Operation and Maintenance Report
January 2021 to December 2021

McCormick & Baxter Superfund Site

Portland, Oregon
ECSI Site No. 74

Prepared for
Oregon Department of Environmental Quality

May 6, 2022
0202315-000/003/01

HALEY ALDRICH

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ACRONYMS AND ABBREVIATIONS

ACB	articulated concrete block
AWQC	ambient water quality criteria
bgs	below the ground surface
BES	City of Portland, Bureau of Environmental Services
cPAHs	carcinogenic PAHs
DEQ	Oregon Department of Environmental Quality
DNAPL	dense non-aqueous phase liquid
EPA	U.S. Environmental Protection Agency
FWDA	Former Waste Disposal Area
GSI	GSI Water Solutions, Inc.
ICs	institutional controls
IGA	Intergovernmental Agreement
LNAPL	light non-aqueous phase liquid
Metro	Metro Regional Government
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
Mosaic	Mosaic Ecology LLC
NAPL	non-aqueous phase liquid
NAVD88	North American Vertical Datum of 1988
NOAA	National Oceanic and Atmospheric Administration
ng/L	nanograms per liter
O&M	Operation and Maintenance
PAH	polycyclic aromatic hydrocarbon
PCP	pentachlorophenol
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RM	River Mile
ROD	Record of Decision
SAP	Sampling and Analysis Plan
Site	McCormick & Baxter Superfund Site
TEQ	toxic equivalency
TFA	Tank Farm Area
TRM	turf-reinforced matting
µg/L	micrograms per liter
USGS	U.S. Geological Survey

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Portland, Oregon

1.0 INTRODUCTION AND PURPOSE

This Operation and Maintenance (O&M) Report has been prepared for the Oregon Department of Environmental Quality (DEQ) to document the O&M activities implemented at the McCormick & Baxter Superfund Site (the "Site") located in Portland, Oregon, between January 1, 2021, and December 31, 2021.

O&M activities are identified in the Final O&M Plan prepared by DEQ and the U.S. Environmental Protection Agency (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 the frequency conducted at the Site from 2005 through 2010. The Final O&M Plan reflects that reduction. The O&M Manual specifies the Sampling and Analysis Plan (SAP) 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 Water Solutions, Inc. (GSI) are in the process of updating the O&M manual, which was last updated in March 2018 (Hart Crowser and GSI 2018).

The purpose of this O&M Report is to document the operation, monitoring, and maintenance activities that occurred in calendar year 2021. Figure 1-1 shows the location of the Site; Figure 1-2 presents the current Site layout and features; Figure 1-3 presents the Site capping components; Figure 1-4 presents the Site layout with surface elevations; Figure 1-5 presents the historical contaminant areas; and Figure 1-6 presents historical non-aqueous phase liquid (NAPL) distribution. This report has been prepared by DEQ's contractor team of Haley & Aldrich and GSI.

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 2022. Section 8 provides references. Appendix A provides a photograph log of Site activities and observations associated with O&M activities. Appendix B provides Site activity documentation, including the field observation forms for the soil and sediment cap, Site inspection meeting summaries, and the sign-in log. Appendix C provides a photograph log of vegetation observations.

Routine operation, monitoring, and maintenance activities in 2021 were implemented primarily by DEQ's contractor, Haley & Aldrich, and its teaming partner GSI (under subcontract to Haley & Aldrich). O&M activities were also performed by Rapid Response Bio Clean, Mosaic Ecology, American Backflow Services, and Ballard Marine Services.

Key personnel for implementation of O&M activities include:

- Sarah Miller: DEQ Project Officer;
- Danielle Johnson: DEQ Contract Officer;
- Rick Ernst: Haley & Aldrich Program Manager;
- Kevin Woodhouse: Haley & Aldrich Site Manager;
- Ben Johnson: GSI Former Hydrogeology Manager; and
- Chris Rhea: GSI Hydrogeology Manager.

2.0 SOIL CAP PERFORMANCE STANDARDS AND ACTIVITIES

This section presents a summary of soil cap performance standards, observations, and maintenance activities at the Site for the reporting period January 1, 2021, through December 31, 2021, 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 2021.

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) (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 (National Oceanic and Atmospheric Administration [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 on March 8, May 20, September 2, and December 7, 2021, by DEQ, Haley & Aldrich, and GSI. EPA attended the May 20, 2021 inspection. These inspections are documented on observation forms developed for the Site. Inspection documentation and pertinent details are included in Appendix B. Observations of interest from the routine inspections are summarized on Figure 2-1 and are described in Section 2.2.1. Representative Site photographs of the Site taken in 2021 are presented in Appendix A. As required for the Site administrative record, a log of all visitors in 2021 was kept and is included in Appendix B.

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 the fence around 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 and filled sporadically throughout 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 2021 inspections, observed burrows were generally less than 6 inches deep; however, an area of deeper burrows was observed during the May Site inspection (Appendix A, Photograph A8). The burrows were filled in during a subsequent site visit to perform maintenance activities. Continued monitoring of burrows will be performed; however, no action will be taken to remove burrowing animals or to fill in the 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 isolate Site contaminants from human and ecological receptors.

No wildlife was observed on the soil cap during the any of the site inspections in 2021, though signs of bird foraging on the surface of the soil cap and burrows under the perimeter fence were observed throughout the year. Goose scat also was observed throughout the soil cap over the course of the year indicating that geese periodically visit the Site.

The gate at the top of North Edgewater Road marks the entrance to the Site and Willamette Cove property. This gate, which is secured with a series of locks and a chain, provides access for two railroads, Northwest Natural Gas, Metro Regional Government (Metro), DEQ, and other agencies. In 2020, DEQ's

primary Site access was switched from North Edgewater Road to the North Van Houten Place gate to improve Site access.

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. Main gate locks to the Site were found cut upon field staff arrival for quarterly site inspection in March and in December for derelict vessel removal.

During the May inspection, field personnel identified a partially buried, black polyvinyl chloride (PVC) riser and cap in the ground in the vicinity of MW-48s. At the time of inspection, the purpose of the riser and cap was unknown but upon review of the soil cap as-built drawings it was determined the riser and cap was one of seven cleanout ports for the perforated storm sewer collection piping. The construction as-built plans for the soil cap indicated that the cleanouts had been installed in vault boxes; however, field observations in May indicated installation did not occur. Installation of vault boxes for the seven cleanouts was completed during July maintenance activities.

In November 2020, DEQ notified Haley & Aldrich that two small cuts were made in the fence fabric surrounding the Site upland. Field staff prepared to perform repairs on the fence fabric during December 2020 O&M activities; however, when field staff arrived and performed a thorough assessment of the entire perimeter fence, the cuts were larger than anticipated and a total of five fence fabric cuts were present. The larger scope of work required a fence repair subcontractor to complete. Efforts to procure a fence repair subcontractor were initiated in early 2021. Haley & Aldrich performed several rounds of solicitation for fence repair subcontractors but was unable to get bids from any vendors. The fence cuts remained until Haley & Aldrich procured materials and tools necessary to self-perform the repairs. Fence repair activities are discussed in further detail in Section 2.3. Aside from fence cuts, the soil cap has not been disturbed or damaged and no other signs of trespassing (e.g., theft, trash dumping, camping, etc.) were observed.

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 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 for the past 12 years. 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 near well EW1s. This may be caused by anaerobic degradation, which generates less heat than aerobic degradation.

Ground surface subsidence is monitored by measuring the inner PVC 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 to be 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 2021 to evaluate the continued effectiveness of EW-1s well sealing activities and to determine if additional settling had occurred since 2009. Measurements of 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, significant additional settling in this area could affect 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 2021 included replacing cut locks and chains, filling animal burrows beneath the perimeter fence, monitoring vegetation, and removing blackberry vines along the perimeter fence. Non-routine maintenance performed in 2021 included completion of replacement signpost and sign installation, tree removal, drum removal and disposal, vault box installation, and fence repairs.

Perimeter signpost and sign replacement activities were initiated in December 2020, with the installation of replacement signposts along the eastern perimeter fence. This activity was completed on January 22, 2022, once replacement signs were received from the vendor and installed on Site gates and the newly installed signposts (Appendix A, Photographs A1 and A2).

Locks on perimeter fence gates were found cut on March 8 and December 23, 2021. Field staff purchased replacement locks from a local hardware store and the gates were resecured prior to field staff leaving the Site on each occasion.

Beginning on March 18, 2021, Mosaic Ecology, LLC (Mosaic) performed blackberry vine and tree removal activities. Mosaic removed blackberry vines growing over the northern and eastern perimeter fence and trees growing under the storage area and perimeter fences that would affect future fence integrity. Mosaic cut trees flush to the ground surface and treated the tree stumps with an herbicide to kill the roots and prevent regrowth (Appendix A, Photograph A6). Blackberry vines were cut back to clear a 5-foot buffer zone against the perimeter fence (Appendix A, Photograph A7). Cut material was then transported offsite for disposal as green waste.

On July 20, 2021, maintenance activities were initiated to install vault boxes around the seven buried cleanout risers that were identified during the May 2021 Site inspection. High-density polyethylene vault boxes were procured and installed at each cleanout location (Appendix A, Photograph A10). A painted T-post was installed adjacent to each vault box to aid in locating the vault box (Appendix A, Photograph A11). Vault box installation was completed in August 2021.

On August 17, 2021, maintenance activities were performed to complete vault box installation and fill in the animal burrows in the soil cap. The burrows were collapsed using a shovel and filled in using aggregate base rock from stockpiled material onsite (Appendix A, Photograph A12). Thirteen burrows located in the vicinity of MW-48s were filled in.

On August 26, 2021, five holes cut into the fabric of the perimeter fence were repaired, including replacement of fabric in some locations. Field staff installed tension bars into the existing fence fabric to secure it to the pole nearest the hole, cut the fence fabric with hole out, and installed new fence fabric between the adjacent poles (Appendix A, Photograph A13).

A vegetation assessment inspection on the soil cap was performed on June 2, 2021. 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; watering events were not necessary in 2021. Targeted weed removal and herbicide application was not necessary in 2021.

On September 22, 2021, American Backflow Services of Portland, Oregon, tested the Site's water supply line backflow prevention valve. The backflow prevention valve met state regulation standards.

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 (Appendix A, Photographs A9 and A11). 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 have damaged the integrity of the soil cap.

The upland soil cap subsidence near wells EW-1s and MW-23d currently is stable. Monitoring will continue in 2022 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.

Institutional controls 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 have damaged the soil cap or that would have been prohibited by deed restrictions.

3.0 SEDIMENT CAP PERFORMANCE STANDARDS AND ACTIVITIES

This section summarizes sediment cap observation and maintenance activities for the reporting period January 1, 2021, through December 31, 2021. Site observations and maintenance activities were conducted according to the O&M Plan. Sediment cap inspections were conducted on March 8, May 20, September 2, and December 7, 2021, by DEQ, Haley & Aldrich, and GSI in conjunction with inspections for the entire Site. Observations of interest based on the routine inspections and site meetings are presented on Figure 2-1. Routine inspections are documented in site inspection summaries and are presented in Appendix B. Table 3-1 provides a summary of sediment cap activities conducted in 2021.

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 (TEQ): $8x10^{-5}$ 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 (µg/L)
  - Chromium (III): 210 µg/L
  - Copper: 12 µg/L
  - Zinc: 110 µg/L
  - PCP: 13 µg/L
  - Acenaphthene: 520 µg/L
  - Fluoranthene: 54 µg/L
  - Naphthalene: 620 µg/L
  - Total carcinogenic PAHs (cPAHs): 0.031 µg/L
  - Dioxins/furans: 1.4x10-5 nanograms per liter (ng/L)

- 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, NOAA, 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 (MCLs)

The criteria above are for comparison only; the 1996 AWQCs remain as 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. Observations were made regarding habitat enhancement features, wildlife, vandalism, and/or trespassing. Representative photographs of the Willamette Cove and Willamette River shorelines taken in 2021 are presented in Appendix A. Sediment cap inspection documentation is included in Appendix B. In general, the sediment cap remains in good condition.

3.2.1 Shoreline Conditions

During the October 2018 site inspection, multiple 2- to 6-inch-wide voids were observed in the ACB along the shoreline in the Willamette Cove during seasonal and tidal low water levels. The gaps were visible for the first time since 2018 during the September 2021 Site inspection. Gaps up to approximately 6-inches wide were observed in areas and minor undulations of the ACB armoring were also observed (Appendix A, Photograph A14). These unconformities do not exhibit signs of erosion or impairment to the sediment cap; however, DEQ and Haley & Aldrich will continue to monitor the unconformities to evaluate the potential causes and to determine if maintenance of the ACB armoring is required.

An erosional depression beneath the turf-reinforced matting (TRM) at the northern end of the Willamette River shoreline was repaired in December 2020. The repair area was monitored specifically during the first two quarterly site inspections of 2021 (i.e., the wet season) to verify that the repair functioned as intended. No further erosion was observed, and specific monitoring of the area was discontinued during the third quarterly site inspection in September 2021.

On July 18, 2018, a fire burned approximately 1 acre at the northwestern end of the riparian area between monitoring wells MW-39s and MW-43s. The fire was likely caused by human activities (i.e., camping on the shoreline) and primarily burned brush and grass undergrowth impacting the riparian area closer to the river. Burned holes in the TRM from the fire were monitored throughout 2021 and were stable until the winter rain season began in November 2021. The high river levels contributed a larger volume of woody debris deposits along the high-water line compared to recent years. The deposition and movement of the debris with water level changes resulted in the enlargement of several of the burned holes and shredding of the TRM border in other areas. Haley & Aldrich procured replacement TRM materials and equipment and, as of the date of this report, is awaiting low river level conditions following the spring freshet in order to implement repairs.

Shoreline sheen 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. Shoreline sheen was not observed from the Willamette Cove or Willamette River shorelines during any of the Site inspections conducted in 2021. Ebullition was observed in Willamette Cove in March 2021 and from the intertidal zone along the Willamette River in September 2021. Ebullition is also monitored as a measure of granular organophilic clay integrity as testing performed in 2008 through 2010 determined that total organic carbon decay resulted in methane gas production and ebullition in those areas. Ebullition observed in 2021 did not contain sheen.

Separation and down-dropping of blocks along the ACB edge was observed at the eastern end of the Willamette Cove sediment cap during the September 2020 site inspection. Repair activities were performed in December 2020 to secure the loose blocks in place with concrete and stabilize the ACB edge. No further separation of the ACB blocks was observed in this area during the 2021 quarterly site inspections.

A derelict sailboat was first observed along the Willamette River Shoreline near the stormwater outfall in December 2020. The vessel remained beached along the shoreline through December 2021 at which point it was removed. Section 3.3 provides further details on vessel removal activities.

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 had 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 has washed down from the steeper, upslope shoreline areas and has settled onto lower ACB surfaces where it has largely remained in place through 2021.

Large pieces of driftwood are deposited along the shoreline at higher elevations during high river-stage events (Appendix A, Photograph A5). 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 shoreline near the former Tank Farm Area (TFA).
- The north end of the Site near the Burlington Northern Railroad bridge.

Boulder clusters placed during the sediment cap construction remained in place during 2021.

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. A homeless encampment was observed during the February 2020 site inspection along the Willamette River shoreline in the vicinity of MW-39 well cluster. The encampment appeared to be abandoned during the July 2020 site inspection with trash and debris present around two abandoned tents. DEQ notified Metro of the abandoned camps; however, due to budget and manpower limitations brought on by COVID-19, Metro was not able to perform trash cleanup activities of the abandoned encampments. The abandoned homeless encampment remained onsite until removal in January 2021. Removal activities are discussed in further detail in Section 3.3

Numerous dilapidated boats (presumably used as dwellings) have been consistently observed anchored in Willamette Cove during recent years. Anchored boats were removed during the summer of 2020 while the City of Portland performed an environmental investigation in Willamette Cove. Following completion of the investigation, vessels were slow to return to the area. A small, dilapidated sailboat and floating dock with a corrugated metal shack were observed anchored in Willamette Cove during the March 2021 site inspection. The sailboat and floating shack were not present during the May 2021 site inspection and the cove was free of anchored boats for the remainder of 2021. All boats observed in Willamette Cove during the year appeared to be anchored beyond the sediment cap, and field staff did not visually observe damage to the sediment cap from moorage or physical contact by boats.

A 25-foot derelict sailboat was first observed on the Willamette River sediment cap during the December 2020 site inspection. The vessel remained beached along the shoreline until removal in December 2021. Additional details on vessel removal are discussed in Section 3.3.

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. Buoys 1, 3, and 4 were not visible during the March 2021 site inspection when the river was at a high flow stage. During the March 2021 inspection, the buoys were flagged for follow up during the next quarterly inspection to ensure they were not underwater due to high river water levels. The buoys remained missing during the May 2021 site inspection, and it was determined that the buoy anchor chains were likely broken, and the buoys lost. Buoy replacement activities are discussed in the following section.

3.3 Sediment Cap Maintenance Activities

The sediment cap was designed to be generally maintenance free. Watering events for the riparian area were not completed during the summer months of 2021 as vegetation did not show signs of drought stress. No signs of stressed vegetation were observed during summer month site visits from June through October 2021.

On January 28, 2021, Rapid Response Bio-Clean performed trash and debris removal of trash associated with the homeless encampment near the MW-39 well cluster (Appendix A, Photographs A3 and A4) and

trash deposited by wind and water. All trash and debris were transported to a local municipal waste facility for disposal.

Buoy replacement activities were initiated in November 2021 and Ballard Marine Construction, LLC (Ballard) was subcontracted to perform buoy replacement. Anchor chain materials and replacement buoys were ordered; however, due to shipping delays from the manufacturer, the buoys have not been received as of March 2022. Buoy replacement activities will be performed upon receipt of the replacement buoys.

The derelict vessel on the Willamette River shoreline was removed in December 2021. Prior to removal, Haley & Aldrich completed the seizure process with DEQ and the Oregon State Marine Board (OSMB) and after the required waiting period had elapsed, the vessel was removed. Ballard was subcontracted to complete this task. Removal activities were performed on December 3, 2021, and Ballard removed the vessel from the shoreline and towed it to the nearest boat launch ramp (Appendix A, Photographs A17 and A18). From there it was loaded onto a trailer and transported to a disposal facility. A Derelict or Abandoned Vessel Seizure and Disposal Report was submitted to OSMB following disposal of the derelict sailboat to document its removal.

3.4 Summary of Sediment Cap Remedy Performance

Overall, the sediment cap observations and inspections during 2021 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 were observed again in 2021 after not being observable in 2019 and 2020. Minor undulations of the ACB armoring also were observed in Willamette Cove. The voids do not show signs of erosion or impairment to the cap and therefore do not pose an immediate concern; however, Haley & Aldrich and DEQ will evaluate the voids and undulations in 2022 to determine if filling of the voids is sufficient or if larger repairs to the sediment cap are required.

Sand covers the shoreline at lower, less steep elevations, and significant amounts of large driftwood have accumulated along the shoreline in 2021. 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 2021.

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 potions 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 (Appendix A, Photographs A15 and A16).

The public frequents the shoreline for recreation, most commonly for hiking or walking dogs. A homeless encampment was identified on the shoreline in 2020 and removed in January 2021. No additional homeless encampments on were observed throughout the rest of 2021.

4.0 GROUNDWATER PERFORMANCE STANDARDS AND ACTIVITIES

This section summarizes groundwater performance standards and activities for the reporting period January 1, 2021, through December 31, 2021. Groundwater remedy observations and maintenance activities were conducted according to the O&M Manual (Hart Crowser and GSI 2018). Manual measurements of NAPL and groundwater levels were collected during Site-wide semiannual monitoring events on June 22 and September 22, 2021. Groundwater measurements at seven wells (MW-15s, MW23d, MW-32i, MW-34i, MW-57s, MW-62i, and MW-Os) were collected during the June 22 monitoring event but were determined to be anomalous during a QC review of field data. The wells were reported as dry and did not match historical data for those wells, which showed the wells had never been measured as dry. Field technicians performed a follow up visit to the Site on July 1, 2021, to re-measure water levels in the seven wells. Measurements collected during this follow up visit were similar to historical water levels for those wells and replaced the previous measurements collected.

4.1 Groundwater Flow Direction and Gradient Assessment

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. Groundwater levels measured during the 2021 period are consistent with water table measurements since 2003, when the barrier wall was installed. This section summarizes groundwater flow based on the 2021 water level measurements.

4.1.1 Horizontal Flow Direction and Gradients

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 22 and July 1, 2021) and Table 4-2 (September 22, 2021).

Shallow groundwater elevation contour maps were developed for each semiannual event during what is typically the seasonal high (June/July) 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 (ranging from approximately 0.001 to 0.003 feet per foot) compared to the steeper groundwater gradients (ranging from approximately 0.007 to 0.04 feet per foot) outside the barrier wall. An anomalously high-water level measurement (nearly 2 feet higher than nearby wells) was observed at well MW-17s, the cause of which is unknown. The elevated water level measurement is not expected to present issues with the efficacy of the subsurface barrier, and water levels at this well will continued to be monitored closely in the future.

On the southeastern side of the barrier wall, groundwater flows southwest toward the Willamette River; while on the northern side of the barrier wall, the groundwater flows to the west toward Willamette Cove. This demonstrates that the barrier wall has effectively cut off the hydraulic connection between the shallow groundwater zone inside and outside of its boundaries. Historically, the hydraulic separation is apparent from the paired monitoring well cluster MW-52s and MW-53s, located at the northeastern edge

of the barrier wall. No 2021 data was available for MW-53s due to a pressure transducer failure (Figure 4-5).

Comparison of groundwater levels for interior monitoring wells EW-1s, MW-52s, MW-36s, and MW 44s (Figure 4-5) illustrate groundwater gradients within the barrier wall are typically southwesterly (i.e., the water level in EW-1s is typically higher than MW-36s). However, during periods of peak flow in the Willamette River (e.g., January and April 2021), groundwater levels within the northwest 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 4-5). 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 4.1.2.

