Operation and Maintenance Report
January 2014 to December 2014

McCormick and Baxter Superfund Site

Portland, Oregon
ECSI Site ID: 74

Prepared for
Oregon Department of Environmental Quality

July 6, 2015
15670-10/Task 4

HARTCROWSER

GSI Water Solutions, Inc.

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ACRONYMS AND ABBREVIATIONS

ACB	articulated concrete block
ACLs	alternate concentration limits
AWQC	ambient water quality criteria
Ballard	Ballard Underwater Construction
bgs	below ground surface
BES	City of Portland, Bureau of Environmental Services
°C	degrees Celsius
DEQ	Oregon Department of Environmental Quality
DNAPL	dense non-aqueous phase liquid
DVD	digital video disc
EPA	US Environmental Protection Agency
ft/ft	foot per foot
FWDA	Former Waste Disposal Area
GSI	GSI Water Solutions, Inc.
Hart Crowser	Hart Crowser, Inc.
HC/GSI	Hart Crowser/GSI Water Solutions, Inc.
ICs	institutional controls
IDW	investigation-derived waste
IGA	Intergovernmental Agreement
LNAPL	light non-aqueous phase liquid
MCLs	maximum contaminant levels
mg/kg	milligrams per kilogram
NAPL	non-aqueous phase liquid
NAVD88	North American Vertical Datum of 1988
NOAA	National Oceanic and Atmospheric Administration
ng/L	nanograms per liter
NW Natural	Northwest Natural
O&M	Operation and Maintenance
OSU	Oregon State University
PAHs	polycyclic aromatic hydrocarbons
PCP	pentachlorophenol
PPE	personal protective equipment
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act

ACRONYMS AND ABBREVIATIONS (CONTINUED)

RM	River Mile
ROD	Record of Decision
site	McCormick & Baxter Superfund site
TFA	Tank Farm Area
TRM	turf-reinforced matting
µg/L	micrograms per liter
USGS	US Geological Survey

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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 (site) located in Portland, Multnomah County, Oregon, between January 1, 2014, and December 31, 2014.

O&M activities are identified in the Final O&M Plan (DEQ/US Environmental Protection Agency [EPA] March 2014), prepared by the DEQ and EPA. 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. The O&M Manual (Hart Crowser/GSI [HC/GSI] 2010) specifies the sampling and monitoring 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. The 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 purpose of this O&M Report is to document the operation, monitoring, and maintenance activities that occurred in calendar year 2014. Figure 1-1 shows the location of the site, Figure 1-2 presents the site layout and features, and 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, Hart Crowser, Inc. (Hart Crowser), and GSI Water Solutions, Inc. (GSI).

The O&M performance standards and activities for the soil cap are discussed in Section 2, the O&M performance standards and activities for the sediment cap are discussed in Section 3, and the groundwater performance standards and activities are summarized in Section 4. Vegetation management is presented in Section 5. Section 6 discusses the remedy protectiveness, and Section 7 presents recommendations for 2015. Section 8 provides references. Appendix A provides a photographic log of activities or observations associated with O&M activities. Appendix B provides documentation including the field observation forms for the soil and sediment cap, status meeting summaries, and the sign-in log, and Appendix C provides the photographic log for vegetation observations and the Vegetative Planting Plan for Shoreline Repair and Maintenance.

Routine operation, monitoring, and maintenance activities in 2014 were implemented primarily by the DEQ's contractor, Hart Crowser, and its teaming partner GSI (under subcontract to Hart Crowser).

O&M activities were also performed by Waste Management (waste hauler) and Ballard Underwater Construction (Ballard; buoy inspection).

Key personnel for implementation of O&M activities include:

- Scott Manzano: Oregon DEQ Project Officer
- Steve Campbell: Oregon DEQ Contract Officer
- Rick Ernst: Hart Crowser Program Manager
- Heidi Blischke: GSI Technical Manager
- Chris Martin: Hart Crowser Site 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, 2014, through December 31, 2014, 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 2014.

2.1 Soil Cap Performance Standards

Contaminated soil was removed and an upland soil cap was constructed on approximately 41 acres of the site in September 2005. Institutional controls (ICs) have 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, and NAPL and requires long-term monitoring and maintenance. The performance standards for the soil cap are:

- 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:
  - 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 site grading, surface stormwater conveyance, and native vegetation.
- Maintain native vegetation within the 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. Site inspections were conducted on January 29, April 16, July 28, and October 14, 2014, by the DEQ and HC/GSI. Observations of interest from the routine inspections are summarized on Figure 2-1 and described below.

Routine inspections are documented on observation forms developed for the site. Supporting documentation and pertinent details are included in Appendix B. As required for the site administrative record, a log of all site visitors in 2014 was kept and is also included in Appendix B.

2.2.1 Visual Inspection

The upland soil cap provides habitat for rabbits, ground squirrels, Canada geese, 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 (Photograph 1, Appendix A).

Evidence of ground squirrel activity was observed at several locations throughout the upland soil cap. Ground squirrels are common to the area, and their burrows typically extend to approximately 1 foot below ground surface (bgs). The ground squirrels use the surplus articulated concrete block (ACB) stockpiled at the site, paved roadway, and concrete well monuments as habitat. A larger than typical animal burrow was observed on the soil cap, likely from a coyote (Photograph 2, Appendix A). None of the observed burrows extend more than 1-foot into the 2-foot soil cap and, therefore, the soil cap continues to isolate site contaminants from human and ecological receptors. Continued monitoring of the burrows is recommended; no action to remove burrowing animals or to fill in the burrows is planned or is necessary at this time.

The gate at the top of North Edgewater Road marks the entrance to the site and Willamette Cove property. This gate, which is locked with a series of locks and a chain, provides access for two railroads, Northwest Natural (NW Natural), the DEQ, and other agencies that require access to the area. The Union Pacific Railroad tracks, which run parallel to the site and neighboring properties, are often used by transients and the public to access the area. Access to the area generally does not affect security because of the surrounding fence, lighting, and alarm system at the site.

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 approximately 1 foot between the time that the soil cap was installed in 2005 and 2008 in a limited area around the wells. A Subsidence in Upland Cap Memorandum (HC/GSI 2008) and an Additional Subsidence Monitoring Memorandum (HC/GSI 2009) 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 is suspected that aerobic degradation of woody debris was occurring and causing the ground surface subsidence. Decreasing groundwater levels within the sediment cap also may have contributed by opening a larger unsaturated zone that allows compaction. In 2009, the shallow well EW-1s, was sealed to reduce the amount of oxygen reaching the unsaturated zone. Since the well was sealed, the subsidence has slowed and in the past few years has become insignificant. The groundwater temperature dropped to approximately 23-25°C and has remained stable for the past 4 years (see Figure 4-6). This temperature is still higher than groundwater from surrounding wells (approximately 15°C) indicating that some heat is still being produced in the subsurface near well EW-1s; this may be caused by anaerobic degradation, which generates less heat than aerobic degradation.

