	NOTES
(1-5/8") 6", 11 ga.	023524	3500	31.00	
(1-7/8") 6-1/2", 9 ga.	023526	2400	32.00	
(2-3/8") 8-1/4", 9 ga.	023527	1700	28.00	
(1-7/8") 6-1/2", 6 ga.	023522	2400	43.20	
(2-3/8") 8-1/4", 6 ga.	023523	1700	34.00	

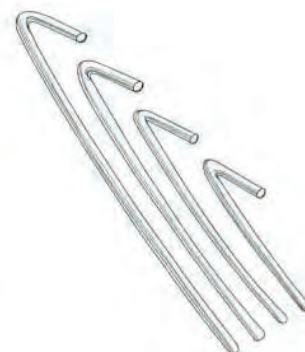
NOTE: Sold only in full bags of 100 pieces.



Aluminum Ties

DESCRIPTION	PART NO.	PER CASE	CASE WEIGHT	NOTES
(1-7/8") 6-1/2", 11 ga. No. 33	023555	5600	50.00	
(1-7/8") 6-1/2", 11 ga. UPC	087036	30/BG	50.00	
(1-7/8") 6-1/2", 9 ga. No. 13	023552	3700	47.00	
(2-3/8") 8-1/4", 9 ga. No. 16	023553	3100	48.00	
(2-7/8") 10-1/2", 9 ga.	023558	2000	39.40	
(4") 12-1/2", 9 ga.	023561	2000	39.40	
(6-5/8") 14", 9 ga.	023564	1200	48.00	
(1-7/8") 6-1/2", 6 ga. No. 23	023559	1000	18.00	
(2-3/8") 8-1/4", 6 ga. No. 26	023560	2400	48.00	
(4") 12-1/2", 6 ga.	023563	500	12.50	

NOTE: Sold only in full bags of 100 pieces.



E-Z Twist Ties / 1.2 oz Steel

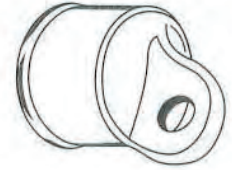
DESCRIPTION	PART NO.	CASE WEIGHT PER 500	CASE WEIGHT PER 1000	NOTES
(1-3/8") 11 ga.	026Y00	13.00	26.00	
(1-5/8") 11 ga.	468D00	15.00	30.00	
(1-7/8") 11 ga.	469D00	16.00	31.00	
(2-3/8") 11 ga.	470D00	19.00	37.00	
(2-7/8") 11 ga.	471D00	21.00	42.00	
(1-5/8") 9 ga.	002178	24.00	48.00	
(1-7/8") 9 ga.	002179	26.00	50.00	
(2-3/8") 9 ga.	023567	29.00	56.00	
(2-7/8") 9 ga.	002229	33.00	—	
(4") 9 ga.	583W00	43.00	—	
E-Z Twist Tie Tool - 11 gauge	475D00	1.00/ea	—	
E-Z Twist Tie Tool - 9 gauge	070260	1.00/ea	—	

NOTE: Sold only in full boxes.



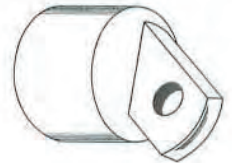
Rail Ends / Die-Cast Aluminum

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	012301	500	.10	
1-5/8"	012302	250	.16	



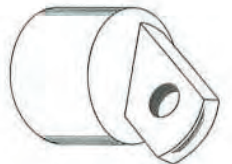
Rail Ends / Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8"	012515	100	.21	
1-5/8"	012506	100	.33	
1-7/8"	012508	50	.39	
2-3/8"	012510	50	.49	
2-7/8"	436A00	50	.59	
3-1/2"	000F99	50	1.00	



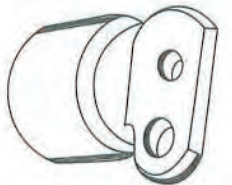
Dura Rail End / Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-5/8"	012712	100	.28	



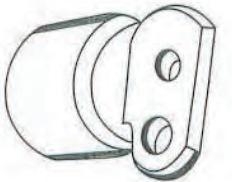
Rail Ends 2-Hole / Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-5/8"	012507	100	.48	
1-7/8"	012509	50	.51	



Dura Rail End 2-Hole / Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-5/8"	012713	100	.36	



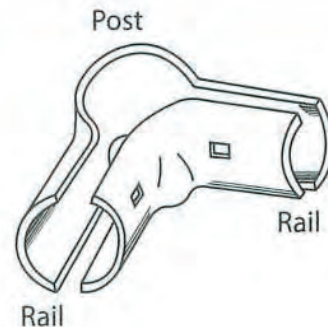
Chain Link - Fittings

Heavy Corner Rail Clamps / Pressed Steel - Galvanized

3/16" Wall Thickness • Sizes: post first - rail second.