The hydrographs in Figures 4-4 through 4-7 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 2022a). This Station is located on the upstream side of the Morrison Bridge (river mile [RM] 12.8), approximately 5.6 river miles from the Site. River stage elevation data reported by USGS are relative to the Portland River Datum at this location. The river stage data are corrected to the North American Vertical Datum of 1988 (NAVD88) at the Site (approximately RM 7) by adding 5.001 feet to the USGS reading. Precipitation data were obtained from the Astor Elementary School rain gauge located approximately 0.5 mile from the Site. This rain gauge is part of the City of Portland Hydra Network (USGS 2022b).

4.1.2 Vertical Flow Direction and Gradients

The Willamette River water stages directly influence groundwater elevations in the 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 (Figure 4-1). Transducer batteries are checked twice a year during the semiannual monitoring events in June and September 2021. Hydrographs for these wells (Figures 4-6 and 4-7) 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) 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. Note that exterior well MW-45d typically follows this same pattern but 2021 groundwater elevation measurements are a few feet higher than nearby paired wells (Figure 4-7). The higher water table measurements appear to be due to transducer calibration/drift and will be evaluated in 2022. Paired exterior shallow well MW-45s is also in hydraulic connection with the river and shows about a quarter-cycle delay from river fluctuations and has a dampened amplitude in comparison with the deeper wells.

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. MW-44s (inside barrier wall) shows a negligible response to tidal effects and river levels (Figure 4-7). The muted amplitude or negligible response of interior shallow wells compared with the deep-zone wells indicates a hydraulic disconnect between 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 intermediate 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 4-6), 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 were muted inside the barrier wall.

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 Resource Conservation and Recovery Act (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 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 retention pond (Figure 1-3) 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 22, July 1, and September 22, 2021. Measurable thicknesses of NAPL were present in 13 Site wells (EW-1s, EW-2s, EW-8s, EW-10s, EW-15s, EW-18s,

EW-23s, MW-10r, MW-20i, MW-22i, MW-56s, MW-Ds, and MW-Gs). Figures 4-8 and 4-9 show the locations of wells with measurable quantities of light NAPL (LNAPL) and/or dense NAPL (DNAPL) during the June, July, and September 2021 monitoring events, respectively (trace detections are not shown on the figures). Tables 4-1 and 4-2 provide semiannual NAPL gauging measurements. Figures 4-10 through 4-20 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 northwest corner that corresponds to the FWDA (Figure 1-5). During the June/July 2021 monitoring event, trace LNAPL was noted in one well (MW-Gs) and measurable DNAPL was observed in five wells (EW-2s, EW-10s, MW-20i, MW-Gs, and MW-Ds) outside the northwestern corner of the barrier wall (Figure 4-8). During the September 2021 monitoring event, trace LNAPL was noted in two wells (MW-Ds and MW-Gs) outside the northwestern corner of the barrier wall, and measurable DNAPL was observed in four wells (EW-10s, MW-20i, MW-Gs, and MW-Ds) (Figure 4-9).

As shown on Figures 4-10 through 4-13, the DNAPL thicknesses measured in wells EW-10s, MW-20i, MW-Ds, and MW-Gs in 2021 are generally consistent with measurements made since NAPL recovery was discontinued in April 2011. The September 2021 measurement at MW-20i did show a slight increase, although it is within the historical range of observed thicknesses (Figure 4-11). Additionally, DNAPL was observed for the first time at well EW-2s in June 2021 but was not detected at that location in September 2021. 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. DNAPL conditions at well EW-2s will continue to be monitored. Overall, the 2021 observations are consistent with historical observations and support the conclusion that NAPL observed in the FWDA is localized and relatively stable. 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/July 2021 monitoring event, measurable LNAPL was present in four wells (EW-15s, EW-23s, MW-15s, and MW-56s) within the barrier wall (Figure 4-8). MW-10r (inside the barrier wall) had a trace detection of LNAPL. Measurable DNAPL was observed in four wells (EW-1s, EW-8s, EW-18s, and MW-22i) inside the barrier wall during the June/July monitoring event (Figure 4-8). During the September 2021 monitoring event, measurable LNAPL was observed in four wells (MW-10r, EW-15s, EW-23s, and MW-56s) within the barrier wall (Figure 4-9). Measurable DNAPL was observed in four wells (EW-1s, EW-8s, EW-18s, and MW-22i) inside the barrier wall (Figure 4-9).

Figures 4-14, 4-15, 4-16 and 4-20 show the elevations of LNAPL and shallow groundwater over time in wells EW-15s, EW-23s, EW-1s, 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 (i.e., LNAPL thickness was not disturbed by recovery). 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.

Measurable DNAPL was present during the 2021 semiannual monitoring events within the barrier wall near the former TFA (Figure 1-5) in wells EW-1s, MW-22i, EW-8s, and EW-18s, as shown on Figures 4-16 through 4-19, respectively. After termination of a temporary recovery period in April 2011, the DNAPL thickness in well EW-1s (Figure 4-16) increased to a thickness of approximately 8 feet by 2014; it has remained roughly the same, with the DNAPL thickness in EW-1s being 8.13 feet in September 2021. The DNAPL thickness in well MW-22i is 8.14 feet thick (Figure 4-17). Approximately 2 feet of DNAPL is consistently present within the sump of well EW-8s, with occasional spikes in the DNAPL thickness. The DNAPL thickness in EW-18s has been generally stable at around 2 feet since 2012 (Figure 4-19).

Overall, both LNAPL and DNAPL appear to be stable except for the DNAPL at EW-8s (Figure 4-18). The pattern in DNAPL thickness at EW-8s is consistent with historical patterns, which vary seasonally. Given these observations, mobilization of LNAPL or DNAPL across either the barrier wall or the Willamette River is unlikely.

4.3 Groundwater Remedy Maintenance Activities

Table 4-3 provides the groundwater O&M activities conducted in 2021. Transducer data loggers were inspected during the semiannual monitoring events in 2021. During the 2020 monitoring event, transducers in wells MW-37s and MW-44d were replaced with new transducers after the existing equipment was found to be irreparable. Both transducers are now operational and recorded data for 2021. However, the transducer at MW-53s failed during the 2021 monitoring event and will be repaired in anticipation of the 2022 event.

A single drum containing wastewater from September 2020 groundwater sampling activities was transported offsite on July 20, 2021, by ACTenviro. The drum of water was transported to US Ecology's facility in Grandview, Idaho for disposal.

4.4 Summary of Groundwater Remedy Performance

Hydraulic conditions are consistent with previous years, verifying that the remedy continues to function as designed. 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.

DNAPL was measured in five wells outside the barrier wall. The DNAPL in the wells has remained stable with some variation due to temperature and pressure (coincident with water level variation). 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 and Fourth Five-Year Review Reports [DEQ/EPA, 2011; DEQ/EPA, 2016]), 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 2021, the barrier wall and impermeable soil cap are functioning as designed to divert groundwater flow around NAPL source areas, prevent rainwater infiltration into NAPL source areas contained within the barrier wall, and prohibit NAPL contained within the barrier wall from migrating to the Willamette River.

Groundwater quality conditions across the Site are consistent with previous years. These findings indicate the barrier wall is effective at retaining NAPL and dissolved phase contaminants, and that the infiltration pond is not creating conditions that are likely to mobilize Site contamination.

5.0 VEGETATION MANAGEMENT

This section summarizes the vegetation management and monitoring activities for the reporting period from January 1, 2021, through December 31, 2021. 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, 2020 and 2021.

Rodents that inhabit the cap have damaged vegetation in the past; however, with the exception of 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 2021.

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.

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) 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 re-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. 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: upper and lower. 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 are present along the shoreline (Photograph Stations 7 and 9). Trees, shrubs, and herbaceous plants are 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 exerata*), 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 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, with the exception of 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 (Figure 5-1). A variety of native trees, shrubs, and herbaceous species are present on the earthen cap as shown in photographs captured at Photograph Stations 1, 2, 3, and 5 (Appendix H). Native shrubs and herbaceous species are 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 of 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 (*Glyeria occidentalis*), tufted hairgrass (*Deschapsia cespitosa*), slender hairgrass, meadow barley, spike bentgrass, meadow foxtail (*Alopecuris 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 2021

On June 2, 2021, 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 (U.S. Department of Agriculture 2020). Baseline and current observations are summarized below.

5.3.1 Riparian Area

Lower Component. In 2021, 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 accidentally burned in 2018. The fire top-killed many of the shrubs. The hawthorn, twinberry, elderberry, ninebark, snowberry, and cascara re-sprouted, and very little evidence of the initial burn damage 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*). As expected, many of the perennial grasses have re-spouted and are now competing with the annual, non-native grasses. The turnip had primarily disappeared. No indications of stress were noted.

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 perfoliatum*) also present. The invasive butterfly bush had established in this area but was successfully removed in 2010 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 was still 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. The thistles still persist, but the herbicide did temporarily lessen their impact in 2020. Noxious weeds will continue to be monitored and are discussed in more detail below.

Upper Component. In 2021, trees and shrubs in the upper component were well established and appeared healthy. The area is fully vegetated, completely recovered from the fires and other earlier stressors. Invasive species have been reduced through periodic herbicide treatments.

Since 2016, the riparian area was watered once or twice in the summer if drought conditions or stressed vegetation is observed. 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. 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 too many of the woody species. Following a period of dry weather and the fire in the riparian area, approximately 2,500 gallons of water was used on August 8, 2018, to avoid excessive late season drought stress that was experienced in 2015 and to a lesser degree in 2016.

In 2020, shrubby species like oceanspray, cascara, twinberry, and Pacific ninebark, all stump sprouted well and are surviving. Taller species like bigleaf maple and madrone had their 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 being invaded 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 2020). 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.

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 C1 through C6 (Appendix C). The stormwater retention pond/drainage swale and the vegetation coverage on the impermeable cap are shown on Photographs C7 and C8, and Photographs C11 and C12, respectively (Appendix C).

Earthen Cap Component. In 2021, the area is 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 H, Photographs C9 and C10). 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 June 2021 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 2021, including spotted knapweed, tree of heaven, 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.

Stormwater Retention Pond/Drainage Swale Component. In 2021, 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 caryopyllea*) and annual fescue (*Vulpia myuros*). A good shrubby edge around the pond and swale was present of Sitka and piper's willow up to 15-feet tall (Appendix C, Photographs C7 and C8), red-osier dogwood, black cottonwood, snowberry. The butterfly bush was sprayed in 2019. This was successfully eliminated from this area in 2020.

Impermeable Cap Component. In 2021, 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, was 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.

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 control 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 was applied in 2018, 2020 or 2021.

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 were needed in 2021 due to the well-established plants and sporadic summer rainfall.

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. 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. 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 June 2021 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. It is expected that some signs of this extreme heat will be seen as dead branches or dead branch tips (new seasonal growth), and dead seedling trees. It is not expected that there will be significant vegetation changes or that replanting will be necessary. The maturing vegetation community is tolerant of such a disturbance and would persist through these extremely high temperatures. Also, noxious plant species will be monitored to determine if another round of herbicide treatments is necessary. The vegetation community will continue to be inspected in 2022, with the next inspection in June.

6.0 SUMMARY OF OVERALL REMEDY PERFORMANCE

Overall, the 2021 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.

7.0 SUMMARY OF PLANNED ACTIVITIES FOR 2022

The Final O&M Plan with descriptions and schedule of O&M activities was completed by DEQ with assistance from EPA, GSI, and Hart Crowser in March 2014.

Table 7-1 presents the soil cap O&M activities planned through 2026. Soil cap O&M activities in 2022 will consist primarily of quarterly inspections and routine maintenance. Semiannual inspections will continue in 2022 to assess and monitor vegetation planting areas, species identification (native, non-native, and invasive), growth, density, and general coverage throughout the Site. The need for noxious weed control activities will be evaluated based on site and vegetation inspections. If the Site experiences drought conditions in 2022, woody species may be in danger of being lost. Due to their shallow rooting, the remaining conifers could show water stress earlier. Conditions will be monitored during the summer months and, if dry conditions are prevalent, a drought assessment survey will be conducted to determine if additional watering is needed. A water tank trailer and firehose has worked well in the past to apply water throughout the Site and this same technique will be used again, if needed.

Table 7-2 presents the sediment cap O&M activities planned through 2026. In 2022, routine activities will include quarterly inspections and routine maintenance, and cleanup of riparian area trash and dumpsites (if present).

Groundwater O&M activities through September 2026 are summarized in Table 7-3. Routine maintenance of the data logger transducers and barometric pressure transducers are also included as elements of groundwater O&M. EPA is preparing a work plan to perform additional groundwater monitoring outside the barrier wall in 2022.

8.0 REFERENCES

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TABLES

Table 2-1: Soil Cap O&M Activities in 2021
2021 O&M Annual Report
McCormick & Baxter Superfund Site

O&M Activity	Frequency in 2021
Visual Inspections:	
Cap surface	March, May, September, December
Subsidence near EW-1s	March, May, September, December
Stormwater conveyance system	March, May, September, December
Security fencing	March, May, September, December
Warning signs	March, May, September, December
Abundance and survival of vegetation	March, May, June, September, December
Routine Maintenance and Monitoring:	
Manual removal of weeds and invasive plants	March
Targeted application of herbicides	None
Non-Routine Maintenance:	
Fire damage inspections	March, May, September, December
Tree removal along fenceline	March
Cleanout vault box installation	July and August
Fill burrows under fence and in cap	August
Fence repairs	August
Replace cut locks	March, December
Utilities Service:	
Water (Backflow Testing)	September

Table 3-1: Sediment Cap O&M Activities in 2021
2021 O&M Annual Report
McCormick & Baxter Superfund Site

O&M Activity	Frequency in 2021
Visual Inspections (from shore):	
Warning buoys	March, May, September, December
Cap surface	March, May, September, December
Habitat quality	March, May, September, December
Routine Monitoring:	
Surface Water, Inter-armor Porewater, and Sub-armor Porewater sampling	None
Crayfish tissue sampling	None
Organoclay core sampling	None
Non-Routine Monitoring:	
Multibeam bathymetric surveys, side-scan sonar survey	None
Non-Routine Maintenance:	
Abandoned Homeless encampment removal	January
Derelict Vessel removal	December
Cut articulated concrete block cable loops	None

Table 4-1: Groundwater and NAPL Elevations: June 22 and July 1, 2021
2021 O&M Annual Report
McCormick & Baxter Superfund Site

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)	Specific Gravity of LNAPL (g/cm^3)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL corrected (ft NAVD88)
EW-1s	6/22/2021	11:06	39.54	-	27.44	39.04	-	0.98	8.38	12.10
EW-2s	6/22/2021	13:01	42.40	-	32.38	44.53	-	0.98	2.11	10.02
EW-8s	6/22/2021	10:32	40.55	-	28.10	48.58	-	0.98	6.20	12.45
EW-10s	6/22/2021	13:38	29.59	-	20.66	41.72	-	0.98	1.07	8.93
EW-15s	6/22/2021	14:00	43.00	32.44	37.56	-	5.12	0.98	-	10.46
EW-18s	6/22/2021	10:44	40.79	-	29.20	43.28	-	0.98	1.43	11.59
EW-19s	6/22/2021	13:47	25.97	-	16.56	-	-	0.98	-	9.41
EW-23s	6/22/2021	14:17	37.64	27.29	30.67	-	3.38	0.98	-	10.29
MW-1r	6/22/2021	9:20	37.81	-	26.35	-	-	0.98	-	11.46
MW-7 WC	NA	NA	36.69	-	NA	-	-	0.98	-	-
MW-10r	6/22/2021	10:10	41.85	31.88	31.88	-	Trace	0.98	-	9.97
MW-15s	6/22/2021	14:00	43.41	-	31.65	-	-	0.98	-	11.76
MW-17s	6/22/2021	12:16	41.34	-	28.54	-	-	0.98	-	12.80
MW-20i	6/22/2021	13:17	41.72	-	32.82	67.58	-	0.98	7.40	8.90
MW-22i	6/22/2021	9:55	42.34	-	32.81	51.32	-	0.98	7.70	9.53
MW-23d	7/1/2021	12:00	40.81	-	30.45	-	-	0.98	-	10.36
MW-32i	6/22/2021	13:00	39.45	-	21.54	-	-	0.98	-	17.91
MW-34i	7/1/2021	12:45	32.82	-	NA	-	-	0.98	-	-
MW-35r	6/22/2021	12:50	32.27	-	23.91	-	-	0.98	-	8.36
MW-36d	6/22/2021	14:05	30.59	-	21.85	-	-	0.98	-	8.74
MW-36i	6/22/2021	14:00	30.30	-	21.54	-	-	0.98	-	8.76
MW-36s	6/22/2021	14:15	30.62	-	19.96	-	-	0.98	-	10.66
MW-37d	6/22/2021	13:45	26.19	-	17.56	-	-	0.98	-	8.63
MW-37i	6/22/2021	13:35	26.07	-	17.33	-	-	0.98	-	8.74
MW-37s	6/22/2021	13:30	24.98	-	15.47	-	-	0.98	-	9.51
MW-38d	6/22/2021	12:12	31.96	-	22.89	-	-	0.98	-	9.07
MW-38i	6/22/2021	12:02	32.15	-	22.74	-	-	0.98	-	9.41

Please refer to notes at the end of the table.

Table 4-1: Groundwater and NAPL Elevations: June 22 and July 1, 2021
2021 O&M Annual Report
McCormick & Baxter Superfund Site

MW-38s	6/22/2021	11:55	32.41	-	21.39	-	-	0.98	-	11.02
MW-39d	6/22/2021	12:42	29.93	-	21.02	-	-	0.98	-	8.91
MW-39i	6/22/2021	12:35	30.18	-	21.20	-	-	0.98	-	8.98
MW-39s	6/22/2021	12:30	29.88	-	20.04	-	-	0.98	-	9.84
MW-40d	6/22/2021	14:45	28.81	-	19.86	-	-	0.98	-	8.95
MW-40i	6/22/2021	14:40	28.92	-	19.91	-	-	0.98	-	9.01
MW-40s	6/22/2021	14:35	28.53	-	17.32	-	-	0.98	-	11.21
MW-41d	6/22/2021	16:00	27.56	-	18.04	-	-	0.98	-	9.52
MW-41i	6/22/2021	15:03	27.22	-	18.28	-	-	0.98	-	8.94
MW-41s	6/22/2021	14:55	27.96	-	18.41	-	-	0.98	-	9.55
MW-42d	6/22/2021	15:25	32.26	-	23.14	-	-	0.98	-	9.12
MW-42i	6/22/2021	15:15	32.67	-	23.76	-	-	0.98	-	8.91
MW-42s	6/22/2021	15:32	32.42	-	20.67	-	-	0.98	-	11.75
MW-43d	6/22/2021	15:50	28.57	-	19.03	-	-	0.98	-	9.54
MW-43i	6/22/2021	15:45	30.49	-	21.22	-	-	0.98	-	9.27
MW-43s	6/22/2021	15:40	31.24	-	21.84	-	-	0.98	-	9.40
MW-44d	6/22/2021	15:05	29.55	-	21.30	-	-	0.98	-	8.25
MW-44i	6/22/2021	15:02	29.47	-	20.45	-	-	0.98	-	9.02
MW-44s	6/22/2021	15:00	29.90	-	17.80	-	-	0.98	-	12.10
MW-45d	6/22/2021	15:13	28.12	-	18.84	-	-	0.98	-	9.28
MW-45i	6/22/2021	15:19	28.05	-	19.03	-	-	0.98	-	9.02
MW-45s	6/22/2021	15:16	28.20	-	18.80	-	-	0.98	-	9.40
MW-46s	6/22/2021	14:30	35.51	-	23.65	-	-	0.98	-	11.86
MW-47s	6/22/2021	14:34	35.56	-	25.28	-	-	0.98	-	10.28
MW-48s	6/22/2021	14:45	38.58	-	27.05	-	-	0.98	-	11.53
MW-49s	6/22/2021	14:40	37.61	-	22.35	-	-	0.98	-	15.26
MW-50s	6/22/2021	9:56	39.12	-	26.85	-	-	0.98	-	12.27
MW-51s	6/22/2021	9:58	39.54	-	22.43	-	-	0.98	-	17.11
MW-52s	6/22/2021	10:34	40.70	-	28.84	-	-	0.98	-	11.86
MW-53s	6/22/2021	10:43	40.42	-	24.19	-	-	0.98	-	16.23

Please refer to notes at the end of the table.