Ground surface subsidence is monitored by measuring the inner polyvinyl chloride (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. 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. There has been essentially no change in distance measured since 2012. Slight differences in the distance measured (within 0.10 inch for all events) is likely due to variability in measuring equipment and operators. The distance remains between 2.60 and 2.50 inches. The total decrease in distance between the inner and outer casing since December 2008 (first periodic measurement conducted) is 1.5 inches—representing 1.5 inches of subsidence of the ground surface in this area, most of which occurred in 2008 and 2009.

While not anticipated, significant additional settling in this area could affect performance of the stormwater conveyance system. The stormwater conveyance system was inspected four times during 2014 and continues to perform as designed with steady flow from the outfall during and immediately after rainfall events. HC/GSI will continue to monitor the area by measuring the casing difference at MW-23d, continuously measuring the water level and temperature at EW-1s, and monitoring the discharge at the stormwater conveyance system outfall.

2.3 Soil Cap Maintenance Activities

In September 2014, the NW Natural gas company excavated a portion of the upland soil cap to access their underground gas line that runs alongside the site, parallel to the Burlington Northern Railroad (Figure 1-4). NW Natural conducted the excavation on order to permanently abandon the line according to a plan

approved by DEQ. A Post Construction Report, prepared by NW Natural (including waste manifests), was completed to document the line decommissioning and is included in Appendix B.

In preparation of the excavation, NW Natural and their subcontractor (GeoEngineers) installed two piezometers on the site on May 15, 2014, to determine the static groundwater elevation. Investigation-derived waste (IDW) generated during the installation of the piezometers consisted of hazardous soil and water. IDW was contained in 55-gallon drums and stored on the asphalt staging area of the site pending disposal. The piezometers were decommissioned on October 31, 2014.

The upland soil cap in the area of excavation consists of 2 feet of clean soil placed over contaminated soil. Orange construction fencing provided a demarcation layer to mark the transition from the clean soil cap and contaminated soil. During excavation, NW Natural removed the clean soil cap, and then removed the contaminated soil beneath the demarcation layer to create two separate soil piles. Both piles were placed on and covered with 10 mil plastic sheeting adjacent to the excavation and clearly labeled. Following line decommissioning, the soil was returned to the excavation in reverse order from which it was removed. IDW soil generated during the installation of the piezometers was also placed with the contaminated soil in the excavation. New orange construction fencing was placed on top of the contaminated soil, and the clean soil cap was replaced over the demarcation layer to reconstruct the cap.

A portion of the site perimeter fence was removed to access the gas line. At the end of each work day, temporary fence was placed around the excavation and was secured to the perimeter fence to limit access to the site. The perimeter fence was restored to previous conditions once the gas line abandonment was complete.

Vegetation was minimally disturbed by the construction. NW Natural mowed a portion of the site from the north corner gate to the excavation. If grassy vegetation does not grow back as anticipated, NW Natural will apply a native seed mix to re-seed the affected area. The seed mix will be approved by the Site Ecologist.

IDW water generated during piezometer installation was removed from the site by NW Natural and disposed of at the Subtitle C Chemical Waste Management Landfill in Arlington, Oregon.

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. Future O&M activities will primarily consist of quarterly inspections and routine maintenance. Initial planning to decommission nonessential and obsolete equipment, including the irrigation system, began in 2012 and will continue in 2015.

The degree of upland soil cap subsidence near wells EW-1s and MW-23d is currently stable. This area will continue to be monitored in 2015 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.

3.0 SEDIMENT CAP PERFORMANCE STANDARDS AND ACTIVITIES

This section summarizes sediment cap observation and maintenance activities for the reporting period January 1, 2014, through December 31, 2014. Site observations and maintenance activities were conducted according to the Final O&M Plan. Sediment cap inspections were conducted in January, April, July, and October 2014 by the DEQ and HC/GSI in conjunction with inspections for the entire site. Observations of interest from the routine inspections and site meetings are presented on Figure 2-1. Routine inspections are documented in observation forms developed and recorded for the site (Appendix B). Table 3-1 provides a summary of sediment cap activities conducted in 2014.

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, 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: $8x10^{-5}$ 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: 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:
  - 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 the DEQ and approved by the EPA in 2011. During meetings in August 2007 among stakeholders (DEQ, EPA, National Oceanic and Atmospheric Administration, Confederated Tribes of Warm Springs, and Yakama Nation), it was agreed that for comparison purposes, the following five criteria would be included in analytical results summary tables in the 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:
  - 2007 criteria for chronic effects to aquatic life
  - 2007 criteria for human health (consumption of organisms)
- Current EPA maximum contaminant levels (MCLs)

Future comparison criteria will include the EPA-approved 2011 AWQCs for human health and other applicable AWQCs at the time of sediment cap water sampling.

3.2 Sediment Cap Observations

Routine sediment cap inspections were conducted on January 29, April 16, July 28, and October 14, 2014 in conjunction with the four quarterly site meetings. Sediment cap inspection documentation is included in Appendix B. Sections 3.2.1 and 3.2.2 describe sediment cap observations regarding habitat enhancement features, wildlife, vandalism, and/or trespassing. In general, the sediment cap remains in good condition. Shoreline sheen was not observed in 2014. Limited ebullition was observed primarily within the two areas of the sediment cap where granular organophilic clay is present.

3.2.1 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. Large woody debris 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 wake from passing boats have washed sand from the ACB where the bank slopes are steeper. Rounded gravel (1-1/2-inch-minus) was placed within the ACB voids along a large portion of the shoreline and Willamette Cove in October 2012. The gravel has largely remained in place through 2014; however, some has washed down steeper shorelines and has settled onto lower ACB surfaces. Shoreline conditions and the distribution of the ACB gravel are shown in the Photograph Log (Appendix A).

Large woody debris along the shoreline at higher elevations was deposited during high river-stage events. The amount of woody debris at the site appears to remain fairly consistent every year. The highest river stage recorded since the sediment cap was installed occurred in June 2011, reaching 22 feet North American Vertical Datum (NAVD88), or 1 foot below the 23-foot flood stage. Erosion of soil mulch and vegetation cover on the green turf-reinforced matting (TRM) was observed in several areas near the lower riparian/ACB armoring elevation after river levels receded. During ACB gravel placement in October 2012, these areas were also repaired. TRM was pulled away from the ACB and voids were filled with crushed rock. The TRM was then pulled back over the crushed rock and re-secured to the ACB using concrete anchor nails. The repairs were observed to remain in place through 2014. The Willamette River did not reach flood stage in 2014 with the maximum elevation at approximately 18 feet NAVD88 in January 2014.