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
4" x 1-5/8"	645H00	50	3.00	

Use 5/16" x 2-1/2" Carriage Bolt - Pt. # 010718



Sleeves / Galvanized - Steel

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-3/8" x 6"	012601	100	.39	
1-5/8" x 6"	012602	50	.53	
1-5/8" x 7"	012603	50	.61	
1-7/8" x 6"	012604	50	.57	



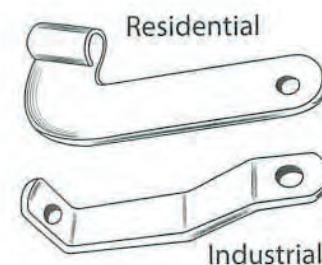
Sleeves - Expansion Type / With Spring • Galvanized - Steel

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-5/8" x 7"	012701	25	.74	
Expansion Spring Only	012705	25	.15	



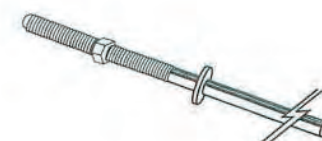
Truss Tighteners / Pressed Steel - Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
Residential	018150	100	.24	
Industrial	018101	100	.45	



Threaded Truss Rods / 3/8" Diameter with Nut • Galvanized - Steel

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
10' 6"	017901	25	3.95	
11'	017902	25	4.13	
12'	017903	25	4.51	
20'	017950	25	7.52	



Tension Bars 3/16" x 5/8" / Galvanized - Steel

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
34"	013601	25	1.13	
40"	013602	25	1.33	
46"	013603	25	1.53	
58"	013604	25	1.92	
70"	013605	25	2.32	



Tension Bars 3/16" x 3/4" / Galvanized - Steel

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
34"	013701	25	1.35	
40"	013702	25	1.59	
46"	013703	25	1.83	
58"	013704	25	2.31	
70"	013705	25	2.79	
82"	013706	25	3.27	
94"	013707	25	3.74	
118"	013709	25	4.70	
142"	013710	25	5.66	



Tension Bars 1/4" x 3/4" / Galvanized - Steel

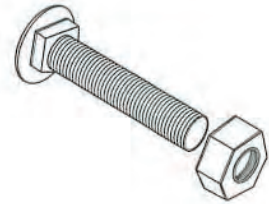
DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
58"	013745	25	3.08	
70"	013747	25	3.72	
82"	013749	25	4.36	
94"	013751	25	5.00	
118"	013755	25	6.27	
142"	013759	25	7.55	



Chain Link - Accessories

Carriage Bolts / With Nut, Galvanized - Steel

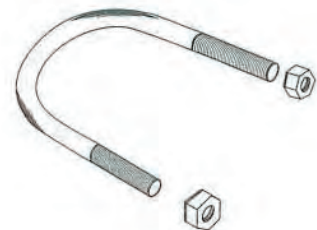
DESCRIPTION	PART NO.	PER CASE	WEIGHT EA.	NOTES
1/4" x 3/4"	010720	1000	.022	
5/16" x 1-1/4"	010701	2000	.039	
5/16" x 1-1/2"	010702	1000	.045	
5/16" x 1-3/4"	010717	1000	.048	
5/16" x 2"	010715	1000	.051	
5/16" x 2-1/4"	010716	1000	.055	
5/16" x 2-1/2"	010718	1000	.059	
3/8" x 1-1/4"	010703	1000	.061	
3/8" x 1-1/2"	010704	1000	.066	
3/8" x 2"	010706	1000	.078	
3/8" x 2-1/4"	010707	1000	.084	
3/8" x 2-1/2"	010708	1000	.090	
3/8" x 3"	010710	1000	.101	
3/8" x 3-1/2"	010712	1000	.112	
3/8" x 4"	010719	1000	.124	



U Bolts / With Nut, Galvanized - Steel

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-7/8" OD x 1/2"	010751	50	.50	
2-7/8" OD x 1/2"	010753	50	.60	
4" OD x 1/2"	010755	50	.67	
4-1/2" OD x 1/2"	010756	50	.83	
6-5/8" OD x 5/8"	010757	50	1.84	

Note: Not for cantilever gate rollers.