Table 4-1: Groundwater and NAPL Elevations: June 22 and July 1, 2021
2021 O&M Annual Report
McCormick & Baxter Superfund Site

MW-54s	6/22/2021	11:36	41.78	-	29.95	-	-	0.98	-	11.83
MW-55s	6/22/2021	11:40	41.09	-	29.67	-	-	0.98	-	11.42
MW-56s	6/22/2021	12:42	43.45	32.60	33.34	-	0.74	0.98	-	10.84
MW-57s	7/1/2021	12:15	42.01	-	31.10	-	-	0.98	-	10.91
MW-58d	6/22/2021	13:20	41.43	-	32.65	-	-	0.98	-	8.78
MW-58i	6/22/2021	13:25	40.99	-	32.45	-	-	0.98	-	8.54
MW-58s	6/22/2021	13:30	41.51	-	31.68	-	-	0.98	-	9.83
MW-59s	6/22/2021	14:11	35.85	-	21.10	-	-	0.98	-	14.75
MW-60d	6/22/2021	11:10	40.18	-	30.96	-	-	0.98	-	9.22
MW-61s	6/22/2021	NA	43.65	-	30.10	-	-	0.98	-	13.55
MW-62i	7/1/2021	12:35	42.73	-	34.08	-	-	0.98	-	8.65
MW-As	6/22/2021	9:22	39.32	-	22.65	-	-	0.98	-	16.67
MW-Ds	6/22/2021	14:35	43.26	-	33.08	34.70	-	0.98	4.32	10.18
MW-Gs	6/22/2021	13:28	40.27	31.15	31.15	43.06	Trace	0.98	1.73	9.12
MW-Os	7/1/2021	11:55	40.96	-	23.65	-	-	0.98	-	17.31
PW-1d	6/22/2021	9:34	44.05	-	32.85	-	-	0.98	-	11.20
PW-2d	6/22/2021	9:48	41.83	-	30.55	-	-	0.98	-	11.28

Notes:

LNAPL specific gravity estimated as 0.981 g/cm^3.
Corrected groundwater elevation = [LNAPL thickness * LNAPL specific gravity] + groundwater elevation

Abbreviations and Acronyms:

DNAPL = dense non-aqueous phase liquid
ft = foot or feet
g/cm^3 = 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 anomalous data

Table 4-2: Groundwater and NAPL Elevations: September 22, 2021
2021 O&M Annual Report
McCormick & Baxter Superfund Site

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 LNAPL corrected (ft NAVD88)
EW-1s	9/22/2021	8:58	39.54	-	28.15	39.29	-	8.13	11.39
EW-2s	9/22/2021	12:28	42.40	-	34.67	-	-	-	7.73
EW-8s	9/22/2021	9:19	40.55	-	29.50	53.04	-	1.74	11.05
EW-10s	9/22/2021	11:42	29.59	-	20.97	42.30	-	0.49	8.62
EW-15s	9/22/2021	10:42	43.00	33.45	43.17	--	9.72	-	9.37
EW-18s	9/22/2021	9:41	40.79	-	29.73	42.82	-	1.89	11.06
EW-19s	9/22/2021	11:34	25.97	-	18.17	-	-	-	7.80
EW-23s	9/22/2021	10:58	37.64	28.43	32.58	-	4.15	-	9.13
MW-1r	9/22/2021	8:34	37.81	-	28.04	-	-	-	9.77
MW-7 WC	NA	NA	36.69	-	NA	-	-	-	-
MW-10r	9/22/2021	10:14	41.85	30.88	30.93	-	0.05	-	10.97
MW-15s	9/22/2021	10:11	43.41	-	32.57	-	-	-	10.84
MW-17s	9/22/2021	10:01	41.34	-	30.82	-	-	-	10.52
MW-20i	9/22/2021	12:14	41.72	-	34.46	67.21	-	7.77	7.26
MW-22i	9/22/2021	10:06	42.34	-	34.00	50.88	-	8.14	8.34
MW-23d	9/22/2021	9:38	40.81	-	32.49	-	-	-	8.32
MW-32i	9/22/2021	8:16	39.45	-	30.77	-	-	-	8.68
MW-34i	9/22/2021	10:40	32.82	-	25.22	-	-	-	7.60
MW-35r	9/22/2021	13:57	32.27	-	23.93	-	-	-	8.34
MW-36d	9/22/2021	9:19	30.59	-	22.41	-	-	-	8.18
MW-36i	9/22/2021	9:05	30.30	-	21.94	-	-	-	8.36
MW-36s	9/22/2021	8:55	30.62	-	21.52	-	-	-	9.10
MW-37d	9/22/2021	8:40	26.19	-	17.78	-	-	-	8.41
MW-37i	9/22/2021	8:25	26.07	-	17.39	-	-	-	8.68
MW-37s	9/22/2021	8:10	24.98	-	17.07	-	-	-	7.91
MW-38d	9/22/2021	10:31	31.96	-	24.23	-	-	-	7.73
MW-38i	9/22/2021	10:38	32.15	-	24.06	-	-	-	8.09

Please refer to notes at the end of the table.

Table 4-2: Groundwater and NAPL Elevations: September 22, 2021
2021 O&M Annual Report
McCormick & Baxter Superfund Site

MW-38s	9/22/2021	10:25	32.41	-	22.85	-	-	-	9.56
MW-39d	9/22/2021	10:15	29.93	-	22.13	-	-	-	7.80
MW-39i	9/22/2021	9:55	30.18	-	21.18	-	-	-	9.00
MW-39s	9/22/2021	10:05	29.88	-	21.84	-	-	-	8.04
MW-40d	9/22/2021	11:20	28.81	-	21.35	-	-	-	7.46
MW-40i	9/22/2021	11:15	28.92	-	20.96	-	-	-	7.96
MW-40s	9/22/2021	11:10	28.53	-	18.72	-	-	-	9.81
MW-41d	9/22/2021	11:03	27.56	-	20.03	-	-	-	7.53
MW-41i	9/22/2021	10:57	27.22	-	19.54	-	-	-	7.68
MW-41s	9/22/2021	10:55	27.96	-	20.00	-	-	-	7.96
MW-42d	9/22/2021	11:53	32.26	-	25.02	-	-	-	7.24
MW-42i	9/22/2021	12:00	32.67	-	25.34	-	-	-	7.33
MW-42s	9/22/2021	12:05	32.42	-	21.84	-	-	-	10.58
MW-43d	9/22/2021	11:45	28.57	-	21.07	-	-	-	7.50
MW-43i	9/22/2021	11:39	30.49	-	22.96	-	-	-	7.53
MW-43s	9/22/2021	11:33	31.24	-	23.31	-	-	-	7.93
MW-44d	9/22/2021	12:35	29.55	-	22.22	-	-	-	7.33
MW-44i	9/22/2021	12:22	29.47	-	21.93	-	-	-	7.54
MW-44s	9/22/2021	12:30	29.90	-	18.68	-	-	-	11.22
MW-45d	9/22/2021	12:59	28.12	-	NA	-	-	-	-
MW-45i	9/22/2021	12:50	28.05	-	20.76	-	-	-	7.29
MW-45s	9/22/2021	13:04	28.20	-	20.43	-	-	-	7.77
MW-46s	9/22/2021	14:15	35.51	-	24.50	-	-	-	11.01
MW-47s	9/22/2021	14:20	35.56	-	27.75	-	-	-	7.81
MW-48s	9/22/2021	13:48	38.58	-	26.71	-	-	-	11.87
MW-49s	9/22/2021	13:55	37.61	-	22.24	-	-	-	15.37
MW-50s	9/22/2021	9:25	39.12	-	27.44	-	-	-	11.68
MW-51s	9/22/2021	9:20	39.54	-	24.28	-	-	-	15.26
MW-52s	9/22/2021	11:34	40.70	-	29.75	-	-	-	10.95
MW-53s	9/22/2021	11:40	40.42	-	26.01	-	-	-	14.41

Please refer to notes at the end of the table.

Table 4-2: Groundwater and NAPL Elevations: September 22, 2021
2021 O&M Annual Report
McCormick & Baxter Superfund Site

MW-54s	9/22/2021	11:08	41.78	-	30.91	-	-	-	10.87
MW-55s	9/22/2021	11:14	41.09	-	29.64	-	-	-	11.45
MW-56s	9/22/2021	12:54	43.45	33.64	34.67	-	1.03	-	9.79
MW-57s	9/22/2021	10:55	42.01	-	33.60	-	-	-	8.41
MW-58d	9/22/2021	14:10	41.43	-	35.06	-	-	-	6.37
MW-58i	9/22/2021	14:05	40.99	-	34.74	-	-	-	6.25
MW-58s	9/22/2021	14:07	41.51	-	33.69	-	-	-	7.82
MW-59s	9/22/2021	14:55	35.85	-	23.33	-	-	-	12.52
MW-60d	9/22/2021	9:34	40.18	-	32.22	-	-	-	7.96
MW-61s	9/22/2021	12:00	43.65	-	32.43	-	-	-	11.22
MW-62i	9/22/2021	10:31	42.73	-	35.07	-	-	-	7.66
MW-As	9/22/2021	8:23	39.32	-	23.15	-	-	-	16.17
MW-Ds	9/22/2021	12:38	43.26	34.86	34.86	35.98	Trace	3.04	8.40
MW-Gs	9/22/2021	11:55	40.27	32.88	32.88	42.81	Trace	1.98	7.39
MW-Os	9/22/2021	9:04	40.96	-	25.64	-	-	-	15.32
PW-1d	9/22/2021	8:37	44.05	-	34.43	-	-	-	9.62
PW-2d	9/22/2021	8:57	41.83	-	32.19	-	-	-	9.64

Notes:

LNAPL specific gravity estimated as 0.981 g/cm^3.
Corrected groundwater elevation = [LNAPL thickness * LNAPL specific gravity] + groundwater elevation

Abbreviations and Acronyms:

DNAPL = dense non-aqueous phase liquid
ft = foot or feet
g/cm^3 = 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 anomalous data

Please refer to notes at the end of the table.

Table 4-3: Groundwater O&M Activities in 2021
2021 O&M Annual Report
McCormick & Baxter Superfund Site

O&M Activity	Frequency in 2021
NAPL Monitoring:	
Manual gauging of site wells	June, July, September
Groundwater Monitoring:	
Groundwater Sampling	None
Downloading continuous water level data from transducers	June, September
Manual water level measurements from site wells	June, July, September
Routine Maintenance of Equipment:	
Transducers	January, June, September, December
Non-Routine Maintenance:	
Changed batteries in transducers (as needed)	June, September

Table 7-1: Soil Cap O&M Activities Planned through 2026
2021 O&M Annual Report
McCormick & Baxter Superfund Site

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

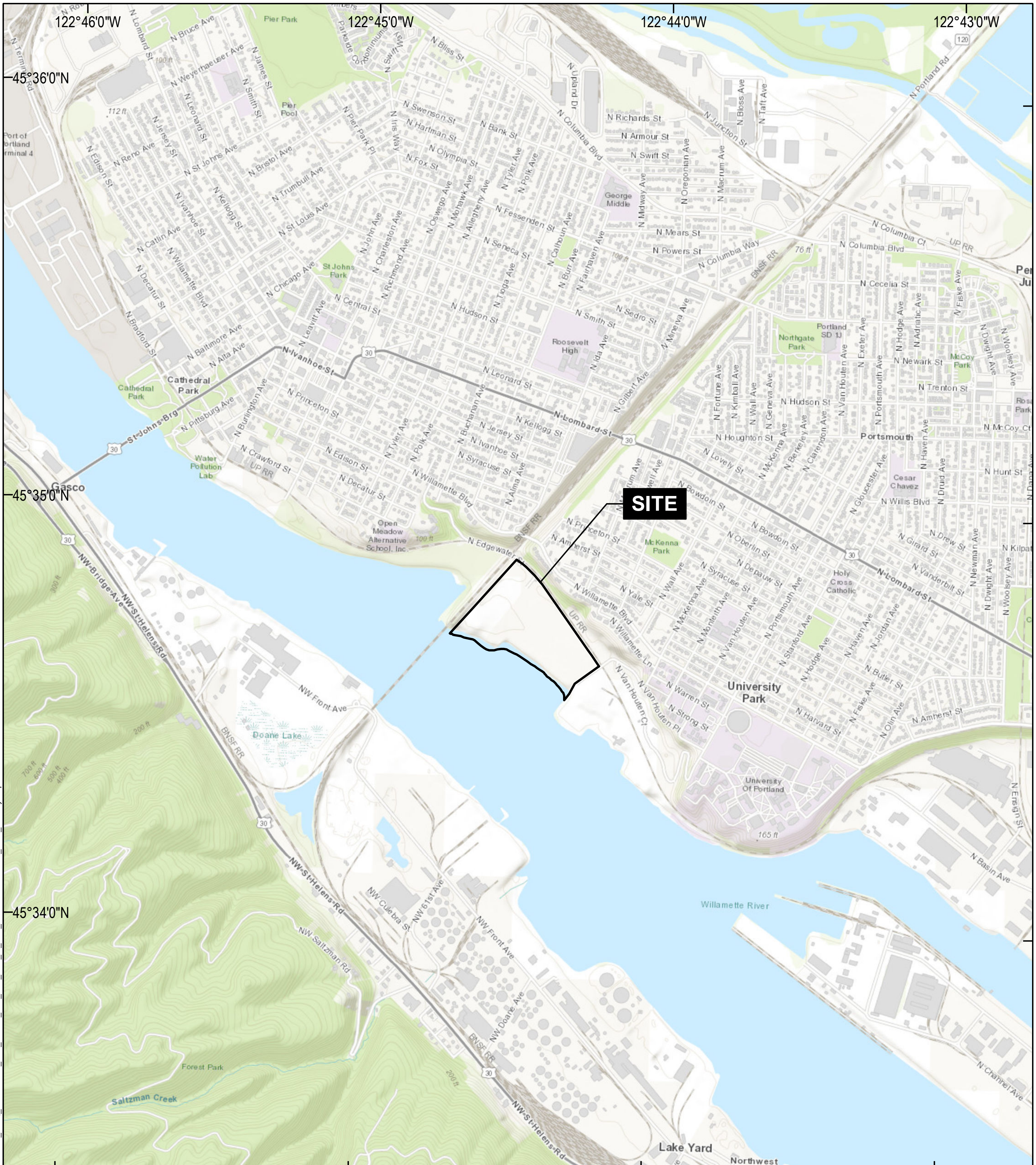
Table 7-2: Sediment Cap O&M Activities Planned through 2026
2021 O&M Annual Report
McCormick & Baxter Superfund Site

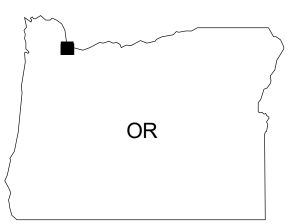
O&M Activity	Frequency
Visual Inspections (from shore):	
Warning buoys	Quarterly
Cap surface	Quarterly
Habitat quality	Annually
Routine Monitoring:	
Water column and inter-armoring water sampling	Every 5 years (next event in 2025)
Organoclay core sampling	Not performed in 2020; additional sampling will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

Table 7-3: Groundwater O&M Activities Planned through 2026
2021 O&M Annual Report
McCormick & Baxter Superfund Site

O&M Activity	Frequency
NAPL Monitoring:	
Manual gauging of site wells	Semiannually
Manual extraction from exterior wells	Not recommended
Groundwater Monitoring:	
Downloading continuous water level data from transducers	Semiannually
Manual water level measurements from site wells	Semiannually
Groundwater Sampling:	
Site-wide	Frequency to be determined
Infiltration pond (MW-59s)	Fall 2025 (every 5 years)
Routine Maintenance of Equipment:	
Interface probes, pumps, vehicle, data loggers / transducers, etc.	As needed

FIGURES





MAP SOURCE: ESRI
SITE COORDINATES: 45°34'43"N, 122°44'24"W

HALEY ALDRICH

GSI Water Solutions, Inc.

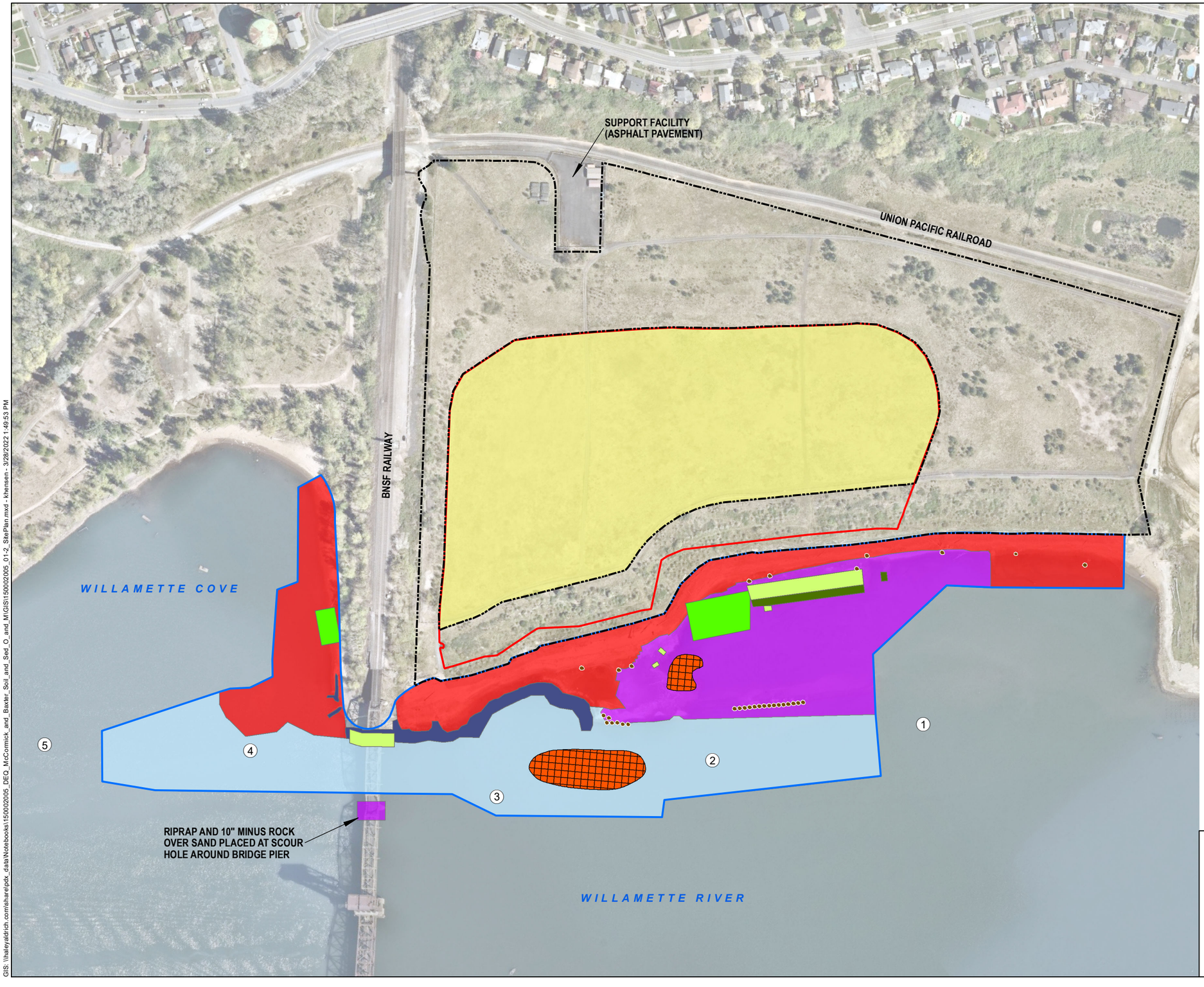
MCCORMICK & BAXTER SUPERFUND SITE
6900 N EDGEWATER STREET
PORTLAND, OREGON

VICINITY MAP

APPROXIMATE SCALE: 1 IN = 2000 FT
MARCH 2022

FIGURE 1-1

GIS: \\haleyaldrich.com\share\pdx_data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\GIS\150002005_01-1_VicinityMap.mxd - khensen - 3/23/2022 9:46:25 AM



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)
- BOULDER CLUSTERS/ROCK MOUND
- RIPRAP ARMOR
- 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, 13 APRIL 2021

0 250 500
SCALE IN FEET

HALEY ALDRICH

GSI Water Solutions, Inc.

MCCORMICK & BAXTER SUPERFUND SITE
6900 N EDGEWATER STREET
PORTLAND, OREGON

CURRENT SITE LAYOUT AND FEATURES

MARCH 2022

FIGURE 1-2

GIS: \\haleyaldrich.com\share\pdx_data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\GIS\150012005_01-2_SitePlan.mxd - khensen - 3/28/2022 1:49:53 PM

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

PROPERTY LINE

FENCE (TYP.)

UNION PACIFIC RAILROAD

BNSF RAILWAY

GRAVEL ROAD

PERFORATED COLLECTION PIPING

SDMH-A

SDMH-B

SDMH-C

SDMH-D

SDMH-E

HIGH POINT

DRAINAGE SYSTEM

INFILTRATION POND

12" MINUS ROCK

8" CORRUGATED HDPE (HIGH DENSITY POLYETHYLENE)

SPILLWAY

12" PVC OUTFALL

ROCK PILE

SAND PILE

DSL EASEMENT (#31530-EA)

WILLAMETTE COVE

WILLAMETTE RIVER

0 200 400

SCALE IN FEET

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.

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GSI Water Solutions, Inc.

MCCORMICK & BAXTER SUPERFUND SITE
6900 N EDGEWATER STREET
PORTLAND, OREGON

SITE CAPPING COMPONENTS

MARCH 2022

FIGURE 1-3

GIS: \\haleyaldrich.com\share\pdx_data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\GIS\150002005_01-3_SITE_CAPPING_COMPONENTS.mxd - khensen - 3/28/2022 2:02:01 PM

LEGEND

- ELEVATION CONTOUR, 1 FT. INTERVAL (NAVD 88)
- 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 EARTHERN CAP
- SEDIMENT CAP BOUNDARY
- EARTHEN SOIL CAP BOUNDARY
- SUBSURFACE BARRIER WALL
- IMPERMEABLE CAP

PROPERTY LINE

FENCE (TYP.)

UNION PACIFIC RAILROAD

BURLINGTON NORTHERN RALROAD

GRAVEL ROAD

PERFORATED COLLECTION PIPING

SDMH-A

SDMH-B

SDMH-C

SDMH-D

SDMH-E

STORM DRAIN SAG 1

STORM DRAIN SAG 2

HIGH POINT

DRAINAGE SYSTEM

INFILTRATION POND

12" MINUS ROCK

8" CORRUGATED HDPE (HIGH DENSITY POLYETHYLENE)

12" PVC OUTFALL

SPILLWAY

ROCK PILE

SAND PILE

DSL EASEMENT (#31530-EA)

WILLAMETTE COVE

WILLAMETTE RIVER

0 200 400
SCALE IN FEET

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. ADDITIONAL ROCK WAS PLACED AT THE 6" MINUS ROCK PLACEMENT AREAS ON 06/26/2007. THESE AREAS HAVE NOT BEEN SURVEYED AND THE CONTOURS OF THIS FIGURE DO NOT REFLECT THE ADDITIONAL ROCK PLACEMENT.

7. ALL FEATURES ARE APPROXIMATE.

HALEY ALDRICH

GSI Water Solutions, Inc.