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 2014.

Numerous wildlife species continue to be observed site-wide; various birds seen most frequently include Canada geese, gulls, cormorants, pigeons, blue herons, ospreys, hawks, and flickers. Crayfish and clams were observed in the Willamette River.

3.2.2 Vandalism and Trespassing

The shoreline along the site and in the Willamette Cove is accessible and is used by the public for various forms of recreation. Throughout 2014, shoreline trash and graffiti were observed.

Numerous dilapidated boats (used as dwellings) were seen anchored in the Willamette Cove during every site visit (Photographs 20 and 21, Appendix A). No effects to the sediment cap were observed from mooring or from physical contact with these boats on the sediment cap. Although no damage to

the ACB was observed or expected, the DEQ communicated these observations to Portland's regional metropolitan government agency, Metro, that owns the Willamette Cove property. The US Coast Guard and Oregon State Marine Board rules prohibit anchoring on the sediment cap.

3.2.3 Buoys

Five permanent buoys were installed in August 2011 along the perimeter of the sediment cap warning boaters of navigational hazards. During the January 2014 site inspection, it was observed that Buoy #4 was missing. This was confirmed during site inspections in April and July 2014. An underwater inspection of the buoy location was conducted in September 2014 as described below.

3.3 Sediment Cap Maintenance Activities

The sediment cap was designed to be generally maintenance free. Maintenance in 2014 included cutting ACB cables that became exposed on the shoreline and performing an inspection of the Buoy #4 location.

Cable loops used to install and adjoin ACB armoring sheets were observed sticking out of the armoring. The cables used to place the ACB are no longer necessary to maintain the integrity of the ACB armoring. The cables were cut off close to the ACB armoring to remove the potential trip hazard from the shoreline.

On September 10, 2014, Hart Crowser and Ballard Underwater Construction (Ballard) mobilized to the site to determine the circumstances regarding the missing buoy. Prior to the inspection, it was unclear whether the buoy was submerged or completely missing. The buoy anchor (concrete ecology block) was located with no hardware attached. The buoy, the buoy chain, and securing hardware were all missing. The diver also inspected the sediment cap armoring around the anchor for damage. The 6-inch minus armoring around Buoy #4 appeared to be in good condition with no scour observed. After determining that the buoy was missing, a replacement buoy was ordered. The buoy is the same model and manufacturer as the original buoy. The buoy has been ordered and is expected to be delivered to Ballard in February 2015. Hart Crowser and Ballard will install the buoy upon its delivery.

3.4 Summary of Sediment Cap Remedy Performance

Overall, the sediment cap observations and inspections revealed no significant change in remedy performance or areas of concern. Future O&M activities primarily will consist of quarterly inspections and routine maintenance. Sediment cap porewater and surface water sampling is scheduled to be conducted in 2015, before the 2016 Fourth Five-Year Review Report. The sampling approach was developed in conjunction with DEQ and EPA and was included as an Appendix to the Draft O&M Plan (DEQ/EPA 2013). Details regarding the sampling are currently being developed through a cooperative effort between the DEQ and Oregon State University (OSU) with assistance from GSI. Upon agreement regarding the specifics of the sediment cap water sampling, GSI will prepare a Sampling and Analysis Plan that will be incorporated into the O&M Manual.

Sand covers the shoreline at lower, less steep elevations, and there are significant amounts of large woody debris that have accumulated to help create wildlife habitat. Numerous wildlife species continue to be observed; various birds including Canada geese, gulls, cormorants, pigeons, blue herons, ospreys, hawks, flickers, and kingfisher were observed in 2014. Crayfish and clams were also observed in the Willamette River. The public frequents the shoreline for recreation, most commonly for walking dogs. Infrequent and minor instances of vandalism and littering have been noted. Rounded gravel used to fill voids within the ACB has created a more stable substrate for wildlife and for a consistent and safer walking surface for public use.

4.0 GROUNDWATER PERFORMANCE STANDARDS AND ACTIVITIES

This section summarizes groundwater performance standards and activities for the reporting period January 1, 2014, through December 31, 2014. Groundwater remedy observations and maintenance activities were conducted according to the Final O&M Plan. Manual NAPL and groundwater level data were collected during the site-wide semiannual monitoring events conducted on June 11, 2014, and on September 25, 2014.

4.1 Groundwater Performance Standards

The groundwater remedy consists of groundwater monitoring, NAPL recovery, a subsurface barrier wall surrounding approximately 18 acres beneath the footprint of the upland soil cap, and ICs. ICs have yet to be completed to restrict groundwater use beneath the site. NAPL recovery was terminated by the EPA and the DEQ in 2011 because the performance standard for NAPL recovery was met; recovery rates were minimal and remaining NAPL at the site does not pose a threat to the Willamette River.

Groundwater within and outside of the subsurface barrier wall remains contaminated with metals, PCP, PAHs, dioxins, and NAPL. Contaminated groundwater within the barrier wall is contained and is not migrating to the river. Outside the barrier wall, residual product in soil within the Former Waste Disposal Area (FWDA) results in elevated concentrations of PCP and PAHs and increased NAPL thicknesses in groundwater. Despite the groundwater contamination in this area, monitoring of downgradient wells, surface water, and the sediment cap (inter-armoring, sub-armoring, and porewater in the organophilic clay) has demonstrated that the groundwater remedy is performing as designed and that groundwater is not adversely affecting the river.

The performance standards for the subsurface barrier wall are:

- Maintain contaminant concentrations in shallow, downgradient compliance wells (or sediment porewater) below the alternate concentration limits (ACLs) set forth in the ROD (EPA 1996):
  - Arsenic (III): 1,000 µg/L
  - Chromium (III): 1,000 µg/L
  - Copper: 1,000 µg/L

- Zinc: 1,000 µg/L
- PCP: 5,000 µg/L
- Total PAHs: 43,000 µg/L
- Dioxins/furans: 0.2 ng/L

- Minimize the transport of NAPL and communication of groundwater zones across the subsurface barrier wall.
- Minimize visible discharge of creosote to the Willamette River.
- Maintain contaminant concentrations in the Willamette River below background concentrations or less than the sediment cap performance standards for surface water.