Hex Nuts / Galvanized - Steel

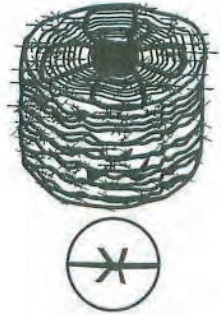
DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1/4"	010791	100	.007	
5/16"	010792	100	.011	
3/8"	010793	100	.016	
1/2"	010795	100	.035	



High Tensile Barb Wire / Class 3 Galvanized • Meets ASTM A 121

DESCRIPTION	PART NO.	QTY. PER REEL	WEIGHT EA.	NOTES
4 pt. 15-1/2 ga. 5" Barb Spacing	013511	1320'	43.00	

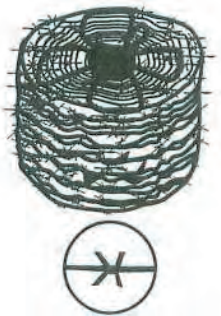
NOTE: Sold only in full reels. 1320' = 80 Rods



Barb Wire, Spec / Class 3 Galvanized • Meets ASTM A 121

DESCRIPTION	PART NO.	QTY. PER REEL	WEIGHT EA.	NOTES
4 pt. 12-1/2 ga. 5" Barb Spacing	013526	1320'	88.00	

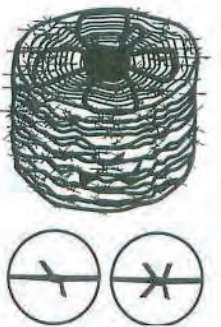
NOTE: Sold only in full reels. 1320' = 80 Rods



Aluminized Barb Wire, Spec / Steel • Meets ASTM A 121

DESCRIPTION	PART NO.	QTY. PER REEL	WEIGHT EA.	NOTES
4 pt. 12-1/2 ga. 5" Barb Spacing	013522	1320'	81.00	

NOTE: Sold only in full reels. 1320' = 80 Rods



Barb Wire, Non-Spec / Commercial Galvanized

DESCRIPTION	PART NO.	QTY. PER REEL	WEIGHT EA.	NOTES
2 pt. 12-1/2 ga.	013502	1320'	69.00	
4 pt. 12-1/2 ga.	013501	1320'	77.00	

NOTE: Sold only in full reels. 1320' = 80 Rods

NOTE: Non-spec Barb Wire will void systems warranties.



Barbed Obstacle Wire / Stainless Steel Barbed Tape with .098" Galvanized Core Wire .80 oz./ft² Zinc Coating

DESCRIPTION	PART NO.	FT. PER LB.	COIL WEIGHT	NOTES
18" Single Coil Galv Core 33L	013515	50'	12.00	
24" Single Coil Galv Core 33L	013514	50'	18.20	

NOTE: Sold only in 50' coils; 50' based on installation at 18" on center spacing. Bulk packaging - 5 coils per box.

LIMITATIONS: The manufacturer recommends the installation of barbed tape obstacle on fences or walls that have a minimum height of 7 feet; or installed in such a manner as to avoid contact by all pedestrian traffic.



Chain Link - Accessories

Barbed Obstacle Wire - Specialty Use / Stainless Steel Barbed Tape with .098" Galvanized Core Wire, .80 oz./ft2 Zinc Coating

DESCRIPTION	PART NO.	COIL YIELD	COIL WEIGHT	NOTES
18" Maze Galv Core 31L	013535	15'	12.00.	
24" Maze Galv Core 31L	007676	20'	29.00	
24"/30" Maze Galv Core 31L	013552	20'	39.00	
24" Maze SS Core 31L	006954	20'	38.00	
30" Maze SS Core 31L	007172	20'	22.00	
30" Super Maze SS Core 51L	005801	25'	32.00	

NOTE: Sold only in full coils. Bulk packaging - 5 coils per box.