MCCORMICK & BAXTER SUPERFUND SITE
6900 N EDGEWATER STREET
PORTLAND, OREGON

CURRENT SITE LAYOUT WITH SURFACE ELEVATIONS

MARCH 2022

FIGURE 1-4

GIS: \\haleyaldrich.com\sharepdx_data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\GIS\150002005_01-4_CURRENT_SITE_LAYOUT_WITH_SURFACE_ELEVATIONS.mxd - khensen - 3/28/2022 2:10:23 PM

LEGEND

- OUTFALL
- FENCE
- SHORELINE
- FORMER FEATURE
- HISTORICAL CONTAMINANT SOURCE AREA

Residential Area

Site Entrance

North Edgewater Street

Bunker Oil Area

Parking Lot

Treated Log Storage

Treated Log Storage

Office

Paint Shed

Gravel Driveway

Central Process Area

Water Treatment Plant

Retort 2 Pit

Retort 1 Pit

Lab

Former Tank Farm

Butt Tank 1

Southeast Disposal Trench Area

Stacker Shed

Retort 3 Pit

Butt Tank 1

Cellon Wash Area

Tank Farm Area (TFA)

Treated Log Storage

Framing Shed

Retort 4 Pit

PCP Mixing Shed

Former Creosote Tank 4

UNION PACIFIC RAILROAD

BNSF RAILWAY

Former Disposal Location

Rail Spurs

Former Waste Disposal Area (FWDA)

OUTFALL 001 (Former Cooling Water)

OUTFALL 003 (Stormwater)

OUTFALL 004 (Stormwater)

OUTFALL 002 (Stormwater Treated Water)

Creosote Dock

Sandy Beach

WILLAMETTE COVE

WILLAMETTE RIVER

0 200 400

SCALE IN FEET

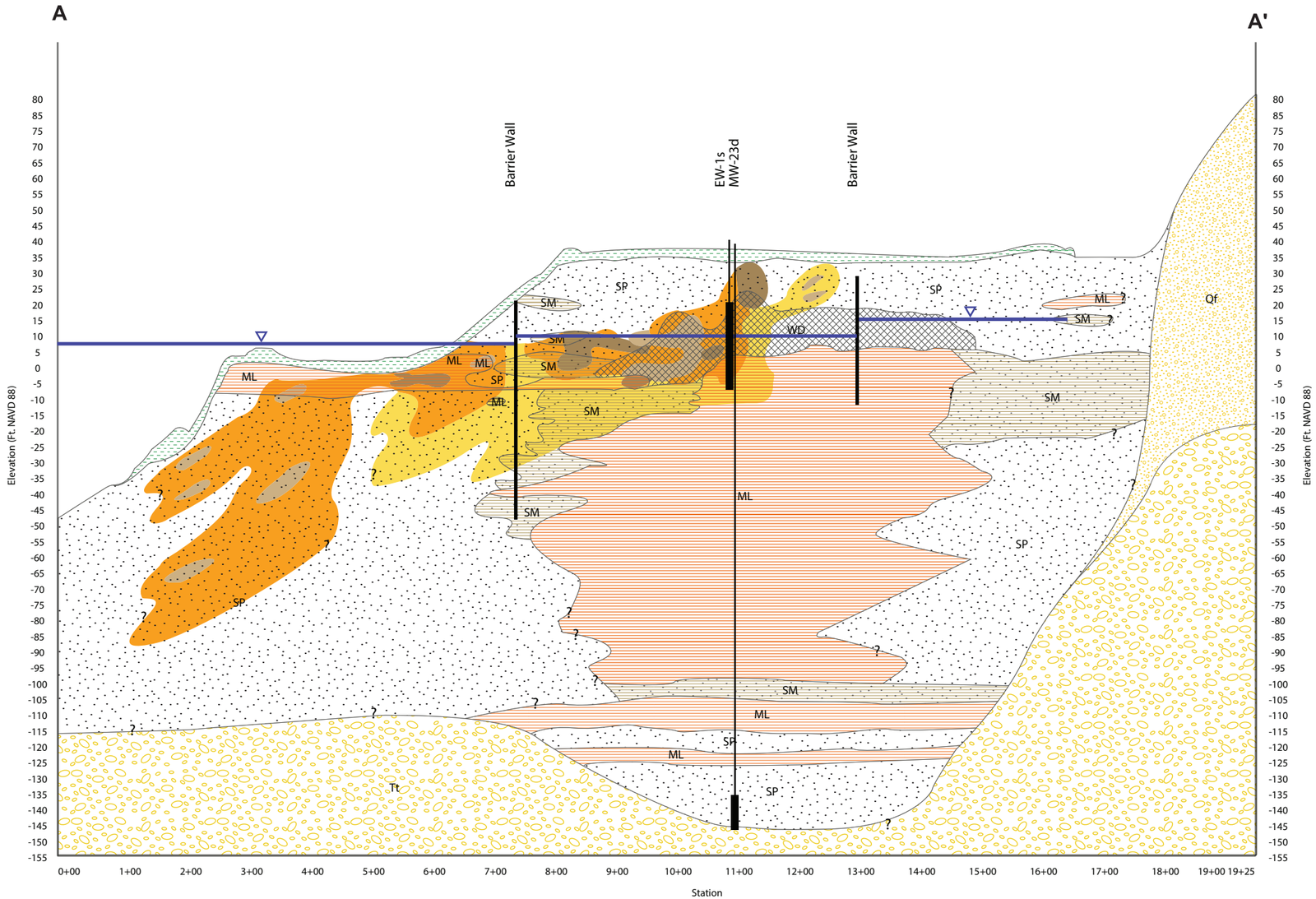
MCCORMICK & BAXTER SUPERFUND SITE
6900 N EDGEWATER STREET
PORTLAND, OREGON

HISTORICAL CONTAMINANT SOURCE AREAS

MARCH 2022

FIGURE 1-5

GIS: \\haleyaldrich.com\share\pdx_data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\GIS\150002005_001-5_HISTORICAL_CONTAMINANT_SOURCE_AREAS.mxd - khensen - 3/23/2022 9:34:43 AM



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 Consisteing of Gravels and Sands
- Tt- Troutdale Formation
- Sediment/Soil Cap
- Approximate Average Water Level 2008
- Creosote Odor
- Strong Creosote Odor
- Heavy Sheen
- Saturated

NOTE: Refer to Figure 1-4 for Plan View of Cross Section Location.

Horizontal Scale in Feet
0 200 400
0 40 80
Vertical Scale in Feet
Vertical Exaggeration = 5x

HALEY ALDRICH

MCCORMICK & BAXTER SUPERFUND SITE
6900 N EDGEWATER STREET
PORTLAND, OREGON

GSI Water Solutions, Inc.

HISTORICAL NAPL DISTRIBUTION
CROSS SECTION

MARCH 2022

FIGURE 1-6

AI — AUTHOR: KHENSEN — OFFICE: XXX

LEGEND

- STORMWATER DISCHARGE MANHOLE
- VAULT BOX INSTALLED AT CLEANOUT
- MONITORING WELL
- BUOY LOCATION
- MISSING BUOY
- 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 EARTHERN CAP
- SEDIMENT CAP BOUNDARY
- EARTHEN SOIL CAP BOUNDARY
- EXTENT OF FENCE LINE WITH BLACKBERRIES REMOVED
- EXTENT OF FENCE LINE WITH TREES REMOVED
- GRAVEL LAYER
- SUBSURFACE BARRIER WALL
- IMPERMEABLE CAP

REPAIRED CUT LOCK ON GATE
REPAIRED CUT LOCK ON GATE
PROPERTY LINE
FENCE (TYP.)
UNION PACIFIC RAILROAD
GRAVEL ROAD
REPAIRED HOLE CUT IN CHAIN LINK FENCE
PERFORATED COLLECTION PIPING
RODENT BURROW IDENTIFIED AND FILLED IN THIS AREA
SDMH-A
STORM DRAIN SAG 1
STORM DRAIN SAG 2
SDMH-C
SDMH-D
DRAINAGE SYSTEM
REPAIRED CUT LOCK ON GATE
INFILTRATION POND
REPAIRED HOLE CUT IN CHAIN LINK FENCE
SDMH-B
HIGH POINT
SDMH-E
12" MINUS ROCK
8" CORRUGATED HDPE (HIGH DENSITY POLYETHYLENE)
REPAIRED HOLE CUT IN CHAIN LINK FENCE
ROCK PILE
BNSF RAILWAY
REPAIRED HOLE CUT IN CHAIN LINK FENCE
HABITAT GRAVEL PILE
12" PVC OUTFALL
SPILLWAY
SAND PILE
COP OUTFALL
REMOVED DERELICT SAILING VESSEL
REPLACED TRANSDUCER FOR MW-44D
AREA WITH TRM TEARS
AREA WITH TRM TEARS
REMOVED ABANDONED HOMELESS ENCAMPMENT
REPLACED TRANSDUCER FOR MW-37S
DSL EASEMENT (#31530-EA)
WILLAMETTE RIVER
1
2
3
4
5

0 250 500
SCALE IN FEET

Location ID Figure 2.5	Buoy Label	Longitude			Latitude		
		Degree	Minute	Second	Degree	Minute	Second
1	Danger Rocks	-122	44	27.9115188	45	34	33.7505887
2	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

NOTES

1. ALL LOCATIONS ARE APPROXIMATE.
2. HORIZONTAL DATUM: NORTH AMERICAN DATUM OF 1983 - 91 ADJ. (NAD83/91), STATE PLANE COORDINATE SYSTEM, OREGON NORTH ZONE. UNITS: INTERNATIONAL FEET.
3. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)
4. AREIAL IMAGERY SOURCE: NEARMAP, 13 APRIL 2021

HALEY ALDRICH

GSI Water Solutions, Inc.

MCCORMICK & BAXTER SUPERFUND SITE
6900 N EDGEWATER STREET
PORTLAND, OREGON

SITE OBSERVATION SUMMARY

MAY 2022

FIGURE 2-1

GIS: \\haleyaldrich.com\share\pdx_data\Notebooks\150002005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\GIS\150002005_02-1_SITE_OBSEVATION_SUMMARY.mxd - mschweitzer - 3/28/2022 2:35:43 PM

FIGURE 4-1

Groundwater Monitoring Well Location Map

McCormick & Baxter Superfund Site
Portland, Oregon

LEGEND

- Groundwater Monitoring Well
- Groundwater Monitoring Well with Transducer
- Subsurface Barrier Wall

Date: March 28, 2022
Data Sources: City of Portland Imagery (Summer 2021)

N

0 100 200 300
Feet

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FIGURE 4-2

Groundwater Contour Map for June/July 2021 Monitoring Event

McCormick & Baxter Superfund Site
Portland, Oregon

LEGEND

- Shallow Groundwater Monitoring Well
- Groundwater Monitoring Well with Transducer
- Groundwater Elevation Contour (dashed where inferred)
- Willamette River Water Level During Sampling Event (8.75 feet)
- Subsurface Barrier Wall

NOTES

1. Groundwater elevation measurements collected at wells screened in the shallow water table. See tables for groundwater elevations at intermediate and deep intervals.
2. MW-17s was not used in 2021 contouring map.
3. Elevations shown in NAVD88.
4. Aerial photo taken summer of 2018.
5. Water levels measured between 9:00 a.m. and 4:00 p.m.
6. Willamette River low tide at 2:30 p.m. River elevation: 8.75 feet NAVD88

NM = Not Measured

Date: March 28, 2022
Data Sources: City of Portland Imagery (Summer 2021)

N

0 100 200 300
Feet

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Document Path: \\VMS\GIS_Files\0205_OR_DEQ\Source_Figures\003_003_M_B\2021_Annual_Report\Figure4-2_GW_Elevations_June2021.mxd

FIGURE 4-3

Groundwater Contour Map for September 2021 Monitoring Event

McCormick & Baxter Superfund Site
Portland, Oregon

LEGEND

- Shallow Groundwater Monitoring Well
- Groundwater Monitoring Well with Transducer
- Groundwater Elevation Contour (dashed where inferred)
- Willamette River Water Level During Sampling Event (5.91 feet)
- Subsurface Barrier Wall

NOTES

1. Groundwater elevation measurements collected at wells screened in the shallow water table. See tables for groundwater elevations at intermediate and deep intervals.
2. Elevations shown in NAVD88.
3. Aerial photo taken summer of 2018.
4. Water levels measured between 9:00 a.m. and 4:30 p.m.
5. Willamette River low tide at 2:30 p.m. River elevation: 5.91 feet NAVD88

NM = Not Measured

Date: March 28, 2022
Data Sources: City of Portland Imagery (Summer 2021)

N

0 100 200 300
Feet

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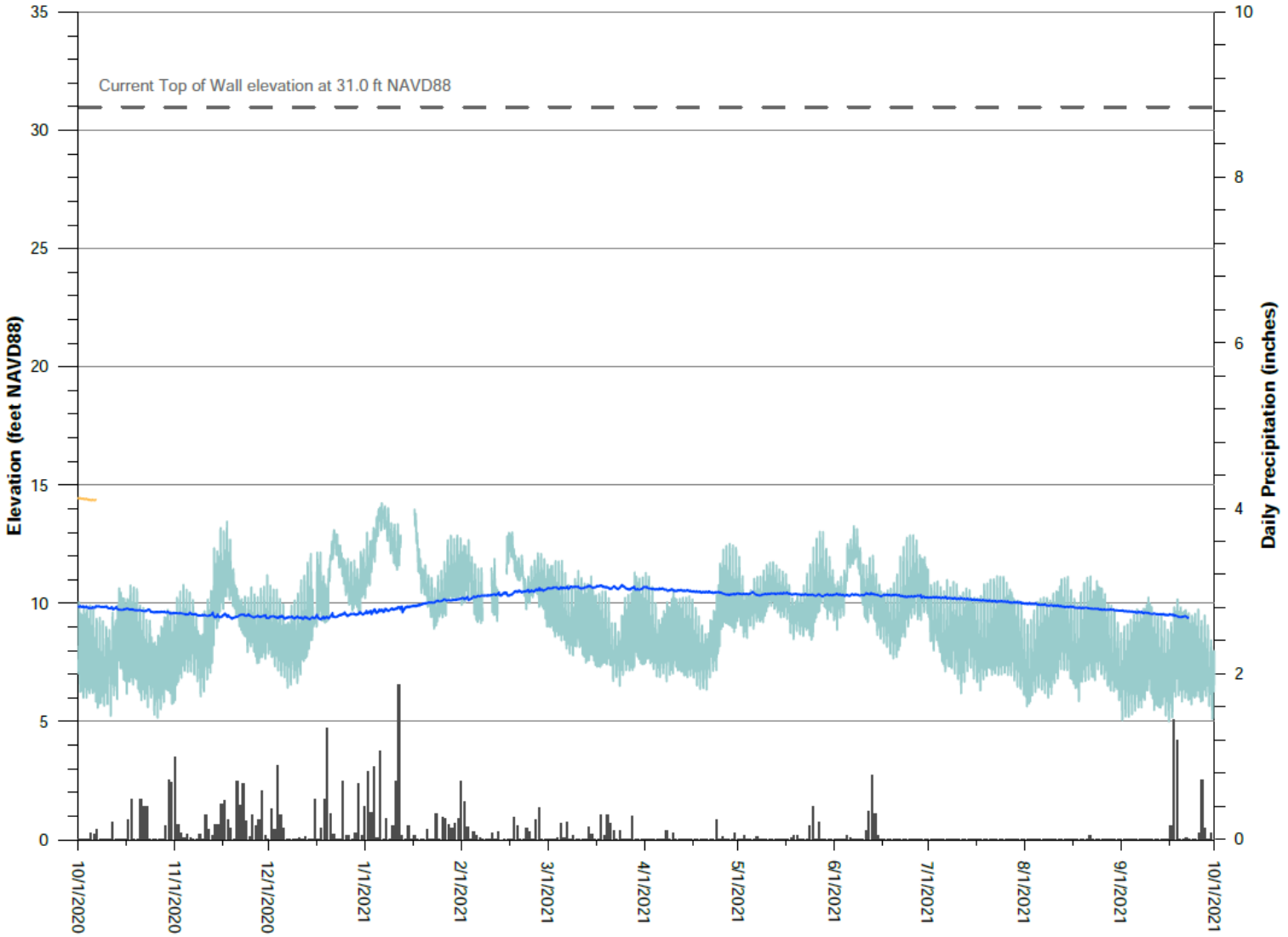
FIGURE 4-4

2021 Groundwater Elevations in Monitoring Wells MW-52s and MW-53s

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

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

NOTES

1. ME-52s is located inside the barrier wall and MW-53s is located outside the barrier wall.
2. Due to a pressure transducer failure, there is no data available for MW-53s. Data gaps in the Willamette River elevation are due to erroneous data.

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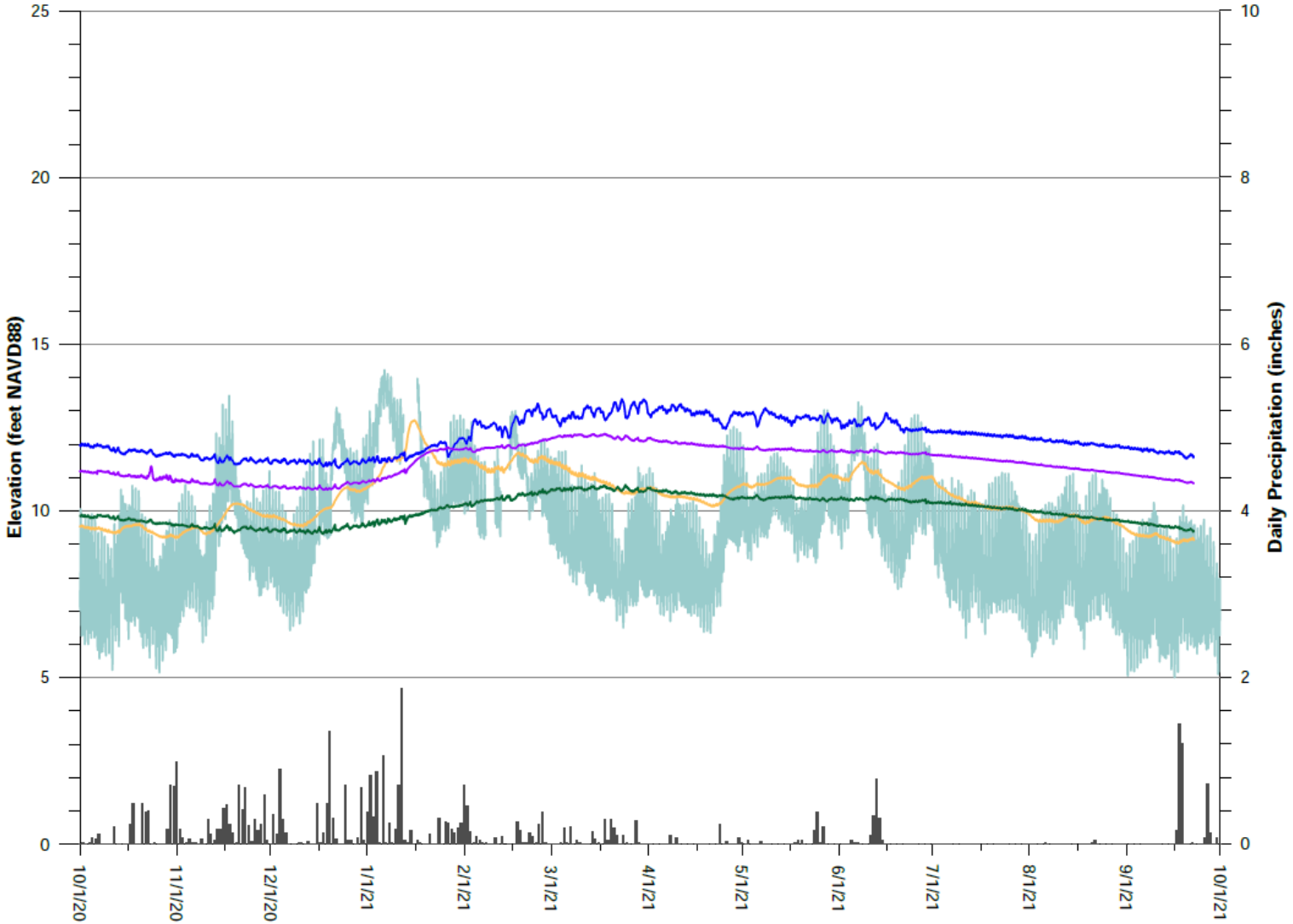
FIGURE 4-5

2021 Groundwater Elevations within the Barrier Wall

McCormick & Baxter Superfund Site
Portland, Oregon



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. Data gaps in the Willamette River are due to erroneous data.

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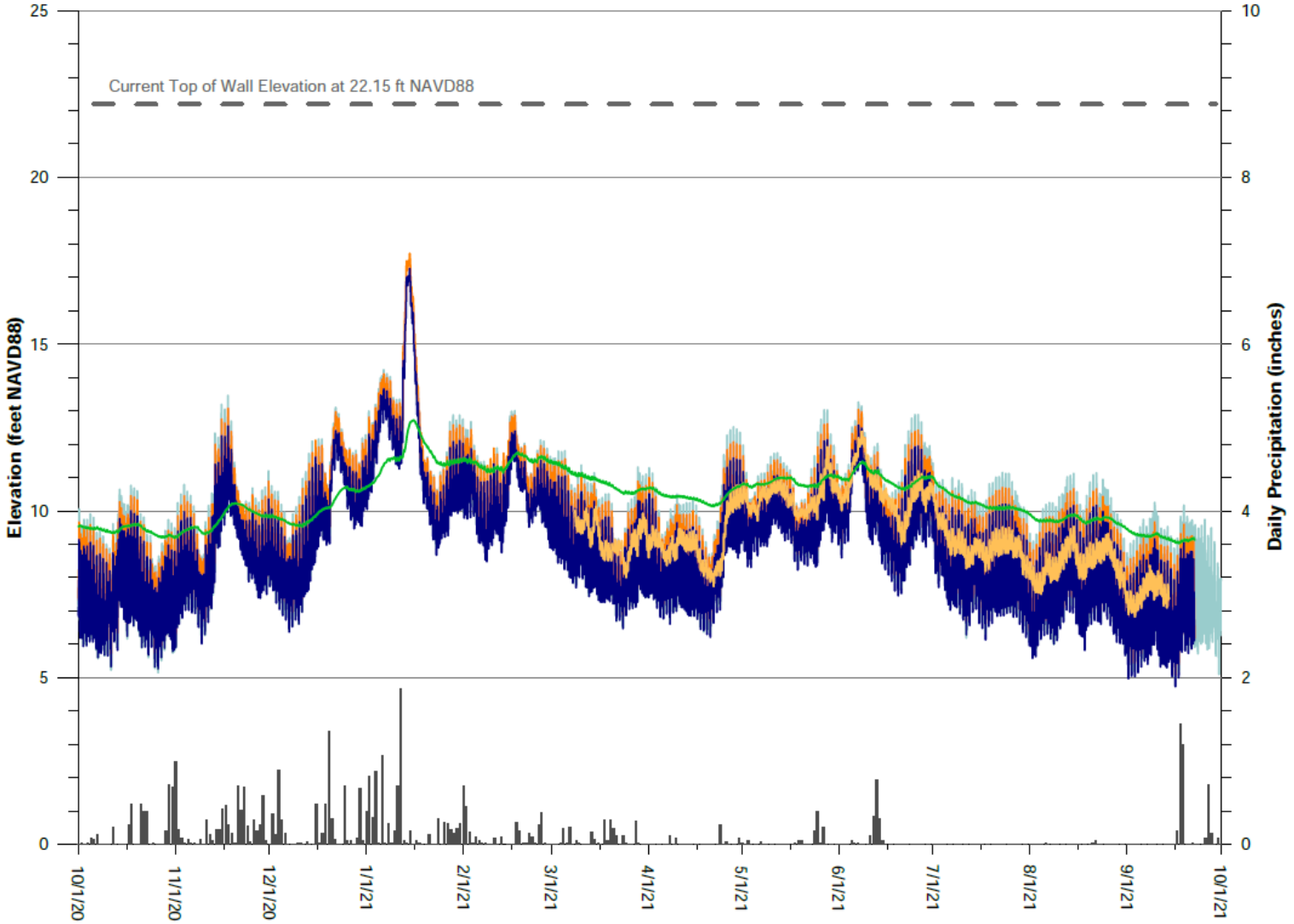
FIGURE 4-6

2021 Groundwater Elevations in Monitoring Wells MW-36 and MW-37

McCormick & Baxter Superfund Site
Portland, Oregon



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 a pressure transducer issue, data did not start recording at MW-37s until March 12, 2021.
3. Data gaps in the Willamette River elevation are due to erroneous data.