As discussed in Section 6 of the Second Five-Year Review Report (DEQ/EPA 2006), the EPA determined that ACLs were not valid as substitutes for the EPA's MCLs in groundwater. Because of this determination, the DEQ and EPA anticipate that amended groundwater cleanup goals for the site will be established in a ROD Amendment consistent with groundwater cleanup goals for the Portland Harbor Superfund Site ROD, expected in 2017. After new groundwater cleanup goals are established in a ROD Amendment, the Final O&M Plan will be revised to reflect the new cleanup goals.

4.2 Groundwater Flow Direction and Gradient Assessment

Manual NAPL and groundwater level data were collected during site-wide semiannual monitoring events conducted on June 11, 2014, and September 25, 2014; continuous water levels were also collected using dataloggers installed in selected monitoring wells. The current monitoring well network is shown on Figure 4-1. This section summarizes groundwater flow based on the 2014 water level measurements.

4.2.1 Horizontal Flow Direction and Gradients

Manual fluid measurements were collected during or immediately following low tide in the Willamette River. Shallow groundwater elevation contour maps were developed for each semiannual event during seasonal groundwater high (June) and low (September) (Figures 4-2 and 4-3, respectively). The groundwater and NAPL elevation data are included in Table 4-1 (June 11, 2014) and Table 4-2 (September 25, 2014).

As shown in the shallow groundwater contour maps (Figures 4-2 and 4-3), the shallow horizontal groundwater gradient within the barrier wall is independent of the gradient outside the barrier wall. This demonstrates that the barrier wall has effectively cut off the hydraulic connection between the shallow groundwater zone inside and outside of the barrier wall. Groundwater flow inside the barrier wall remains relatively flat (typically less than 0.002 foot per foot [ft/ft]) compared to the slightly steeper groundwater gradients (ranging from 0.002 ft/ft to 0.03 ft/ft) outside the barrier wall that are directed westerly toward the river and the Willamette Cove. When the Willamette River reaches approximately 12-15 feet NAVD88, which typically occurs in the winter and spring and often peaks in June with the snow melt, the gradient partially reverses within the barrier wall near MW-36s in the

northwest corner. This is because of the deep hydraulic connection through sand at the base of the western edge of the barrier wall where the reversal in vertical gradient to an upward gradient when the river level exceeds the groundwater level within the barrier wall area. The Willamette River stage peaked earlier than usual in 2014, between February and May. Therefore, a significant flow reversal within the barrier wall area was not observed in June. The gradient within the barrier wall area in September is slightly greater, with a 2.8-foot variation between MW-48s in the eastern end and MW-36s in the western end versus 0.4 foot variation in June which is reflective of the higher river level in June.

Historical and annual hydrographs were prepared using the 30-minute pressure transducer data from paired monitoring wells located inside and outside the barrier wall as shown on Figures 4-4 through 4-11. The 11 site wells containing transducers are shown on Figure 4-1 and include two shallow and deep paired well clusters (MW-36s/37s, MW-36d/37d, MW-44s/45s, and MW-44d/45d) along the riverfront portion of the barrier wall, one shallow well pair (MW-52s/53s) on the upland side of the barrier wall, and one shallow interior well (EW-1s). The hydrographs compare water level elevations for selected well pairs to river stage elevation[1] and precipitation data[2]. The hydrographs show water levels in wells through the September 25, 2014, semiannual monitoring event. Water level data beyond this date will be included in the 2015 Annual Report.

The hydrographs document groundwater elevation differences and assess barrier wall performance over time. Clear differences in the groundwater elevations between shallow wells within, and directly outside of the barrier wall demonstrate that the barrier wall is effectively isolating the groundwater within the barrier wall.

4.2.2 Vertical Flow Direction and Gradients

Vertical gradients inside and outside the barrier wall along the Willamette River were observed in monitoring well clusters MW-36/MW-37 and MW-44/MW-45 (Table 4-3). The hydrographs for these wells (Figures 4-8 through 4-11) indicate that the deep groundwater zone is in direct hydraulic connection with the river. The deep zone both inside and outside of the barrier wall closely mimics the river stage, both in elevation and timing, with a small vertical gradient that varies upward and downward with the tidal changes. The exterior shallow wells, also in hydraulic connection with the river, show about a quarter cycle delay from river fluctuations and have dampened amplitude in comparison with the deeper wells.

[1] River stage data were recorded every 30 minutes from US Geological Survey (USGS) station number 14211720 (USGS 2014a). This station is located on the upstream side of the Morrison Bridge (River Mile [RM] 12.8). River stage elevation data reported by the USGS are relative to the Portland River Datum at this location. The river stage data are corrected to NAVD88 at the site (approximately RM 7) by adding 5.001 feet to the USGS reading.

[2] Precipitation data shown on Figures 4-4 through 4-11 were obtained from the Astor Elementary School rain gauge located approximately 0.5 mile from the site. Daily totals were obtained from the City of Portland Hydra Network available on the USGS Web site (USGS 2014b).

The muted or nonexistent response of interior shallow wells compared with the intermediate and deep zone wells suggests a clear hydraulic disconnect between the shallow aquifer within the barrier wall and the deeper water-bearing zones. The location where the response is greatest, but still significantly muted, is in well MW-36s (Figures 4-6 through 4-9), where a hydraulic connection exists at the base of the barrier wall. While a muted response of well MW-36s to changes in daily river stage elevation is still observed, water levels in the shallow interior wells MW-44s and EW-1s are virtually non-responsive to the changes in the Willamette River stage (Figures 4-10 and 4-11 for MW-44s, and Figures 4-6 and 4-7 for EW-1s). This reflects the presence of a confining silt layer between the shallow and intermediate zones near wells MW-44 and EW-1s.

Although precipitation in the Willamette River watershed ultimately affects the stage of the river, direct precipitation near the site 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)-style soil cap 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 vastly overshadowed by the response of groundwater to variations in river stage. The shallow zone up-gradient 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, and that there may be a slight groundwater mound east of the soil cap.

The hydrographs illustrate a net vertical gradient between the shallow and deep water-bearing zones, which continues to be slightly downward inside the barrier wall, similar to vertical gradients measured in 2008 through 2013. The net downward gradient is greater inside the barrier wall because the net shallow groundwater elevation inside the barrier wall continues to be slightly elevated compared to the net river stage. The net vertical gradient outside the barrier wall on the river side is small and varies upward and downward according to the trends of the Willamette River. Neutral or upward vertical gradients were observed when the river stage was at a higher elevation for a prolonged period, which occurred several times in February and June 2014. The vertical gradients in 2014 were comparable (in both direction and magnitude) to the gradients observed in 2008 through 2013.