LIMITATIONS: The manufacturer recommends the installation of barbed tape obstacle on fences or walls that have a minimum height of 7 feet; or installed in such a manner as to avoid contact by all pedestrian traffic.



Coil Spring Tension Wire, Spec / Class 1 Galvanized • Meets ASTM 824

DESCRIPTION	PART NO.	FT. PER LB.	COIL WEIGHT	NOTES
7 ga. .80 zinc coating - Priced per lb.	023541	12'	100.00	
7 ga. .80 zinc coating - Priced per ft.	023499	12'	85.00	

NOTE: Sold only in full coils. Weights are approximate.



Coil Spring Tension Wire, Spec / Class 2 Galvanized • Meets ASTM 824

DESCRIPTION	PART NO.	FT. PER LB.	COIL WEIGHT	NOTES
7 ga. 1.2 zinc coating - Priced by coil	023505	12'	85.00	

NOTE: Sold only in full coils. Weights are approximate.



Coil Spring Tension Wire, Spec / Meets ASTM 824, Type 1

DESCRIPTION	PART NO.	FT. PER LB.	COIL WEIGHT	NOTES
7 ga. .40 aluminized - Priced per lb.	023548	12'	85.00	
7 ga. .40 aluminized - Priced per ft.	023540	12'	85.00	

NOTE: Weights are approximate.



Smooth Tension Wire, Spec / Class 3 Galvanized • Meets ASTM A 641

DESCRIPTION	PART NO.	FT. PER LB.	COIL WEIGHT	NOTES
6 ga., 1.00 zinc coating	023500	10-1/4'	100.00	
9 ga., .90 zinc coating	023501	17'	100.00	
9 ga., .90 zinc coating UPC	087025	17'	10.00	
10 ga., .85 zinc coating	023511	20-1/2'	100.00	
11 ga., .85 zinc coating	023521	25-3/4'	100.00	
12 ga., .80 zinc coating	023531	33-1/2'	100.00	
16 ga., .60 zinc coating	023535	96'	100.00	

NOTE: Weights are approximate.

NOTE: Non-spec Tension Wire will void systems warranties.



Barbless Wire / Class 1 Galvanized

DESCRIPTION	PART NO.	QTY. PER REEL	REEL WEIGHT	NOTES
12-1/2 ga.	013531	1320'	62.00	
14 ga.	013532	1320'	44.00	

NOTE: Sold only in full reels.



Hog Rings / Class 3 • Steel - Zinc Coating • Meets ASTM F 626

DESCRIPTION	PART NO.	QTY. PER LB.	CASE WEIGHT	NOTES
12-1/2 ga. .80	023601	224	25.00	
12-1/2 ga. .80 UPC	087037	88	25.00	
9 ga. .90	023602	80	25.00	

NOTE: Weights are approximate.



Hog Rings / Meets ASTM F 626

DESCRIPTION	PART NO.	QTY. PER LB.	CASE WEIGHT	NOTES
9 ga. Aluminum	023621	264	10.00	
9 ga. Stainless Steel	003765	169	25.00	

NOTE: Weights are approximate.



Malco Hog Rings / Weight is approximate. *Meets ASTM A 641

DESCRIPTION	PART NO.	QTY. PER LB.	BOX WEIGHT	NOTES
9 ga. Galvanized Steel Class 3*	664C00	500	6.00	
9 ga. Aluminum	665C00	500	2.00	
Malco Hog Ring Plier	661C00	N/A	2.90/ea	

NOTE: Malco hog rings and pliers cannot be used with non-Malco hog rings or hog ring tools

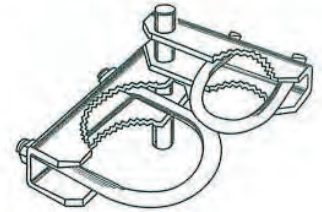
NOTE: Weights are approximate.