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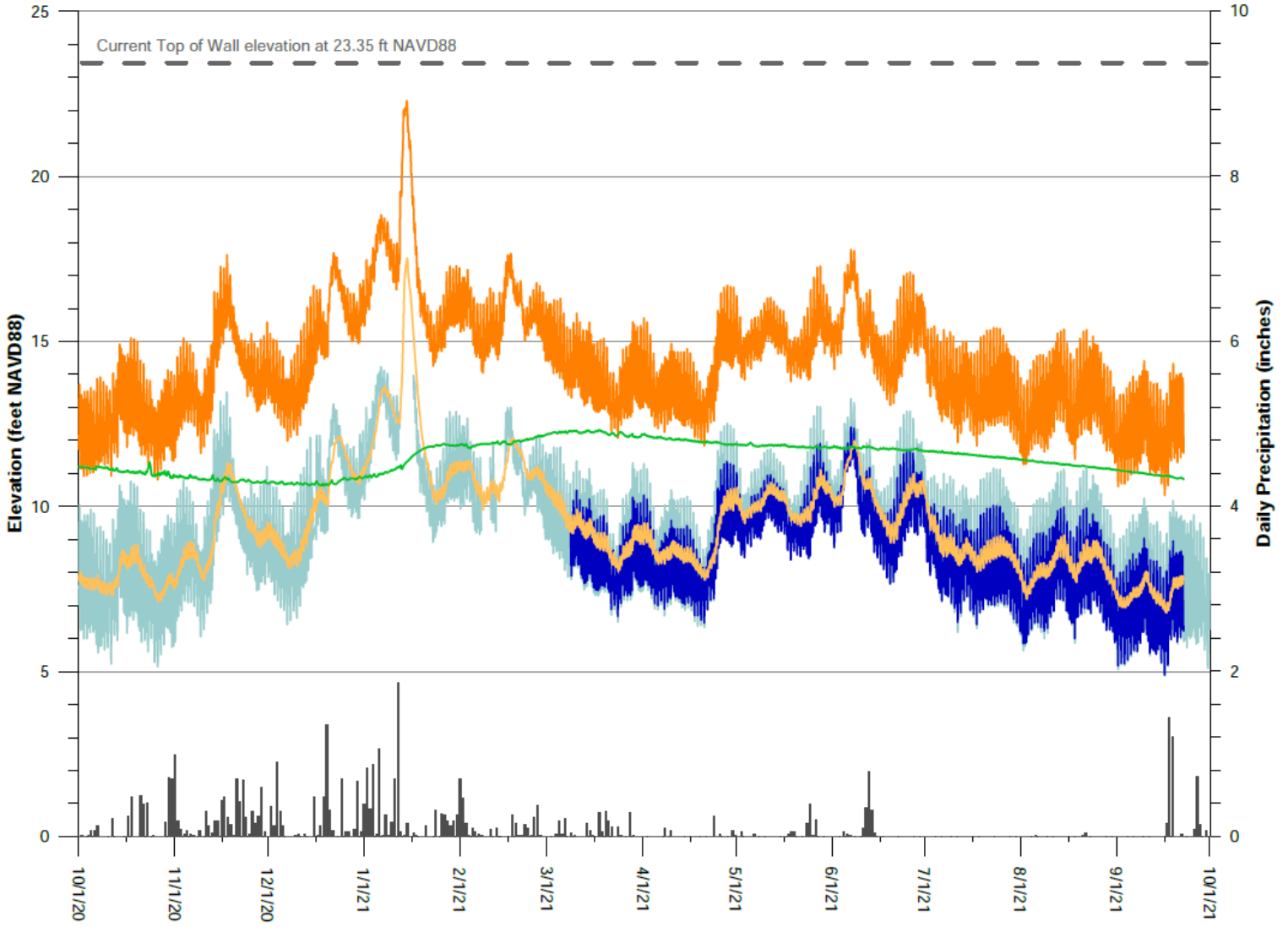

FIGURE 4-7

2021 Groundwater Elevations in Monitoring Wells MW-44 and MW-45

McCormick & Baxter Superfund Site
Portland, Oregon

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.
2. Due to a pressure transducer issue, data did not start recording at MW-44d until March 08, 2021.
3. Data gaps in the Willamette River elevation are due to erroneous data.

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FIGURE 4-8

Measureable LNAPL and DNAPL Distribution Map for June/July 2021 Sampling Event

McCormick & Baxter Superfund Site
Portland, Oregon

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

NOTE

1. Trace LNAPL was identified in MW-10r and MW-Gs.

Date: March 28, 2022
Data Sources: City of Portland Imagery (Summer 2021)

N

0 100 200 300
Feet

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Document Path: \\VMS\GIS_Files\0205_OR_DEQ\Source_Figures\003_003_M_B\2021_Annual_Report\Figure4-8_LNAPL_and_DNAPL_Map_June2021.mxd

FIGURE 4-9

Measureable LNAPL and DNAPL Distribution Map for September, 2021, Sampling Event

McCormick & Baxter Superfund Site
Portland, Oregon

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

NOTE

1. Trace LNAPL was identified in MW-Ds, MW-Gs.

Date: March 28, 2022
Data Sources: City of Portland Imagery (Summer 2021)

N

0 100 200 300
Feet

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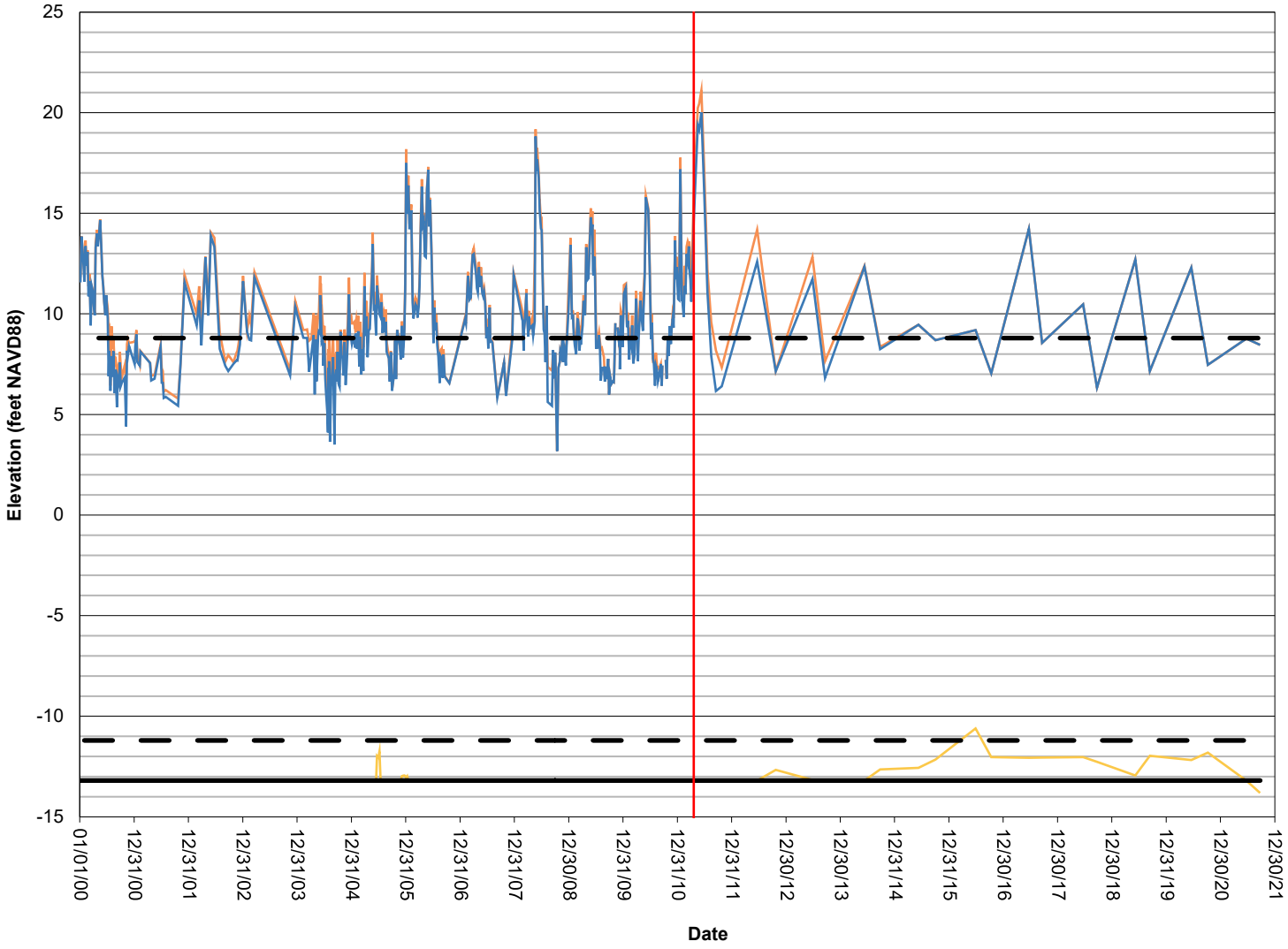
Document Path: \\VMS\GIS_Files\0205_OR_DEQ\Source_Figures\003_003_M_B\2021_Annual_Report\Figure4-9_LNAPL_and_DNAPL_Map_Sept2021.mxd

FIGURE 4-10

1999 to 2021 NAPL Thickness Plot for Well EW-10s

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]
- End NAPL Recovery[3]

NOTES

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

1. Top of well screen is at 8.80 ft NAVD88, and bottom of well screen is at -11.20 ft NAVD88.
2. Existing well depth is at -13.20 ft NAVD88.
3. NAPL recovery terminated 4/21/11.

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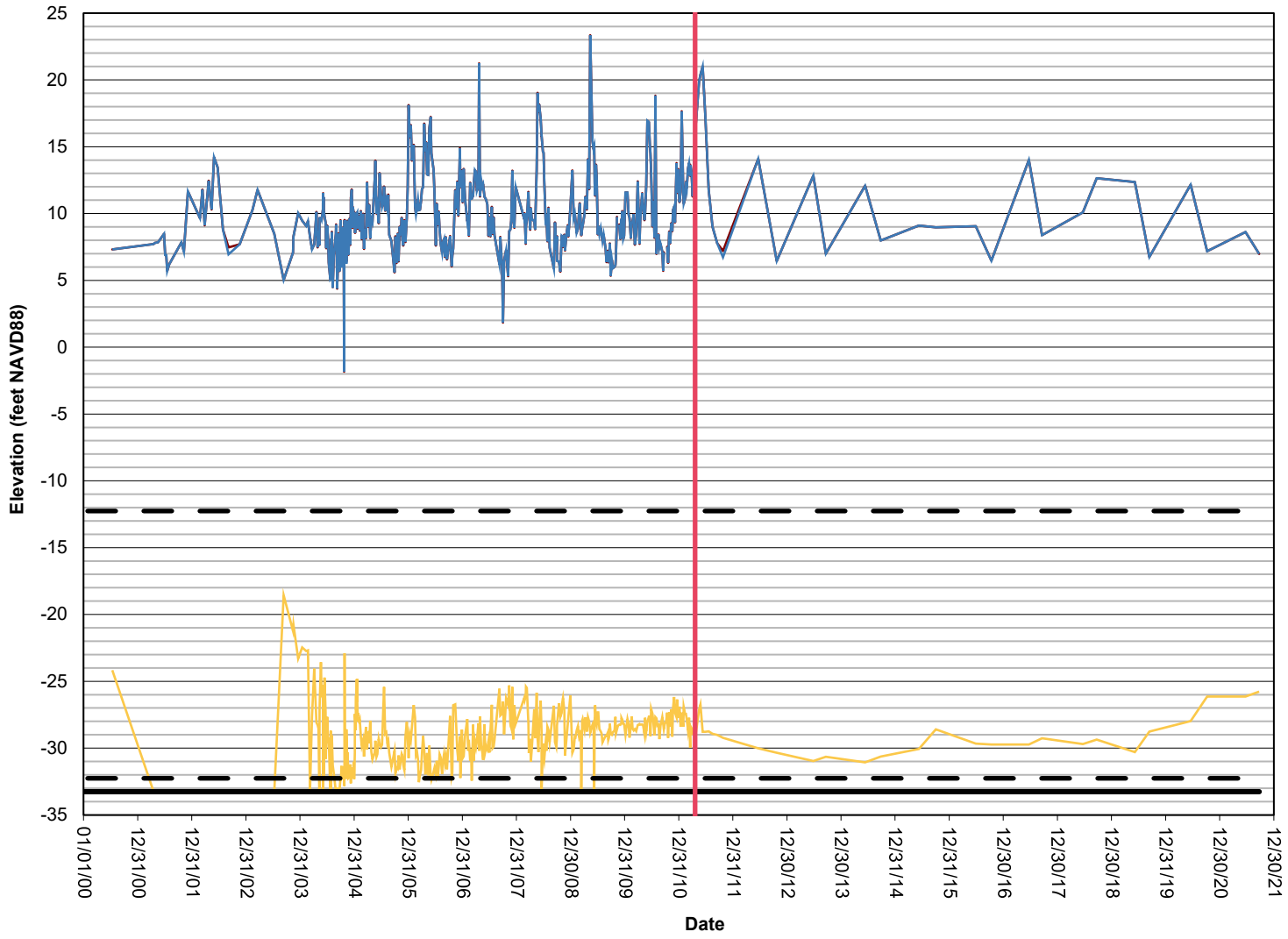
FIGURE 4-11

2001 to 2021 NAPL Thickness Plot for Well MW-20i

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]
- End of NAPL Recovery[3]

NOTES

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

1. Top of well screen is at -12.26 ft NAVD88, and bottom of well screen is at -32.26 ft NAVD88.
2. Existing well depth is at -33.26 ft NAVD88.
3. NAPL recovery terminated on 4/21/11.

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.

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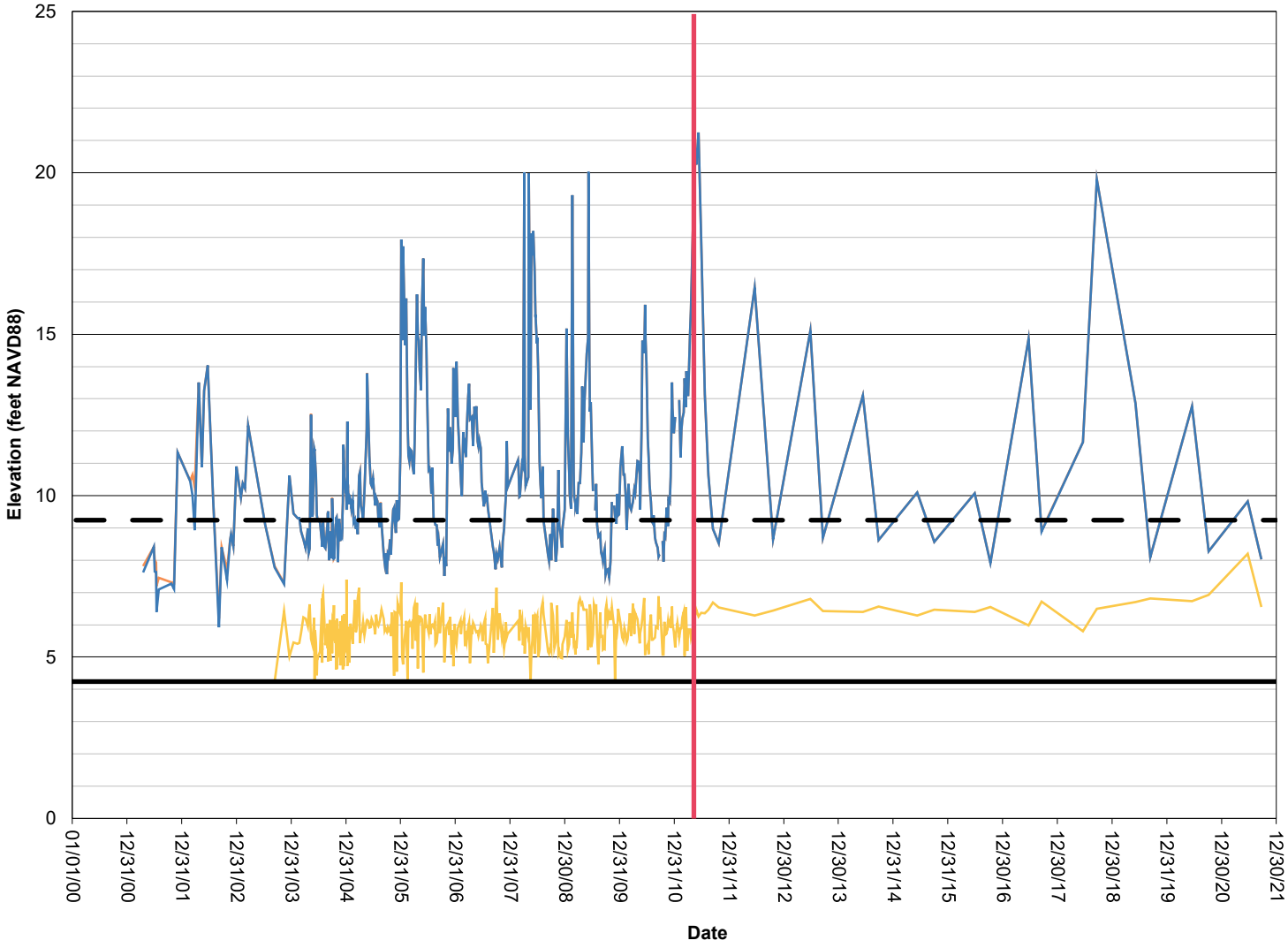
FIGURE 4-12

2001 to 2021 NAPL Thickness Plot for Well MW-Ds

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]
- End of NAPL Recovery[3]

NOTES

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

1. Top of well screen is at 9.24 ft NAVD88, and bottom of well screen is at 4.24 ft NAVD88.
2. Existing well depth is at 4.24 ft NAVD88.
3. NAPL Recovery terminated on 4/21/11.

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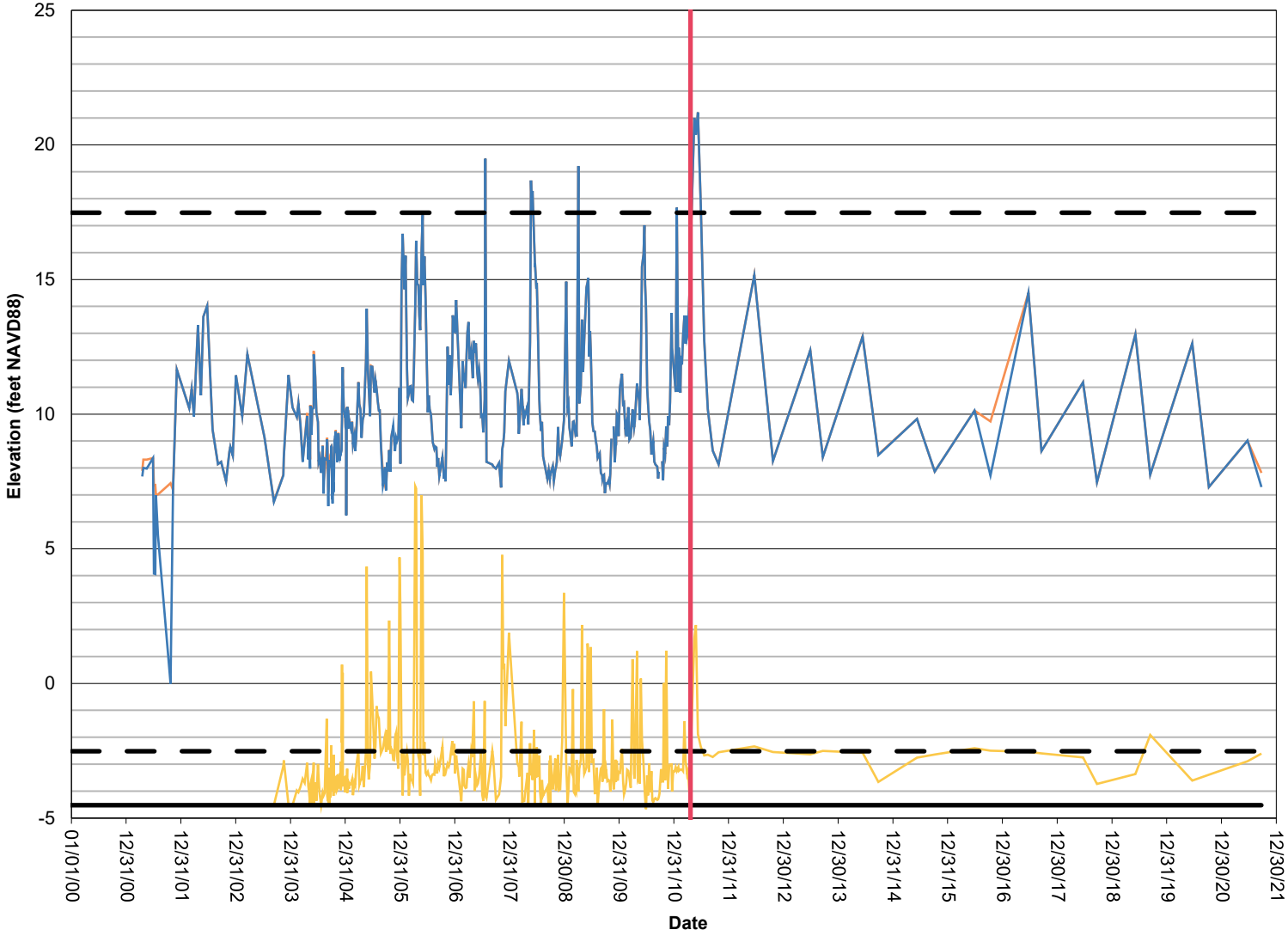
FIGURE 4-13

2001 to 2021 NAPL Thickness Plot for Well MW-Gs

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]
- End of NAPL Recovery[3]

NOTES

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

1. Top of well screen is at 17.48 ft NAVD88, and bottom of well screen is at -2.52 ft NAVD88.
2. Existing well depth is at -4.52 ft NAVD88.
3. NAPL recovery terminated on 4/21/11.