4.3 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 FWDA outside the barrier wall (the remaining area with active NAPL recovery) was conducted in 2011. Based on the findings from the NAPL investigation (Dense Non-Aqueous Phase Liquid [DNAPL] Data Gap Investigation; HC/GSI 2011a) and extensive monitoring of the sediment cap (described in the Third Five-Year Review Report [DEQ/EPA 2011]), the 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 (HC/GSI 2011a), and the results supported the regulatory decision and confirmed that 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.

Measurable quantities of NAPL were present in 12 site wells (EW-1s, EW-8s, EW-10s, EW-15s, EW-18s, EW-23s, MW-10r, MW-20i, MW-22i, MW-56s, MW-Ds, and MW-Gs) gauged semiannually in 2014. Figures 4-12 and 4-13 show the locations of wells that contained measurable quantities of light NAPL (LNAPL) and/or DNAPL for the June and September 2014 monitoring events, respectively. Tables 4-1 and 4-2 provide semiannual NAPL gauging measurements. Figures 4-14 through 4-24 show the NAPL and groundwater elevations versus time in individual wells that routinely contain NAPL. A NAPL thickness figure has not been prepared for well MW-10r because of the limited appearance of LNAPL in this well. 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 elevation and the well depth elevation.

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

4.3.1 Outside the Barrier Wall

The only area where NAPL is observed routinely outside of the barrier wall is next to the northwest corner of the enclosure that corresponds to the FWDA (Figure 1-3). In 2014, measureable quantities of NAPL were observed in four wells (EW-10s [LNAPL and DNAPL], MW-20i [DNAPL], MW-Ds [DNAPL], and MW-Gs [DNAPL]) in this area. As shown on Figures 4-14 through 4-17, the NAPL thicknesses measured in wells EW-10s, MW-20i, MW-Ds, and MW-Gs in 2014 are generally stable since NAPL recovery was discontinued in April 2011. This is consistent with historical observations and supports the conclusion that NAPL observed in the FWDA is localized and stable. There is no evidence of NAPL mobility either across the barrier wall or to the Willamette River.

4.3.2 Inside the Barrier Wall

During semiannual monitoring, measurable LNAPL was present in five wells (EW-1s, EW-15s, EW-23s, MW-10r, and MW-56s) within the barrier wall. Figures 4-18 through 4-21 show the elevation of LNAPL and shallow groundwater versus time in wells EW-15s, EW-23s, MW-56s, and EW-1s, 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 because LNAPL was not recovered inside of the barrier wall during this time (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 stable.

DNAPL was detected during the 2013 semiannual monitoring events within the barrier wall near the former TFA (see Figure 1-5 for TFA location) in wells EW-1s, MW-22i, EW-8s, and EW-18s, as shown on Figures 4-21 through 4-24, respectively. Monitoring well EW-1s was recorded as having a LNAPL thickness of 0.9 foot during the June 11, 2014, semiannual monitoring event. Despite a handful of trace LNAPL readings in the past, this is the first measurable LNAPL thickness observed in this well (Figure 4-21). The DNAPL thickness in well EW-1s (Figure 4-21) has been increasing slowly to a thickness of approximately 8 feet since mid-2011, after termination of a temporary recovery period in April 2011.

Monitoring well EW-1s was recorded as having a LNAPL thickness of 0.9 foot during the June 11, 2014, semiannual monitoring event. Despite a handful of trace LNAPL readings in the past, this is the first measurable LNAPL thickness observed in this well (Figure 4-21). The DNAPL thickness in well EW-1s (Figure 4-21) has been increasing slowly to a thickness of approximately 8 feet since mid-2011, after termination of a temporary recovery period in April 2011.

As shown on Figure 4-22, the DNAPL thickness in well MW-22i is approximately 7 feet thick. Historically, DNAPL measurements in this well have been shown through extraction to be triggered by the presence of floating pin-sized globules of DNAPL and not a continuous layer of pure DNAPL. In well EW-8s, the DNAPL thickness has been stable since 2012, with one exception in the June 11, 2014, semiannual monitoring event with a thickness of 4.9 feet; the thickness returned to the stable 2 feet in the September 25, 2014, semiannual monitoring event (Figure 4-23).

Overall, both LNAPL and DNAPL appear to be stable and there is no evidence of their mobility either across the barrier wall or to the Willamette River.

4.4 Groundwater Remedy Maintenance Activities

Transducer data loggers were inspected in 2014 during semiannual monitoring events. The transducer batteries in well MW-53s had died between the September 2013 and June 2014 semiannual monitoring events. The batteries were replaced in June 2014, but there is a data gap in this well between March 2014 and June 2014. During the September 2014 semiannual monitoring event, it was discovered that the transducers in MW-36s and MW-37d were not functioning properly. At that time, replacement transducers were installed to continue monitoring water levels. Both malfunctioning transducers were sent to Instrumentation Northwest for inspection. Instrumentation Northwest was able to recover data from MW-37d but the data from MW-36s was not recoverable. Table 4-4 provides the groundwater O&M activities conducted in 2014.

IDW stored at the facility include soil, water, and monitoring well casing from monitoring well decommissioning in 2012. Hazardous IDW soil and personal protective equipment (PPE) were removed from the site in May 2014; the hazardous IDW water was removed in June 2014.

4.5 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.

The semiannual NAPL gauging and water level monitoring events were conducted on June 11 and September 25, 2014. With the exception of well EW-10s, there was no measureable LNAPL in wells outside the barrier wall. DNAPL was measured in four wells outside the barrier wall. The NAPL in these wells has remained stable with some variation due to temperature and pressure (or water level variation).

Horizontal gradients outside the barrier wall are greatest during periods of high precipitation and/or low river levels and decrease during periods of low precipitation and/or high river levels. Groundwater gradients inside the barrier wall remain flat and generally to the west (except when peak river stage causes a gradient reversal), while outside and up-gradient of the barrier wall, shallow groundwater flow is diverted around the barrier wall to the northwest and south. While most of the monitoring wells mimic the stage variations in the Willamette River, the oscillations in the shallow interior wells are delayed and muted and likely are the result of changes in pressure at depth rather than a hydraulic connection to the river. The large differences in shallow groundwater elevations within the barrier wall compared to directly outside the barrier wall indicate that these zones are hydraulically separate. Under stable river conditions, vertical groundwater gradients are generally slightly downward inside the barrier wall in the FWDA and former TFA, with the exception of small upward gradients observed during high river levels in the former TFA.

Based on the findings from the DNAPL Data Gap Investigation (HC/GSI 2011a), subsequent monitoring of the post-extraction NAPL thicknesses in wells in the FWDA, and extensive monitoring of the sediment cap (described in the Third Five-Year Review Report [DEQ/EPA 2011]) and groundwater, the decision to discontinue NAPL recovery is 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 2014, the barrier wall and impermeable soil cap are functioning as designed to divert groundwater flow around and prevent rainwater infiltration into NAPL source areas contained within the barrier wall and NAPL contained within the barrier wall is prohibited from migrating to the Willamette River.