Chain Link - Gate Fittings

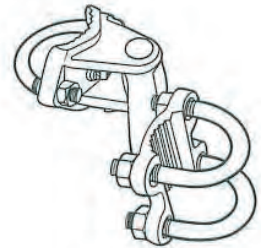
180° Industrial Hinges / Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
2-3/8" x 1-5/8" or 1-7/8"	015601	10	3.00	
2-7/8" x 1-5/8" or 1-7/8"	015603	10	3.20	
3-1/2" x 1-5/8" or 1-7/8"	015604	10	4.00	
4" x 1-5/8" or 1-7/8"	015605	10	4.20	
4-1/2" x 1-5/8" or 1-7/8"	015606	10	4.50	
6-5/8" x 1-5/8" or 1-7/8"	015607	4	6.00	
8-5/8" x 1-5/8" or 1-7/8"	015609	4	9.00	



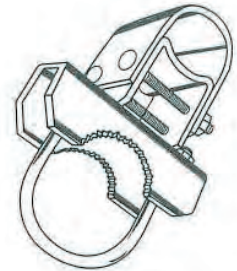
Offset 180° Industrial Hinges / Malleable Iron – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
2-3/8" x 1-5/8" or 1-7/8"	014033	4	3.52	
2-7/8" x 1-5/8" or 1-7/8"	014034	4	3.85	
4" x 1-5/8" or 1-7/8"	014036	4	4.62	
6-5/8" x 1-5/8" or 1-7/8"	014038	4	8.00	



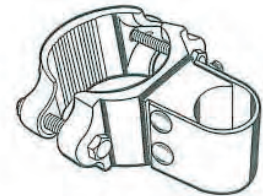
Bulldog Industrial Hinges / Pressed Steel – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
2-3/8" x 1-5/8" or 1-7/8"	015671	10	3.20	
2-7/8" x 1-5/8" or 1-7/8"	015672	10	3.30	
4" x 1-5/8" or 1-7/8"	015674	10	3.70	
4-1/2" x 1-5/8" or 1-7/8"	015675	10	3.90	
6-5/8" x 1-5/8" or 1-7/8"	015676	4	5.90	



Box Industrial Hinges / Malleable Iron – Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
2-3/8" x 1-5/8" or 1-7/8"	015751	4	3.70	
2-7/8" x 1-5/8" or 1-7/8"	015752	4	4.10	
4" x 1-5/8" or 1-7/8"	015754	4	4.50	
6-5/8" x 1-5/8" or 1-7/8"	015756	4	11.50	
8-5/8" x 1-5/8" or 1-7/8"	015757	4	16.68	



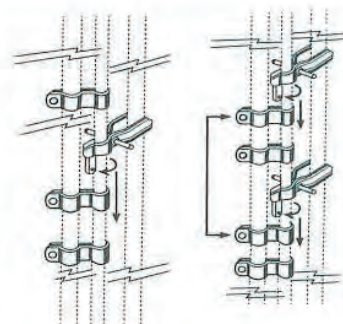
Chain Link - Gate Fittings

Industrial Latches / Pressed Steel - Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-5/8" Assembly	017201	10	4.80	
1-7/8" Assembly	017202	10	4.98	
Assembly includes: 1 Fork, 3 Guides, Bolts. Drop Rod not included.				
1-5/8" Guide Only	017211	75	0.99	
Use 3/8" x 2-1/4" Carriage Bolt - Pt. #010707				
1-7/8" Guide Only	017212	75	1.05	
Use 3/8" x 2-1/2" Carriage Bolt - Pt. #010708				
1-5/8" Fork Only	017213	25	1.54	
1-7/8" Fork Only	017214	25	1.56	
1-5/8" Assembly with Drop Rod	017217	10	12.00	
1-7/8" Assembly with Drop Rod	017218	10	12.00	

Assembly with Drop Rod includes: Fork, 3 Guides, Bolts, 1-3/8" x 7' Drop Rod - with Fork welded to Rod.

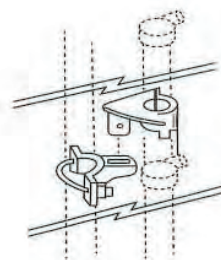
NOTE: Optional with 4 Guides and 2 Forks at extra cost.



Frost Free Latch Assembly / For Double Swing Gates • Malleable Iron - Galvanized

DESCRIPTION	PART NO.	PER SACK	WEIGHT EA.	NOTES
1-5/8" Gate Frame	017205	10	2.83	
1-7/8" Gate Frame	017206	10	2.98	

NOTE: Does not require Drop Rod.



Fence-Loc Latches / Pressed Steel - Galvanized

DESCRIPTION	PART NO.	PER CARTON	WEIGHT EA.	NOTES
1-3/8" Gate Frame	017223	30	2.23	
1-5/8" or 1-7/8" Gate Frame	017221	15	4.50	