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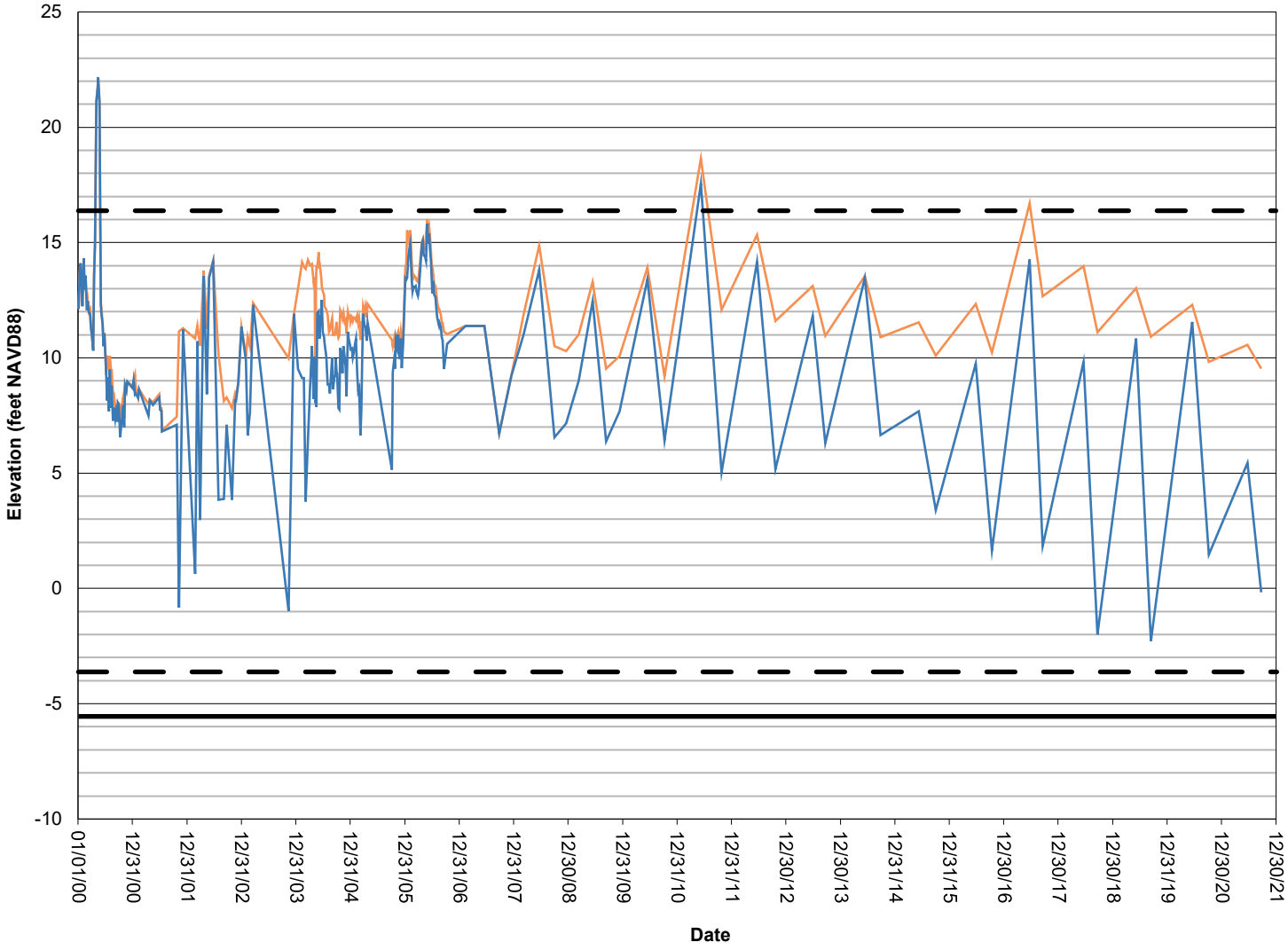
FIGURE 4-14

1999 to 2021 NAPL Thickness Plot for Well EW-15s

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

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

1. Top of well screen is at 16.38 ft NAVD88, and bottom of well screen is at -3.62 ft NAVD88.
2. Existing well depth is at -5.55 ft NAVD88.

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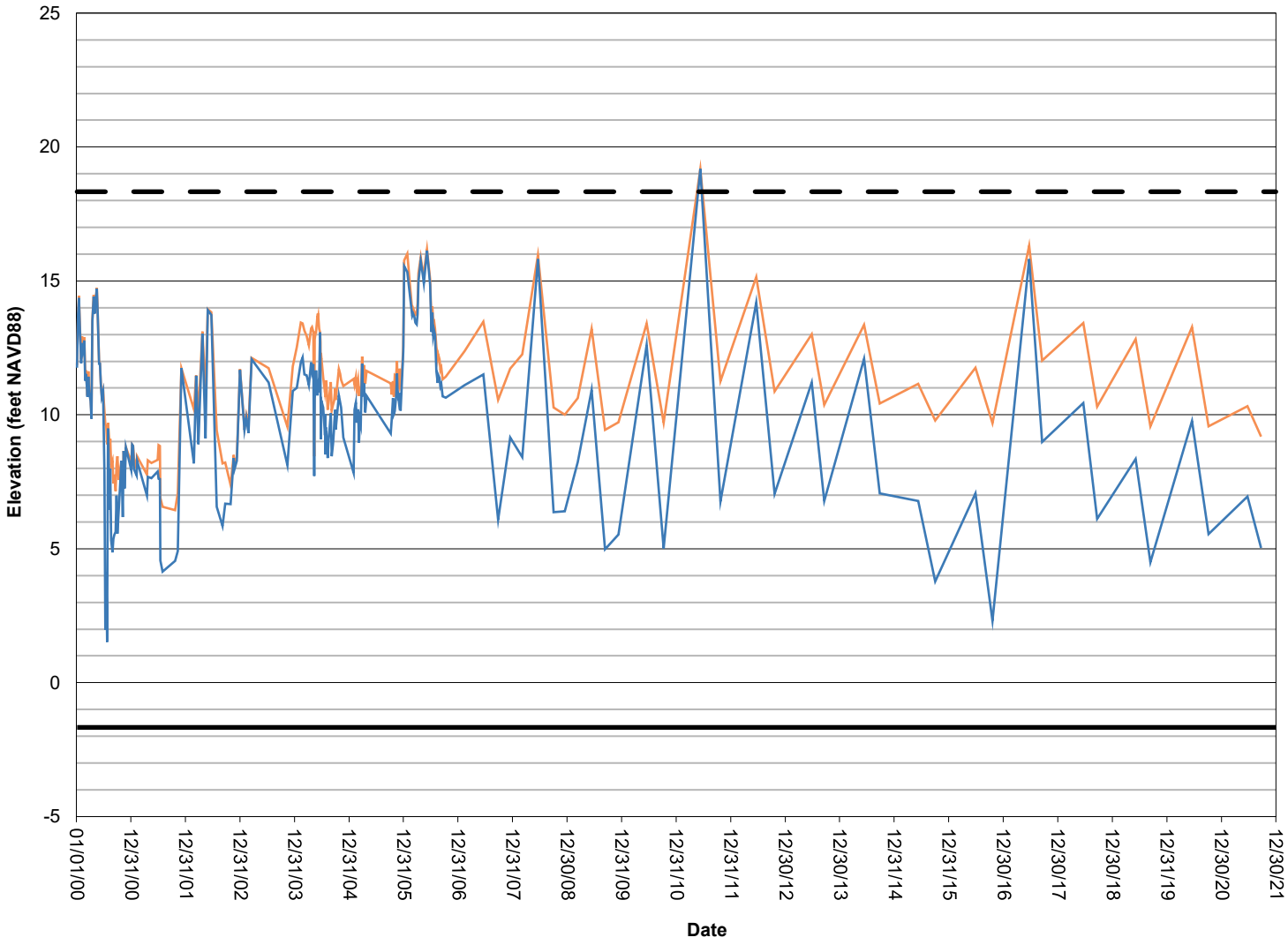
FIGURE 4-15

1999 to 2021 NAPL Thickness Plot for Well EW-23s

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

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

1. Top of well screen is at 18.33 ft NAVD88, and bottom of well screen is at -1.67 ft NAVD88.
2. Existing well depth is at -1.67 ft NAVD88.

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FIGURE 4-16

2009 to 2021 NAPL Thickness Plot for Well EW-1s

McCormick & Baxter Superfund Site
Portland, Oregon

LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]
- End of NAPL Recovery[3]

NOTES

1. Top of well screen is at 17.12 ft NAVD88, and bottom of well screen is at -7.88 ft NAVD88.
2. Existing well depth is at -7.88 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 September 2009. Given that the elevations are changing with time, the elevations shown are approximate.

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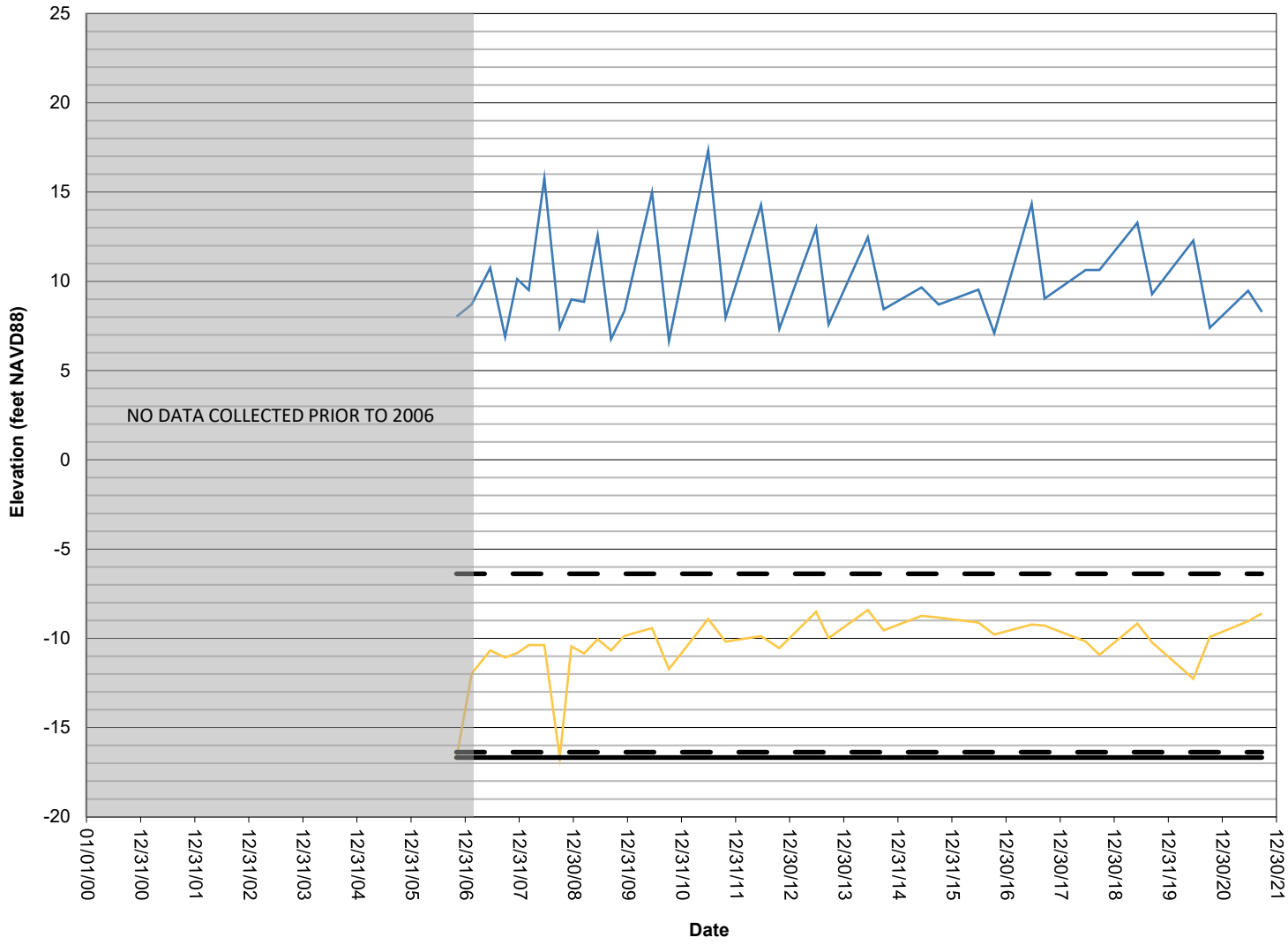
FIGURE 4-17

2006 to 2021 NAPL Thickness Plot for Well MW-22i

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

1. Top of well screen is at -6.38 ft NAVD88, and bottom of well screen is at -16.38 ft NAVD88.
2. Existing well depth is at -16.68 ft NAVD88.

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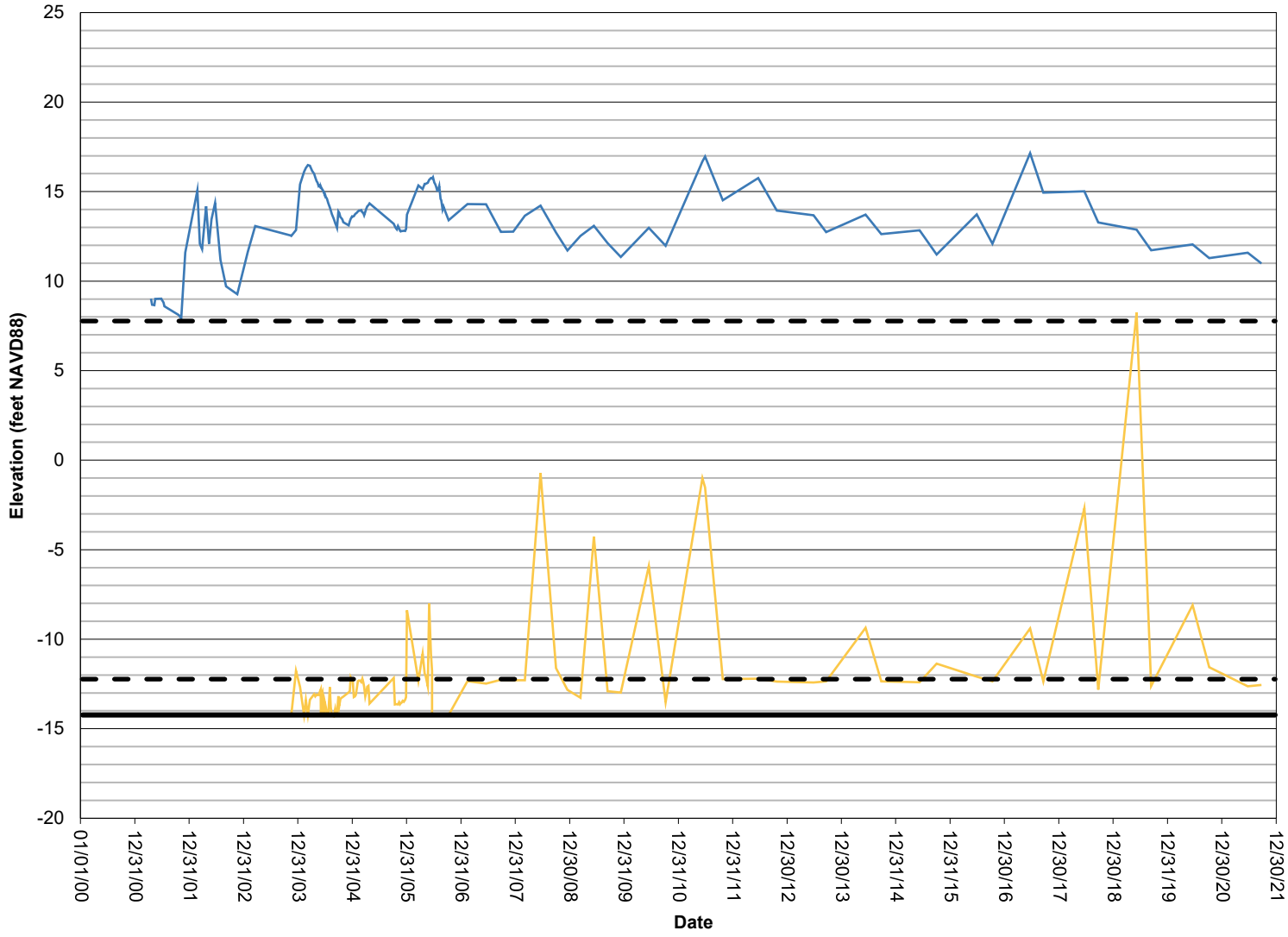
FIGURE 4-18

2001 to 2021 NAPL Thickness Plot for Well EW-8s

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

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

1. Top of well screen is at 7.77 ft NAVD88, and bottom of well screen is at -12.23 ft NAVD88.
2. Existing well depth is at -14.23 ft NAVD88.

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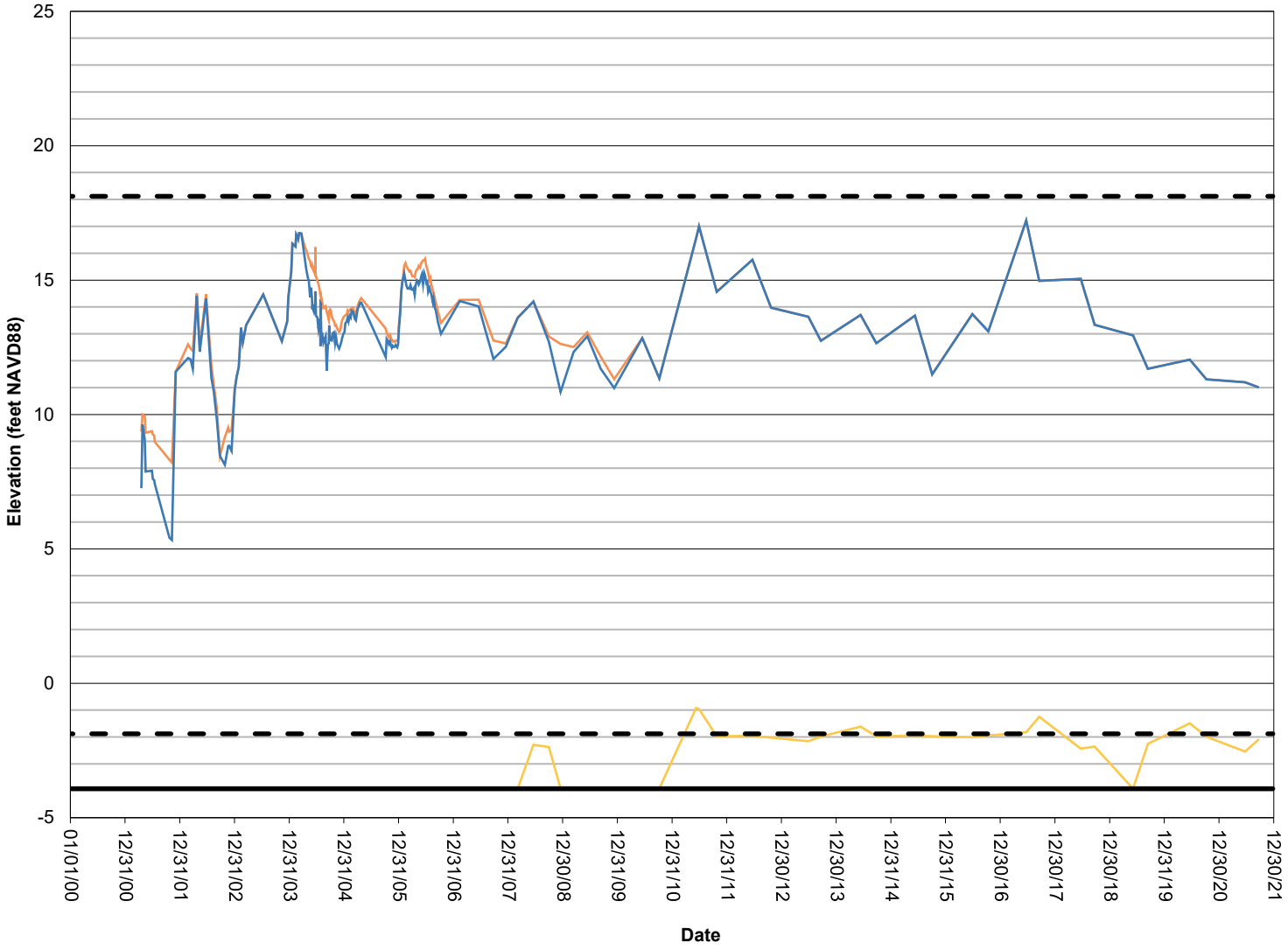
FIGURE 4-19

2001 to 2021 NAPL Thickness Plot for Well EW-18s

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

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

1. Top of well screen is at 18.12 ft NAVD88, and bottom of well screen is at -1.88 ft NAVD88.
2. Existing well depth is at -3.92 ft NAVD88.