5.0 VEGETATION MANAGEMENT

This section summarizes the vegetation management and monitoring activities for the reporting period January 2014 through December 2014. Vegetation management activities on the upland cap were conducted in accordance with the McCormick & Baxter Vegetation Management Plan (HC/GSI 2011b).

The upland cap was constructed during a two-year period beginning in 2004 with the re-grading of the Willamette River bank. The 6-acre Riparian Area cap was installed and tied into the in-water sediment cap. In 2005, a 34-acre multiple-component designed 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 the 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 and the irrigation system was no longer needed.

Overall, the planting and vegetation management goals have been met. The irrigation system and piping have been inactive since 2009 and are scheduled for decommissioning in 2015. Semiannual noxious weed control activities, including herbicide application, were conducted by BES from spring 2006 through spring 2010. Hart Crowser assumed vegetation management responsibilities at this time. A private subcontractor (Native Ecosystems Northwest) provided herbicide services to targeted areas of noxious weeds as needed starting in the fall of 2010. 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, but will likely resume in 2015.

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 during site visits in 2014.

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

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 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 2010, the BES determined that the vegetation had been fully established, as discussed in its final 2010 Vegetation Management Report (BES 2010). Hart Crowser 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. Photographic documentation of the inspection was completed to establish a baseline to evaluate the progress of future vegetation treatments and the qualitative observations at select site locations. These locations or "Photo Stations" are shown on Figure 5-1 and the photographs are provided in Appendix C, Vegetation Photographic Log. 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 (Photo Stations 8 and 9). The lower component is subject to Willamette River stage fluctuations, which influence vegetation conditions at its lower edge during high-water events.

Lower Component. The lower component originally was planted with a variety of native trees and shrubs including: Oregon ash (*Fraxinus latifolia*), black 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*), Piper's willow (*Salix piperi*), 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. A significant quantity of large woody debris was observed along the entire length of the lower edge. 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. Thistle (*Cirsium arvense*) was the most common noxious weed with lesser quantities of knapweed (*Centaurea Sp*.) and butterfly bush (*Buddleia davidii*) present.

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, snowberry (*Symphoricarpos albus*), red-flowering currant (*Ribes sanguineum*), oceanspray (*Holodiscus discolor*), red-osier dogwood, 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. 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, 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 woody debris was present throughout the lower component and in smaller quantities within the upper component. Thistle, knapweed, and butterfly bush continue to grow 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 photos taken at Photograph Locations 1, 2, 3, and 5 (Appendix C). Native shrubs and herbaceous species are present in the stormwater retention pond/drainage swale (Photo Station 4, Appendix C). Meadow grasses and herbs are present on the impermeable cap (Photograph Location 6, Appendix C).

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 hawthorne (*Crataegus douglasii*), madrone, snowberry, blue elderberry (*Sambucus cerulea*), Oregon-grape (*Mahonia aquifolium*), 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 polyphullus*), and Canada goldenrod. Nearly all of these plant varieties remain 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 5, Appendix C). 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 (*Scirpus 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*). 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. 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 with the installed trees and shrubs looking healthy and spreading on the earthen cap component, shrubs 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, with the exception of 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

On June 10 and October 20, 2014, a Hart Crowser ecologist 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, growth and vigor, and effectiveness of previous noxious weed treatments. The Photograph Log shows select Photo Stations during the June 2014 inspection and are paired with photographs from the June 2011 baseline inspection for a qualitative assessment of the site. Photo Stations are shown on Figure 5-1. On July 11, 2014, a Vegetative Planting Plan for Shoreline Repair and Maintenance was prepared to address

damage observed along the Lower Riparian Area and ACB armoring. This Vegetation Planting Plan is included in Appendix C. Observations are summarized below.

5.3.1 Riparian Area

Lower Component. Trees and shrubs in the lower component were observed to be well established and growing both vertically and laterally. Many of the trees and shrubs planted in this area have reached a height of 8 to 20 feet. As the tree species continue to develop, they will increase shading along the shoreline of the river. Several red alder and cascara were stressed or dying, particularly near noxious weeds that had been sprayed with herbicide in previous years. The Oregon ash and black hawthorn plants that showed signs of stress in 2013 were recovering and growing well. The individual species identified during the baseline site visit were present, with a few volunteer red alder and black cottonwood saplings colonizing the area between the upper and lower components.

At the time of the 2014 inspections, water levels in the Willamette River were low, and the mid- to upper-beach face was exposed (Photograph 8, Appendix C). The species originally planted in the lower component continued to perform well during the summer months despite the dry conditions. A notable amount of thistle (*Cirsium spp*.) and non-native pea (*Vicia sp*.) were observed throughout the lower component, but were stressed or dead. Small quantities of Saint John's wort (*Hypericum sp*.), knapweed, and butterfly bush were present and did not appear to be colonizing other locations in the area.

Localized areas of exposed TRM were observed along the length of the lower edge of the TRM, likely as a result of river fluctuations and movement of large woody debris along the lower shoreline. A significant quantity of large woody debris, including a log raft, were observed along the entire length of the lower component of the Riparian Area in June and October 2014. Thistle was the most common noxious weed present in this area; along with lesser quantities of knapweed and butterfly bush. In 2013, the herbicide treatment appeared to have affected the cascara and red alder within the area, as several were observed to be stressed or dead; more caution should be taken when applying herbicides. Some new volunteer red alder had sprouted in this area by spring 2014.

Upper Component. Native trees and shrubs in the upper component appeared to be performing well. Grand fir, Ponderosa pine, madrone, Nootka rose, snowberry, Oregon-grape, Douglas hawthorne, and elderberry appeared well established and performing best within this component. Ponderosa pine were 15 to 20 feet tall. Madrone and live oak were present along the fence. Individual plants, including oceanspray, cascara, twinberry, and Pacific ninebark, were stressed because of dry conditions in 2013, but were growing well in 2014. However, these species and other plantings originally installed in this area were generally healthy, well rooted, and growing vertically and laterally. Groundcover plantings also appeared healthy. Sparse areas of bare ground were observed. Knapweed was the most notable noxious weed, with lesser quantities of thistle, goldenrod, and butterfly bush present in localized areas. These weeds had been treated in 2013 and their numbers were much reduced.

Summary. In general, the upper and lower components appeared to be performing well with the installed trees and shrubs looking healthy and spreading. Groundcover species are providing good coverage of the site soils, with the exception of a few small areas of bare ground. There is a patch in the south end of the lower component where shrubs had been washed away by high river levels. A planting plan of suggested plants to be installed in these eroded areas was submitted to DEQ and is included in Appendix C. Large woody debris increased from 2013 to 2014 along the shoreline to the middle of the bank near the break between the upper and lower components (Photographs 8 and 10, Appendix C). This large woody debris provides habitat for birds, small mammals, and other wildlife using this portion of the site. Small quantities of thistle, knapweed, and butterfly bush continue to grow in the Riparian Area, but most have been treated with herbicide in 2013 and were observed to be dead or reduced in quantity in 2014 compared to 2013. Thistle became more dense in the lowest part of the slope.

5.3.2 Upland Area

Earthen Cap Component. Tree and shrub plantings on the earthen cap were healthy and growing well (Photographs 2, 3, 4, and 6, Appendix C). Ponderosa pine, Oregon grape, elderberry, and serviceberry were performing the best. Nootka rose dominated the northwest portion of the earthen cap and were previously stressed, but have recovered well. Trees and shrubs ranged in height from approximately 6 to 15 feet. Herbaceous species provided full coverage of the ground. No indications of stress were observed. Localized areas of moss were observed in the herbaceous layer. Small quantities of knapweed and thistle were present, primarily within the southern portion near the fence line.

Stormwater Retention Pond/Drainage Swale Component. Vegetation in the drainage swale area was well established and appeared healthy, but most shrubs were either highly stressed or dead within the stormwater retention pond and riprap-lined outlet (Photograph 5, Appendix C). Red-osier dogwood volunteers were observed within the northwest portion of the swale. Sitka willow had grown to 10 to 15 feet tall, and the Piper's willow were 6 to 8 feet tall. Volunteer cottonwoods were observed to range from 20 to 25 feet tall. While most willows at the southeast end (riprap-lined outlet) of the stormwater swale were dead, some were re-sprouting from the base of their trunks. Many of the grasses and herbs, particularly those that required more water, did not survive, although sparse patches of water plantain, slough sedge, and other emergent vegetation were present. Most of the herbaceous and emergent plantings in this component did not survive because of the sandy nature of the soil, which does not provide adequate moisture retention and inundation to support all of the originally installed plant species during the dry months of the year; however, other species are well established and replanting is not needed at this time. Noxious weeds were not observed in this component.

Impermeable Cap Component. The grassland species on the impermeable cap provided excellent coverage of the ground (Photograph 6, Appendix C). Gumweed was observed along the southwestern edge of the impermeable cap and provides increased diversity in this area. The remaining grasses and herbs were thriving. Moss was present in localized areas in the central portion of this component where grasses and herbs did not become established. Limited quantities of knapweed, thistle, and skeletonweed were observed within the western portion of this component.

Summary. The Upland Area components were performing well with the exception of small areas of alder and willow in the stormwater retention pond and its riprap-lined outlet channel. Groundcover (herbaceous) species provided excellent coverage of the ground with the exception of a few areas containing bare ground and the relatively bare understory in the pond area. Limited quantities of noxious weeds were observed in the upland and were primarily limited to the western portion of the impermeable cap and the southern portion of the earthen cap.

5.4 Vegetation Maintenance Activities

This section describes activities conducted to maintain vegetation in 2014. The general planting goals (NOAA 2004) continue to be met.

5.4.1 Noxious Weed Control

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 in June 2013. Following this event, several areas of desirable native plants were observed to be stressed in the immediate vicinity of spot spraying activities. Based on these observations, and the reduced number of noxious weeds, noxious weed control efforts were not completed in the fall of 2013 or in 2014. Native plants stressed from spraying have begun to return to normal growth. Noxious weed control may be necessary in 2015. Additional care should be taken to limit the effects of the herbicide on native plant species.

5.4.2 Irrigation

An above ground irrigation system was installed at the site following cap construction to irrigate vegetation planted over most of the earthen cap, stormwater retention pond, and riparian areas of the site. This system has not been in service since 2011. Efforts began in 2014 to remove the infrastructure of the irrigation system.

5.5 Vegetation Performance Summary

The tree, shrub, and groundcover plantings continue to perform well throughout the site. A limited number of stressed, dead, or apparently dying plants were observed. Vegetation performance in 2011 indicated irrigation was not needed, and the irrigation system was decommissioned in 2012. While summer and fall conditions in 2013 and 2014 were dry, plants were growing and thriving, except in the stormwater retention pond component of the Upland Area. Some volunteer species were noted and will help to increase species diversity where present at the site. Groundcover species provide excellent coverage. Noxious weeds continue to be present and will likely require ongoing management and control to prevent them from colonizing larger areas; however, noxious weeds have not spread throughout the site because of effective management practices. Thistle and knapweed were the most notable noxious weeds observed in 2013 and 2014.

6.0 SUMMARY OF OVERALL REMEDY PERFORMANCE

Overall, the 2014 soil and sediment cap observations and inspections and groundwater 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 2015

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

Table 7-1 presents the soil cap O&M activities planned through 2021. Soil cap O&M activities in 2015 will consist primarily of quarterly inspections and routine maintenance. It is also expected that the irrigation system will be removed and shrubs will be planted along the top of the ACB in areas of erosion. Semiannual inspections should be continued in 2015 to assess and monitor vegetation planting areas, species identification (native, non-native, and invasive), growth, density, and general coverage throughout the site. Noxious weed control activities may be required in 2015 to maintain a thriving and functional riparian habitat.

Table 7-2 presents the sediment cap O&M activities planned through 2021. In 2015, activities are expected to include quarterly inspections, routine maintenance, and replacement of missing Buoy #4. A Sampling and Analysis Plan will be prepared for the 2015 sediment cap water sampling event that will be conducted to support the Five-Year Review process.

The frequency of the groundwater monitoring activities through September 2021 are summarized in Table 7-3. The next groundwater quality sampling event will occur in 2020 except for sampling infiltration pond monitoring well MW-59s, which will be sampled in 2015. Routine maintenance of equipment, such as the data logger transducers and providing site utility service are also included as elements of groundwater O&M.