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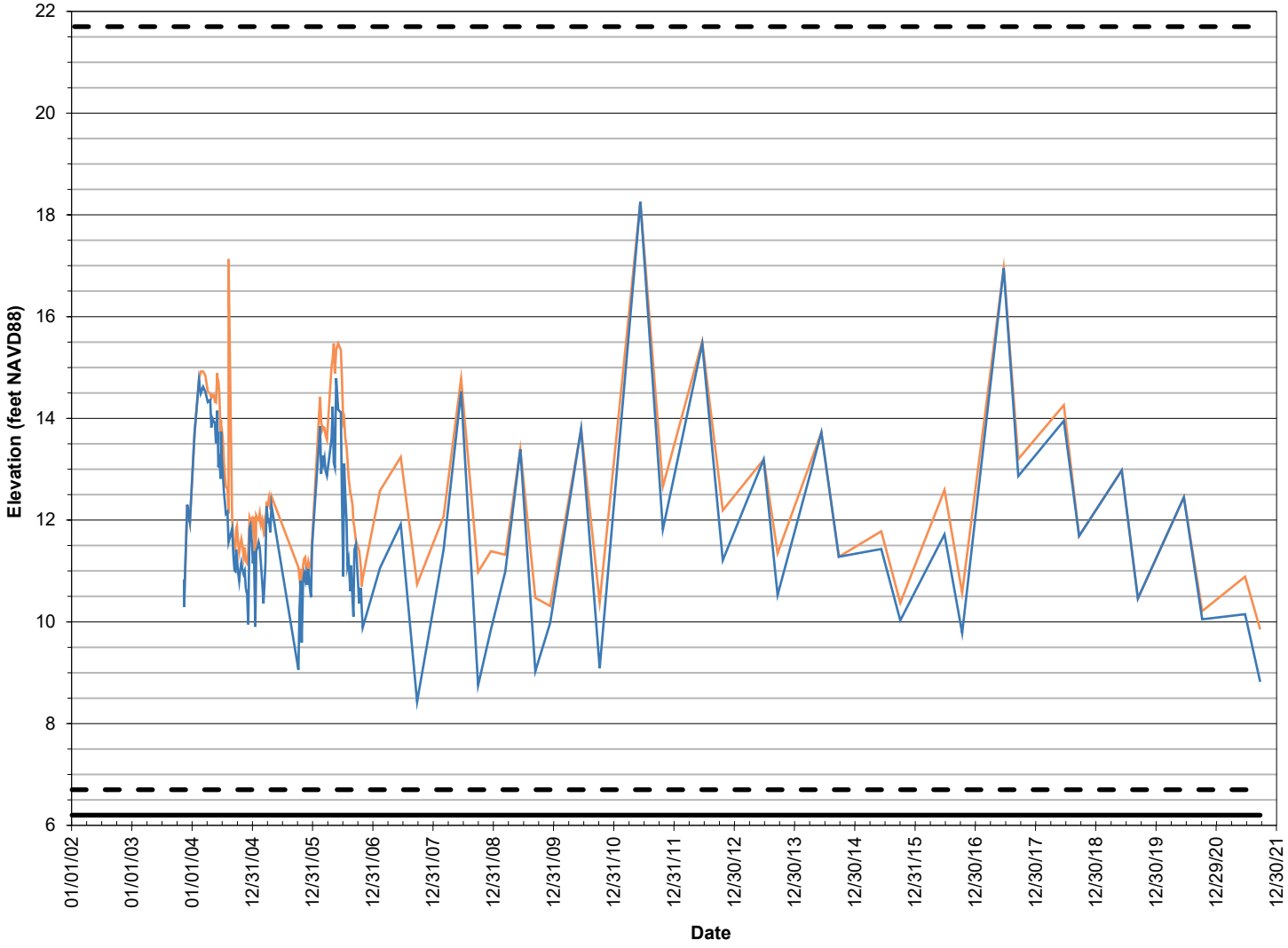
FIGURE 4-20

2001 to 2021 NAPL Thickness Plot for Well MW-56s

McCormick & Baxter Superfund Site
Portland, Oregon



LEGEND

- LNAPL
- Groundwater
- DNAPL
- Well Screen (Top and Bottom)[1]
- Well Depth[2]

NOTES

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

1. Top of well screen is at 21.70 ft NAVD88, and bottom of well screen is at 6.70 ft NAVD88.
2. Existing well depth is at 6.20 ft NAVD88.

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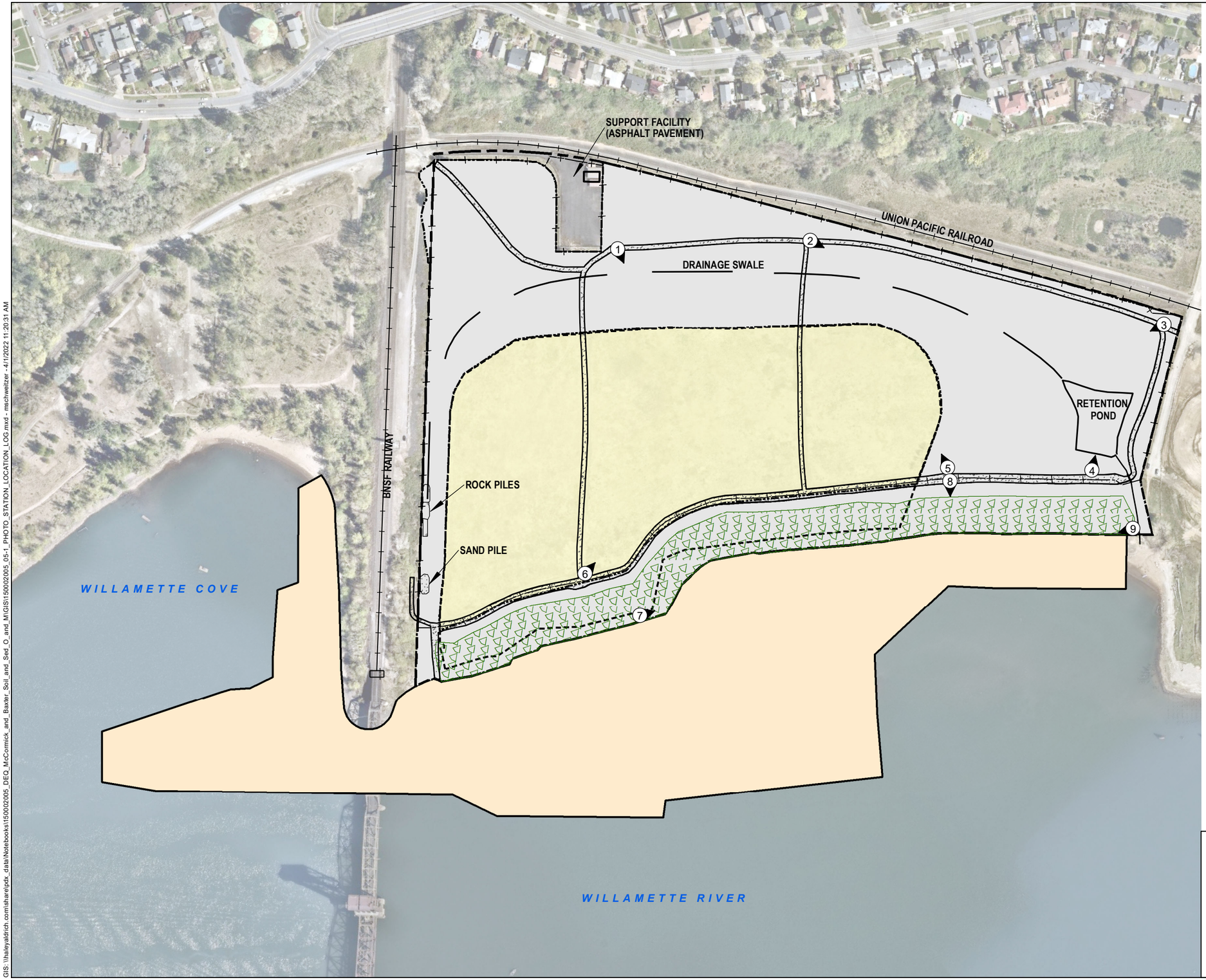


LEGEND

- PHOTOGRAPH STATION, NUMBER, AND DIRECITON TAKEN
- FENCE
- ROCK
- SAND
- RIPARIAN AREA
- 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, 13 APRIL 2021

0 250 500
SCALE IN FEET

HALEY ALDRICH

GSI Water Solutions, Inc.

MCCORMICK & BAXTER SUPERFUND SITE
6900 N EDGEWATER STREET
PORTLAND, OREGON

PHOTO STATION LOCATION LOG

APRIL 2022

FIGURE 5-1

GIS: \\haleyaldrich.com\share\pdx_data\Notebooks\150012005_DEQ_McCormick_and_Baxter_Soil_and_Sed_O_and_M\GIS\150012005_05-1_PHOTO_STATION_LOCATION_LOG.mxd - mschweitzer - 4/1/2022 11:20:31 AM

APPENDIX A
Photograph Log - Site Activities and Observations

Photograph A1: Replaced signpost and sign along eastern perimeter fence. View facing southwest. (January 2021).

Photograph A2: Site informational sign added to entrance gate on Van Houten Street. View facing north. (January 2021).

Photograph A3: Former homeless encampment area at the northern end of the Willamette River shoreline after removal of abandoned campsite and trash. View facing north (January 2021).

Photograph A4: Former homeless encampment area at the northern end of the Willamette River shoreline after removal of abandoned campsite and trash. View facing southeast (January 2021).

Photograph A5: Willamette River shoreline and view of water over sediment cap. View facing southwest. (March 2021).

Photograph A6: Removal of trees growing under fence line in paved storage area. View facing north (March 2021).

Photograph A7: Weed whacking and removal of blackberry vines growing over eastern perimeter fence. View facing southeast (March 2021).

Photograph A8: Animal burrow in soil cap near MW-48s (May 2021).

Photograph A9: Soil cap condition in southeastern quadrant of soil cap during the second quarter site inspection (May 2021).

Photograph A10: Installation of vault box for stormwater conveyance piping cleanout CL-4 that was previously buried in the soil cap (August 2021).

Photograph A11: Installation of marked T-post for location of newly installed stormwater conveyance piping cleanout vault box at CL-4. View facing southwest (August 2021).

Photograph A12: Collapsing animal burrows in the soil cap and filling in with aggregate base rock material. Burrows were located in the vicinity of MW-48s (August 2021).

Photograph A13: Replacement of fence fabric section where hole was cut into western perimeter fence. View facing southwest (August 2021).

Photograph A14: Low river level and low tide conditions showing unconformities of the ACB in Willamette Cove. View facing west (September 2021).

Photograph A15: Low river level conditions showing edge of ACB armoring and transition to rip rap armoring on the sediment cap. View facing southeast (September 2021).

Photograph A16: Exposed sediment cap in intertidal zone during low river level conditions. View facing northeast (September 2021).

Photograph A17: Cutting of the fin keel on the derelict vessel to allow for removal of the vessel and trailering for transport to a disposal facility. View facing southeast (December 2021).

Photograph A18: Shoreline after removal of the derelict vessel. View facing northwest (December 2021).

APPENDIX B
Site Activity Documentation

McCormick & Baxter Operational & Functional Determination Period Status Meeting Summary

Monday, 3/8/2021, 13:30
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 Kevin Woodhouse Ben Johnson	Project Officer Site Manager Hydrogeologist	DEQ Hart Crowser GSI

Meeting Summary

Site Walk and Inspection

Site inspection participants met onsite at 13:55 at the paved parking and storage building area at the site. Participants attempted to enter at the N. Van Houton gate but it was blocked by a train across the tracks. Participants were able to enter from the N. Edgwater gate as the train did not extend that far along the tracks. Once onsite the following items were discussed.

- Fence repair and tree removal activities
- Transducer replacement in MW-37s and MW-44d
- Five-Year review data reporting and timeline
- Maintenance items performed on 1/22/21 and trash removal performed on 1/28/21
- Site maintenance needs, including upcoming tree removal for the third week of March 2021
- Upcoming BAP, DEQ would like technical assistance from Hart Crowser during the PPA process

The site inspection concluded at 15:25. Kevin Woodhouse stayed onsite until 16:00 replacing transducers for wells MW-37s and MW-44d. Kevin left the site at 16:00 to purchase a replacement lock and returned at 16:25 to secure the gate before finishing at the site.

Shoreline Inspection

The following items were inspected along the shoreline:
Shoreline:

- Willamette River and Willamette Cove shoreline conditions
- ACB condition
- Gravel overlay on ACB
- Buoy locations
- Stormwater discharge
- Ebullition from sediment cap
- Shoreline vegetation
- Debris and dumpsites

The Willamette River tides at the time of inspection (between 13:55 and 15:25) were at 9.05 feet NAVD88 (3.95 feet COP) and 8.43 feet NAVD88 (3.33 feet COP), respectively. The daily high tide was at 13:10 with elevations of 9.24 feet NAVD88 and 4.14 feet COP. The daily low tide was at 22:50 with elevations of 6.32 feet NAVD88 and 1.22 feet COP.

A lot of wood debris (trunks, branches, and small sticks) was deposited on the Willamette River shoreline after the recent rains in January and February 2021. Shoreline conditions are shown in Photographs 1 and 2. Trash and debris was removed from the Willamette River shoreline and the riparian area in January 2020, however small trash items have been washed up and deposited on the shoreline.

The September 2017 shoreline ACB repairs continue to appear to be in good condition and will continue to be monitored throughout the year. Patches of river rock were present along the lower edge of the shoreline along the riparian area.

The repair to the erosional depression under the TRM is functioning and will be monitored for the next few inspections for signs of additional erosion. No changes were observed to the repair since the fourth quarter 2020 site inspection.

The eastern most edge of the ACB armoring was observed to be buckling/sagging during the third quarter 2020 inspection. Repairs were made in December 2020. The repair is functioning and will be monitored over the next few inspections to verify that the repair is holding.

Stormwater discharge (Photograph 3) was occurring from the outfall at an estimated 5-8 gallons per minute. The outfall is in good condition. No change to the outfall armoring was observed since the last inspection. No repairs are planned and the armoring will continue to be monitored during the rainy season for signs of scouring or erosion.

Sporadic, light ebullition was observed from the organoclay layers in Willamette Cove. No ebullition was observed from organoclay layers in the Willamette River.

The abandoned vessel that was identified during the previous inspection was still present along the shoreline during the inspection (Photograph 4).

Buoys 1, 3 and 4 were not visible during the time of inspection. It is unlikely that they were incidentally moved and based on the partially submerged view of Buoy 5, it is believed that the buoys not visible are submerged since the inspection took place during a high tide. The presence of the buoys will be observed during the next event where personnel are onsite and closer to a low tide to verify if they are submerged or missing.

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.)
- EW-1s and MW-23d area of subsidence

The lock on the main gate was found cut upon arrival (Photograph 5) and the gates were open. No evidence of theft or entry into the storage building was observed. Following the conclusion of the inspection, Kevin Woodhouse purchased a replacement lock and secured the gate before departing the site.

The impermeable cap and soil cap were in good condition. 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.

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 2.75 inches, which is the same as recent measurements.

The down sign-posts identified during the previous site inspection were replaced during maintenance activities performed on 12/9/20 with the signs replaced on 1/22/21. The completed sign posts were observed by DEQ and functioning as designed (Photograph 6).

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).	Kevin Woodhouse	Quarterly
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Kevin Woodhouse	Quarterly
■ Monitor burned holes (approximately 3-inch diameter) in the TRM in brush fire area.	Kevin Woodhouse	Quarterly
■ Quarterly Site Inspections	Kevin Woodhouse	Quarterly
■ Maintenance Activities	Kevin Woodhouse	As needed
■ Tree removal and blackberry vine removal	Kevin Woodhouse	March 2021
■ Fence Repair	Kevin Woodhouse	Spring 2021
■ Low-tide monitoring and transducer data download,	Kevin Woodhouse Tess Lydick Rodrigo Prugue	June 2021
■ Five-Year Review data review and reporting.	Kevin Woodhouse Ben Johnson	Summer 2021

Site Activities / Miscellaneous Field Activities Performed Since Last Inspection

- Finished replacement of signs on sign-posts on 1/22/21.
- Performed trash and debris removal with Rapid Response Bio-Clean on 2/22/21.

Deliverables

- None submitted

Budget Status: Currently within the anticipated budget**.** A BAP is in the process of being prepared for additional data management framework development effort (Task 7), removal of the abandoned vessel (Task 2), and technical assistance (Task 4).

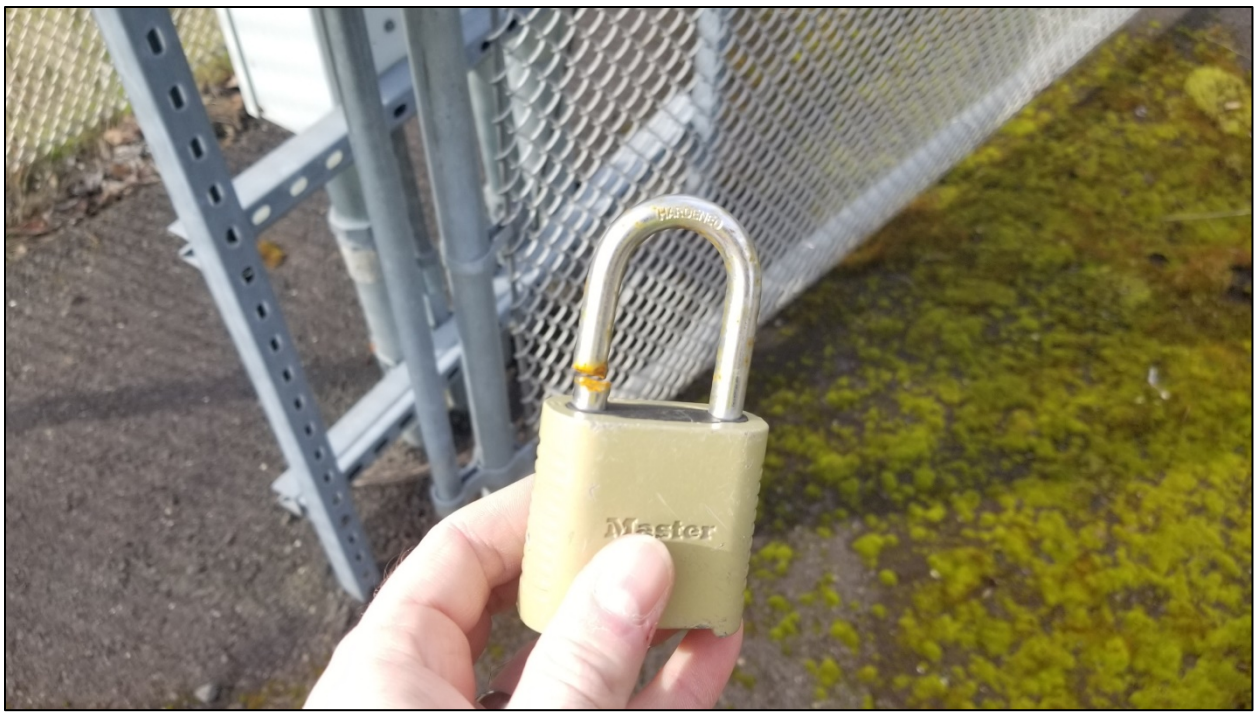
Photos:

Photograph 1: Large tree trunk that washed up on shore at Willamette Cove and Willamette River shoreline junction beneath Burlington Northern Railroad lines. View facing northeast.

Photograph 2: Willamette River shoreline with lots of wood debris deposited on it. View facing southeast.

Photograph 3: Stormwater outfall with approximately 5-8 gpm of flow. View facing southeast.

Photograph 4: Abandoned vessel on the shoreline of the Willamette River is still present. View facing west.



Photograph 5: Lock cut on the main gated entrance from N. Edgewater Avenue.

Photograph 6: Replaced sign and sign post by eastern perimeter fence. View facing west.

McCormick & Baxter Operational & Functional Determination Period Status Meeting Summary

Monday, 5/20/2021, 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	Project Officer	DEQ
	Kevin Woodhouse	Site Manager	Hart Crowser
	Ben Johnson	Hydrogeologist	GSI
	Annie Christopher	Project Team	EPA
Site Visitors:	Hunter Young	Visitor	EPA
	CDM-Smith representative	Visitor	CDM-Smith

Meeting Summary

Site Walk and Inspection

Site inspection participants met onsite at 09:00 at the paved parking and storage building area at the site. Also meeting onsite were Hunter Young (EPA) and a CDM-Smith representative to look at storage building facility and river access to evaluate if EPA can use the site as a processing facility for upcoming sediment coring work. Attendees showed visitors the facilities and visitors departed between approximately 09:45 and 10:00. After visitor departure, attendees began inspection of site

Once onsite the following items were discussed.

- Fence repair and tree removal activities
- Transducer replacement in MW-37s and MW-44d
- Annual report
- Five-Year review data reporting and timeline
- Maintenance items performed on since last inspection
- Technical assistance needs from DEQ under Task 4

The site inspection concluded at 11:30 and Ben Johnson and Kevin Woodhouse departed the site at 11:45. Sarah Miller and Annie Christopher stayed onsite longer to discuss additional details regarding the prospective purchaser agreement for the site.

Shoreline Inspection

The following items were inspected along the shoreline:
Shoreline:

- Willamette River and Willamette Cove shoreline conditions
- ACB condition
- Gravel overlay on ACB
- Buoy locations
- Stormwater discharge
- Ebullition from sediment cap
- Shoreline vegetation
- Trash and debris
- Derelict vessel

The Willamette River tides at the time of inspection (between 09:00 and 11:30) were at 9.38 feet NAVD88 (4.28 feet COP) and 9.93 feet NAVD88 (4.83 feet COP), respectively. The daily high tide was

at 12:50 with elevations of 10.10 feet NAVD88 and 5.00 feet COP. The daily low tide coincided with the river level at the start of the inspection at 09:00.

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.

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.

The repair to the erosional depression under the TRM continues to function. The repair will be monitored for one more quarter, after which it will be determined stabilized and specific monitoring will not be needed unless additional erosion is observed.

Several seams of the TRM were loose in the middle section of the Willamette River shoreline and several tears/rips were present from snags by woody debris (photograph 3). Replacement of TRM sections and securing of the loose seams will be performed during the next O&M visit.

Stormwater discharge was occurring from the outfall at an estimated 1 gallon per minute or less. The outfall is in good condition but had a little bit of moss buildup clogging the bottom of the “duckbill” outlet. Once the moss was cleared, the flow temporarily increased for a minute until the backed-up water flowed out. It was observed during this time that someone had shoved some wiring and metal into the outfall as a hiding place. The metal/wiring is presumed to have been stripped from the derelict vessel and will be removed during the next O&M visit.

No ebullition was observed from the organoclay layers in Willamette Cove or in Willamette River.

The derelict vessel that was first observed in December 2020 on the Willamette River shoreline remains in place near the stormwater outfall. Hart Crowser was authorized under the recent task order amendment to initiate removal activities and will begin coordinating with Oregon State Marine Board to do so.

Buoys 1, 3 and 4 were observed missing during the first quarter inspection in March 2021 and remained missing during this inspection. The buoys are presumed to have been struck by wood trunk/debris over the winter which broke the chain and will be replaced. Hart Crowser will initiate procurement activities for buoy replacement.

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.)
- EW-1s and MW-23d area of subsidence
- Gas vents.

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

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.

An animal burrow was identified in the vicinity of MW-48s (photograph 4). The animal burrow appears to be greater than 1 foot deep but the full depth is unknown. The burrow will be filled during the next O&M site visit.

Gas vents were inspected as part of the Five-Year Review checklist of items. Evidence of rodent or animal activity (e.g., nesting materials or freshly dug up soil was observed in two of the gas vent vaults. Repairs will be made to reset or install larger vault boxes with gravel bottoms to fortify the vaults and prevent animal intrusion.

While searching for gas vent vault boxes, a black PVC riser and cap was found protruding slightly from the cap surface in the vicinity of MW-48s. This may be a cleanout for the storm sewer. Sarah believes this may be a storm sewer cleanout riser. DEQ and Hart Crowser will review record drawings after this meeting to verify if the riser is a cleanout. If it is a cleanout, a vault box and marker post will be installed.

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 2.75 inches, which is the same as recent measurements.

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).	Kevin Woodhouse	Quarterly
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Kevin Woodhouse	Quarterly
■ Monitor burned holes (approximately 3-inch diameter) in the TRM in brush fire area.	Kevin Woodhouse	Quarterly
■ Quarterly Site Inspections	Kevin Woodhouse	Quarterly
■ Maintenance Activities	Kevin Woodhouse	As needed
■ Fence Repair	Kevin Woodhouse	Spring 2021
■ Vessel Removal	Kevin Woodhouse	June 2021
■ TRM and vault box repairs	Kevin Woodhouse	June 2021
■ Low-tide monitoring and transducer data download	Ryan Lewis Tess Lydick Rodrigo Prugue	June 2021

■ Five-Year Review data review and reporting.	Kevin Woodhouse Ben Johnson	June 2021

Site Activities / Miscellaneous Field Activities Performed Since Last Inspection

- Tree and blackberry vine removal was performed on 3/18.

Deliverables

- None submitted

Budget Status: Currently within the anticipated budget**.**

Photos:

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

Photograph 2: Willamette River shoreline with lots of wood debris deposited on it. View facing southeast.

Photograph 3: Loose or torn section of TRM that requires repairs. View facing north.

Photograph 4: Animal burrow in the vicinity of MW-48s.

Photograph 5: PVC riser and cap protruding through the soil cap and presumed to be a storm sewer cleanout.

Photograph 6: Rodent nesting inside the gas vent vault box at GV-3.

McCormick & Baxter Operational & Functional Determination Period Status Meeting Summary

Thursday, 9/2/2021, 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 Kevin Woodhouse Ben Johnson	Project Officer Site Manager Hydrogeologist	DEQ Hart Crowser GSI

Meeting Summary

Site Walk and Inspection

Kevin Woodhouse and Ben Johnson arrived onsite at 09:00 at the paved parking and storage building area at the site. Sarah Miller arrived at approximately 09:15. Attendees discussed project related items at the storage building until approximately 09:35 and then began site inspection.

The following items were discussed.

- Five-Year Review report revisions
- Prospective purchaser agreement updates.
- Maintenance items performed since last inspection
- Task order updates for O&F project

The site inspection concluded at 11:00 and all attendees departed the site by 11:15 after closing up gates and storage building.

Shoreline Inspection

The following items were inspected along the shoreline:
Shoreline:

- Willamette River and Willamette Cove shoreline conditions
- ACB condition
- Gravel overlay on ACB
- Buoy locations
- Stormwater discharge
- Ebullition from sediment cap
- Shoreline vegetation
- Derelict vessel

The Willamette River tides at the time of inspection (between 09:00 and 11:00) were at 6.05 feet NAVD88/0.95 feet COP and 5.43 feet NAVD88/0.33 feet COP. The daily high tide was at 01:45 with elevations of 9.15 feet NAVD88/4.05 feet COP. The daily low tide coincided was at 11:55 with elevations of 5.26 feet NAVD88/0.16 feet COP.

Large logs and woody debris continue to be present at or above the high tide line along the Willamette River shoreline. Tide levels were particularly low during the site inspection as in coincided with low tide and seasonally low river levels (Photograph 1). The ACB unconformities in Willamette Cover were able to be observed. Photographs 2 through 4 show several views of the buckled ACB causing the unconformities. An action item for Hart Crowser and DEQ will be to review records on ACB unconformities to evaluate if additional buckling has occurred since previous reporting and if repairs need to be made to this portion of the ACB armoring.

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.

The tide level was low along the Willamette River shoreline and the tidal flats were exposed more than normal during the inspection (Photograph 5).

Several seams of the TRM were loose in the middle section of the Willamette River shoreline and several tears/rips were present from snags by woody debris. Hart Crowser is in the process of procuring replacement TRM material to repair the damaged sections and repairs will be implemented in a future O&M visit.

No stormwater discharge was occurring from the outfall at the time of the inspection. The outfall is in good condition.

Ebullition was observed from the organoclay layers in Willamette River. No ebullition was observed from Willamette Cove.

The derelict vessel that was first observed in December 2020 on the Willamette River shoreline remains in place near the stormwater outfall. Hart Crowser has worked with the Oregon State Marine Board to go through the seizure process and in now in the process of soliciting subcontractors to remove the derelict vessel.

Buoys 1, 3 and 4 were observed missing during the first quarter inspection in March 2021 and remained missing during this inspection. Hart Crowser is in the process of soliciting subcontractors to perform buoy replacement.

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
- Gas vents vault repairs and storm sewer cleanout vault installations.

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

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 kneed high) at the time of inspection.

Animal burrows that were identified in the vicinity of MW-48s during the previous site inspection were filled in and attendees inspected the filled burrows. 13 burrows were filled during O&M visits in August and no new burrows were observed during the site inspection.

Attendees inspected the new vault box that was installed on storm sewer cleanout CL4. The newly installed vault was representative of the vault installations and the other cleanout vaults were not inspected.

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 was mistakenly not measured during the site inspection. The distance between the inner and outer casing will be measured during the upcoming low tide monitoring event on September 22, 2021.

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).	Kevin Woodhouse	Quarterly
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Kevin Woodhouse	Quarterly
■ Monitor burned holes (approximately 3-inch diameter) in the TRM in brush fire area.	Kevin Woodhouse	Quarterly
■ Quarterly Site Inspections	Kevin Woodhouse	Quarterly
■ Maintenance Activities	Kevin Woodhouse	As needed
■ Vessel Removal	Kevin Woodhouse	September 2021
■ TRM repairs	Kevin Woodhouse Ryan Lewis	September 2021
■ Low-tide monitoring and transducer data download	Ryan Lewis Madeleine Stoll Rodrigo Prugue	September 22, 2021
■ Five-Year Review Reporting.	Kevin Woodhouse Ben Johnson	September, 30 2021

Site Activities / Miscellaneous Field Activities Performed Since Last Inspection

O&M site visits:

- July 20, 2021: IDW disposal (removal of 1 wastewater drum), Kubota maintenance, repairs to gas vent vault boxes, begin storm sewer cleanout vault installation.
- August 17, 2021: Completed storm sewer cleanout vault installation, filled in 13 animal burrows in soil cap, and begin fence repairs.
- August 26, 2021: Completed fence repairs to holes cut in fence fabric, 5 holes repaired.

Deliverables

- Draft Five-Year Review Report submitted to DEQ on June 16, 2021
- Draft Five-Year Review Report submitted to EPA on July 9, 2021
- Final 2020 Annual O&M report submitted on July 30, 2021

Budget Status: Currently within the anticipated budget**.**

Photos:

Photograph 1: Low tide and seasonally low river level conditions for the Willamette River in Willamette Cove.

Photograph 2: Buckled ACB from the northeastern end of ACB along shoreline in Willamette Cove. View facing southwest.

Photograph 3: A second section of buckled ACB from the northeastern end of ACB along shoreline in Willamette Cove. View facing northeast.

Photograph 4: Buckled ACB along center portion of ACB in Willamette Cove. View facing southwest.

Photograph 5: Low-river level and exposed tidal flats along the Willamette River shoreline. View facing southeast.

McCormick & Baxter Operational & Functional Determination Period Status Meeting Summary

Tuesday, 12/7/2021, 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	Project Officer	DEQ
	Kevin Woodhouse	Site Manager	Hart Crowser
	Ben Johnson	Hydrogeologist	GSI
	Chris Rhea	Hydrogeologist	GSI

Meeting Summary

Site Walk and Inspection

Kevin Woodhouse, Ben Johnson, Chris Rhea, and Sarah Miller arrived onsite at 09:00 at the paved parking and storage building area at the site. Attendees discussed project related items at the storage building until and then began site inspection.

The following items were discussed.

- Data Management Plan updates
- Prospective purchaser agreement updates.
- Maintenance items performed since last inspection
- Vessel removal
- Buoy replacement

The site inspection concluded at approx. 11:30 and all attendees departed the site after closing up gates and storage building.

Shoreline Inspection

The following items were inspected along the shoreline:
Shoreline:

- Willamette River and Willamette Cove shoreline conditions
- ACB condition
- Gravel overlay on ACB
- Buoy locations
- Stormwater discharge
- Ebullition from sediment cap
- Shoreline vegetation
- Derelict vessel

The Willamette River tides at the time of inspection (between 09:00 and 11:30) were at 11.54 feet NAVD88/6.44 feet COP and 10.84 feet NAVD88/5.74 feet COP. The daily high tide was at 08:10 with an elevations of 11.72 feet NAVD88/6.62 feet COP. The daily low tide was at 15:20 with elevations of 9.87 feet NAVD88/4.77 feet COP.

Several large rain events occurred in November that raised the river level (Photograph 1) and deposited lots of woody debris on the shoreline (Photograph 2). Compared to the summer, increased amounts of large woody debris (trunk and large branch size) were present at the high tide line and a lot of small woody debris pieces (smaller branches and logs) had accumulated at the low tide line.

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.

Stormwater discharge was occurring from the outfall at the time of the inspection. A flow rate of approximately 10 gallons per minute was estimated by visual observation. The outfall is in good condition.

Several seams of the TRM were loose in the middle section of the Willamette River shoreline and several tears/rips were present from snags by woody debris. Hart Crowser has procured replacement TRM material to repair the damaged sections and repairs will be implemented in a future O&M visit.

No ebullition was observed from organoclay layers in Willamette Cove or alone the Willamette River shoreline.

The derelict vessel that was first observed in December 2020 was removed on December 3, 2021, by Ballard Marine (Ballard). Trash associated with the vessel was also removed. Hart Crowser will complete the derelict vessel removal report upon receipt of the disposal documentation from Ballard.

Buoys 1, 3 and 4 were observed missing during the first quarter inspection in March 2021 and remained missing during this inspection. Hart Crowser has subcontracted Ballard to perform buoy replacement and they have ordered the replacement materials however there is a delay from the manufacturer for shipping the items. The current estimate is mid-January for receiving the replacement buoys.

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
- Gas vents vault repairs and storm sewer cleanout vault installations.

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

The impermeable cap and soil cap were in good condition. Grasses and plant species on the impermeable cap were in a low stubble stage approximately 3 to 6 inches in height at the time of inspection. No animal burrows were identified 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 remains at 2.75 inches. The distance was mistakenly not measured during the third quarter site inspection and was measured during the subsequent low tide monitoring event on September 22, 2021, and was also measured at 2.75 inches.

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).	Kevin Woodhouse	Quarterly
■ Continue to monitor MW-23d inner/outer casing relationship for movement.	Kevin Woodhouse	Quarterly
■ Monitor burned holes (approximately 3-inch diameter) in the TRM in brush fire area.	Kevin Woodhouse	Quarterly
■ Quarterly Site Inspections	Kevin Woodhouse	Quarterly
■ Maintenance Activities	Kevin Woodhouse	As needed
■ TRM repairs	Kevin Woodhouse	Winter 2021
■ Buoy Replacement, waiting on replacement buoy delivery	Kevin Woodhouse	January 2022

Site Activities / Miscellaneous Field Activities Performed Since Last Inspection

O&M site visits:

- December 3, 2021: Derelict vessel was removed by Ballard Marine

Deliverables

- Revised draft versions of the Data Management Plan were submitted on November 22, 2021 and December 17, 2021.

Budget Status: Currently within the anticipated budget**.** A Budget and Assumptions Proposal (BAP) for continued O&M activities was submitted on November 19, 2021. The BAP is currently with DEQ for review. A revised BAP was submitted for O&F activities on September 29, 2021. DEQ issued a new task order for O&F activities on September 30, 2021.

Photos:

Photograph 1: High tide water levels along the Willamette River shoreline. View facing northwest.

Photograph 2: Woody debris piled up on Willamette River shoreline after several rain events in November. View facing south.

Photograph 3: Stormwater discharge through outfall. Estimated flow rate of 10 gallons per minute.

Table 2.2
Example Site Visitation Record
McCormick and Baxter Creosoting Company
Portland, Oregon

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	a.m./ p.m.?	Time OUT	a.m./ p.m.?	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
12/9/20	0900	/	~1630	—	Kevin Woodhouse	Hart Crowser	O+M
12/9/20	0915	/	~1630	—	Ryan Lewis	Hart Crowser	O+M
1/22/21	0910	/	1145	—	Kevin Woodhouse	HC	O+M
1/22/21	0910	—	1145	—	Ryan Lewis	HC	O+M
1/22/21	1020	—	11:45	—	Tim Walters	HC	O+M
1/27/21	0815	-			Ryan Lewis	HC	O+M
2/22/21	1430	—	1500	—	Kevin Woodhouse	HC	O+M
2/22/21	1430	—	1500	—	Alex Stauncli	Mosaic Ecology	O+M
3/8/21	1355	—	1600	—	Kevin Woodhouse	HC	site inspection
"	"	-	1525	—	Sarah Miller	DEQ	site inspection
"	"	—	1525	—	Ben Johson	GSI	site inspection
3/17/21	~1400		~1415		Kevin Woodhouse	HC	check buoys
3/18/21	0700		[illegible]		Kevin Woodhouse	Hart Crowser	Tree removal
3/18/21	07:15				Alex Stauncli	Mosaic Ecology	O+M
3/18/21	07:15				Steve Rybarsyk	"	"
3/18/21	07:15				Jason Schauer	"	"
3/18/21	07:15				Sierra Bloomer	"	"

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Table 2.2
Example Site Visitation Record
McCormick and Baxter Creosoting Company
Portland, Oregon

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	a.m./ p.m.?	Time OUT	a.m./ p.m.?	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
2/15	0715		[illegible]		David Powell	Mosaic Ecology	O+M
2/15	0715		[illegible]		Blake Willson	"	O+M
2/15	0715				Josiah Hamowitz	"	O+M
5/20	900		1145		Sarah Miller	DEQ	Inspectn
	900		[illegible]		Pamela [illegible]	RJM - NWH	Inspection
	900		[illegible]		Ben Johnson	GSI	O+M
	9:00		1145		Anne Christopher	EPA	SI Site Inspection
5/20	9:00		[illegible]		Hunter Young	EPA	Inspection
5/20	09:00		[illegible]		Kevin Woodhouse	Hart Crowser	Site Inspection
6/22	0811		1635		Tess Lydick	Hart Crowser	Maintenace / Low tide water levels
6/22	0822		~~1635~~ ~~H45~~		Ryan Lewis	Hart Crowser	O+M & Low tide water levels
6/22	0822		1145		Sarah Van Gluck	Hart Crowser	O+M
6/22	0822		1145		Madeleine Stoll	Hart Crowser	O+M
6/22	0800		1635		Rodrigo Prugue	GSI	O+M & Low tide water levels
6/25	0740		0830		Ryan Lewis	Hart Crowser	O&M
7/20	0700		1205	AM	Sarah Van Gluck	Hart Crowser	O&M

Table 2.2
Example Site Visitation Record
McCormick and Baxter Creosoting Company
Portland, Oregon

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	a.m./ p.m.?	Time OUT	a.m./ p.m.?	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
7/20	0900	AM	12:00	PM	Ryan Lewis	Hart Crowser	O&M
8/17/21	0745	AM	11:30	PM	Ryan Lewis	Hart Crowser	O&M
8/17/21	0745	AM	11:30	PM	Sarah Van Glubt	Hart Crowser	O&M
8/17/21	0745	AM	11:30	AM	Kevin Woodhouse	HC	O+M
8/26/21	0700		0925		Kevin Woodhouse	HC	O+M
8/26/21	0700		1630		Ryan Lewis	HC	O+M
8/26/21	0700		1630		Sarah Van Glubt	HC	O+M
9/2/21	0900		1100		Kevin Woodhouse	HC	3Q Inspection
9/2/21	0900		1100		Sarah Miller	DEQ	" "
9/2/21	0900	AM	1100		Ben Johnson	GSI	" "
9/2/21	1230		1500		Sarah Miller	DEQ	Site Walk PPA/Reuse
9/2/21	1230				Lauren Wirtis	DEQ	Site Walk PPA
9/2	1259				Andy Gasser	RestorCap	" "
9/2	1259				Kari Dupler	RestorCap	" "
9/2	1259				Rob Marinai	RESTORCAP	" "
9/2	1300		↓		Kat West	SKO	
9/10	0745	AM	0930	AM	Sarah Van Glubt	Hart Crowser	O&M

Table 2.2
Example Site Visitation Record
McCormick and Baxter Creosoting Company
Portland, Oregon

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	a.m./ p.m.?	Time OUT	a.m./ p.m.?	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
9/22/21	0700	AM	1630	PM	Sarah van Gilst	Hart Crowser	low tide monitoring
9/22/21	0700	AM	1630	PM	Ryan Lewis	"	"
9/22/21	0700	AM	1630	PM	Tess Lydick	"	"
9/22/21	0700	AM	1630	PM	Madeleine Stoll	"	"
9/22/21	0700	AM	1600	PM	Rodrigo Prugue	GSI	"
12/3/21	1130		1500		Kevin Woodhouse	HC	vessel removal
12/7/21	0900		1115		Kevin Woodhouse	HC	4Q Site inspection
12/7/21	0900		1115		Sarah Miller	DEQ	" "
12/7/21	0900		1115		Ben Johnson	GSI	" "
12/7/21	0900		1115		Chris Rhea	GSI	" "

APPENDIX C
Photograph Log - Vegetation Inspection

Photograph C1: Earthen cap and drainage swale in the foreground with the impermeable cap in the background. Taken looking south from Photograph Station 1 comparing baseline and conditions in 2014. (Left - June 2011, Right - June 2014).

Photograph C2: Tree and shrub plantings on the earthen cap. Taken looking southeast from Photograph Station 2 (June 2021).

Photograph C3: Tree and shrub plantings on the earthen cap are healthy and spreading. Taken from Photograph Station 2 looking southeast (October 2012).

Photograph C4: Tree and shrub plantings on the earthen cap are healthy and spreading. Taken from Photograph Station 2 looking southeast (June 2021).

Photograph C5: Eastern edge of the earthen cap with perimeter road in foreground. Taken from Photograph Station 3 looking west (October 2012).

Photograph C6: Eastern edge of the earthen cap with perimeter road in foreground. Taken from Photograph Station 3 looking west (June 2021).

Photograph C7: Stormwater pond dominated by willow and alder. Taken from Photograph Station 4 looking northeast (October 2012).

Photograph C8: Stormwater pond dominated by willow and alder. Taken from Photograph Station 4 looking northeast (June 2021).

Photograph C9: Willow plantings on the earthen cap. Taken from Photograph Station 5 looking northeast (October 2012).

Photograph C10: Willow plantings on the earthen cap. Taken from Photograph Station 5 looking northeast (June 2021).

Photograph C11: 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).

Photograph C12: Impermeable cap dominated by grasses and herbaceous vegetation. Taken from Photograph Station 6 looking east (June 2021).

Photograph C13: Vegetation growth within the lower riparian component. Taken from Photograph Station 7 looking south (May 2012).

Photograph C14: Vegetation growth and wood debris within the lower riparian component and along the shoreline. Taken from Photograph Station 7 looking southeast (June 2021).

Photograph C15: Upper riparian component with trees, shrubs, and herbaceous plants. Taken from Photograph Station 8 looking southwest (Left - May 2012; right - October 2012).

Photograph C16: Upper riparian component with trees, shrubs, and herbaceous plants. Taken from Photograph Station 8 looking southwest (June 2021).

Photograph C17: Lower riparian component with large wood along the edge. Taken from Photograph Station 9 looking northwest (Left - May 2012; right - October 2012).

Photograph C18: Lower riparian component with large wood along the edge. Taken from Photograph Station 9 looking northwest (June 2021).