8.0 REFERENCES

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Table 2-1: Soil Cap O&M Activities in 2014
2014 O&M Annual Report
McCormick and Baxter Superfund Site

O&M Activity	Frequency in 2014
Visual Inspections:	
Cap surface	January, April, July, October
Subsidence near EW-1s	January, April, July, October
Stormwater conveyance system	January, April, July, October
Security fencing	January, April, July, October
Warning signs	January, April, July, October
Abundance and survival of vegetation	January, April, June, July, October
Routine Maintenance and Monitoring:	
Manual removal of invasive plant	None
Targeted application of herbicides	None
Non-Routine Maintenance:	
NW Natural gas line decommissioning	September
Filling of potential animal burrow into the earthen cap	Periodically along fence
Utilities Service:	
Water, electric, phone, alarm, solid waste, toilet	None

Table 3-1: Sediment Cap O&M Activities in 2014
2014 O&M Annual Report
McCormick and Baxter Superfund Site

O&M Activity	Frequency in 2014
Visual Inspections (from shore):	
Warning buoys	January, April, July, October
Cap surface	January, April, July, October
Habitat quality	January, April, June, July, October
Routine Monitoring:	
Water column and inter-armoring water sampling	None
Organoclay core sampling	None
Non-Routine Monitoring:	
Multibeam bathymetric surveys, side-scan sonar survey	None
Diver Inspection of buoy	September
Non-Routine Maintenance:	
Cut ACB cable loops	March

Table 4-1 - Groundwater and NAPL Elevations: June 11, 2014
McCormick and Baxter Superfund Site
Portland, Oregon

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft)	Depth to water (ft)	Depth to DNAPL (ft)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL Corrected (ft NAVD88)
EW-1s	6/11/2014	15:06	40.1	26.1	27.0	40.5	0.9	7.5	14.0
EW-2s	6/11/2014	14:22	42.4	29.3	29.3		Trace		13.1
EW-8s	6/11/2014	15:24	40.5		26.8	49.8		4.9	13.7
EW-10s	6/11/2014	14:00	29.4	17.0	17.1		0.1		12.4
EW-15s	6/11/2014	14:33	43.0	29.5	29.5		Trace		13.5
EW-18s	6/11/2014	15:17	40.7		27.0	42.4		2.3	13.7
EW-19s	6/11/2014	13:54	25.9		13.2				12.7
EW-23s	6/11/2014	14:41	37.6	24.3	25.5		1.3		13.3
MW-1r	6/11/2014	13:40	37.6		23.5				14.1
MW-7 WC	6/11/2014	14:15	36.7		22.1				14.6
MW-10r	6/11/2014	14:56	41.9		28.1				13.7
MW-15s	6/11/2014	16:35	43.3		29.5				13.7
MW-17s	6/11/2014	17:07	41.3		27.6				13.7
MW-20i	6/11/2014	14:10	41.4	29.4	29.4	72.5	Trace	2.2	12.1
MW-22i	6/11/2014	14:59	42.3		29.8	50.7		8.3	12.5
MW-23d	6/11/2014	17:17	41.1		28.1				12.9
MW-32i	6/11/2014	17:25	39.3		25.2				14.1
MW-34i	6/11/2014	16:58	32.7		20.3				12.3
MW-35r	6/11/2014	13:57	32.3		19.0				13.3
MW-36d	6/11/2014	14:06	30.5		18.5				12.0
MW-36i	6/11/2014	14:02	30.2		18.1				12.1
MW-36s	6/11/2014	13:59	30.7		17.3				13.5
MW-37d	6/11/2014	13:54	26.1		14.0				12.0
MW-37i	6/11/2014	13:51	25.9		13.8				12.1
MW-37s	6/11/2014	13:45	24.9		12.3				12.5
MW-38d	6/11/2014	14:22	31.8		19.4				12.4
MW-38i	6/11/2014	14:19	32.1		20.5				11.6
MW-38s	6/11/2014	14:15	32.3		18.6				13.7
MW-39d	6/11/2014	14:27	29.8		17.7				12.1
MW-39i	6/11/2014	14:31	30.1		18.0				12.1
MW-39s	6/11/2014	14:34	29.8		17.2				12.6
MW-40d	6/11/2014	16:30	28.7		16.4				12.2
MW-40i	6/11/2014	16:32	28.7		16.6				12.2
MW-40s	6/11/2014	16:34	28.3		15.0				13.3
MW-41d	6/11/2014	16:36	27.4		15.0				12.5
MW-41i	6/11/2014	16:40	27.1		14.6				12.5
MW-41s	6/11/2014	16:42	27.8		15.2				12.5
MW-42d	6/11/2014	16:08	32.2		20.0				12.2
MW-42i	6/11/2014	16:04	32.7		20.4				12.2
MW-42s	6/11/2014	16:01	32.4		18.7				13.6
MW-43d	6/11/2014	16:12	28.3		16.1				12.2
MW-43i	6/11/2014	16:16	30.3		18.2				12.2
MW-43s	6/11/2014	16:21	31.1		18.7				12.4
MW-44d	6/11/2014	14:57	29.6		17.1				12.5
MW-44i	6/11/2014	15:02	29.3		17.2				12.2
MW-44s	6/11/2014	15:05	29.6		16.0				13.6
MW-45d	6/11/2014	14:52	27.9		15.7				12.2
MW-45i	6/11/2014	14:48	28.0		15.8				12.2
MW-45s	6/11/2014	14:45	28.2		15.6				12.6
MW-46s	6/11/2014	16:10	35.5		21.8				13.7
MW-47s	6/11/2014	15:21	35.5		22.6				12.9
MW-48s	6/11/2014	17:10	38.7		24.9				13.8
MW-49s	6/11/2014	17:05	37.6		18.5				19.1
MW-50s	6/11/2014	15:36	39.3		25.4				13.8

Table 4-1 - Groundwater and NAPL Elevations: June 11, 2014
McCormick and Baxter Superfund Site
Portland, Oregon

Well ID	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft)	Depth to water (ft)	Depth to DNAPL (ft)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL Corrected (ft NAVD88)
MW-51s	6/11/2014	15:30	39.5		23.0				16.5
MW-52s	6/11/2014	16:16	40.7		27.0				13.7
MW-53s	6/11/2014	16:09	40.4		21.9				18.5
MW-54s	6/11/2014	16:18	41.8		28.0				13.8
MW-55s	6/11/2014	16:23	41.0		24.8				16.3
MW-56s	6/11/2014	13:47	43.5		29.8				13.7
MW-57s	6/11/2014	16:30	42.0		28.6				13.5
MW-58d	6/11/2014	17:00	41.4		29.0				12.4
MW-58i	6/11/2014	16:57	41.0		28.6				12.4
MW-58s	6/11/2014	16:55	41.5		28.8				12.8
MW-59s	6/11/2014	16:52	35.9		18.8				17.1
MW-60d	6/11/2014	13:37	40.1		27.9				12.1
MW-61s	6/11/2014	14:35	43.6		26.9				16.7
MW-62i	6/11/2014	17:02	42.6		30.2				12.4
MW-As	6/11/2014	17:30	39.3		20.8				18.5
MW-Ds	6/11/2014	14:30	42.9		29.8	36.5		2.2	13.1
MW-Gs	6/11/2014	14:05	40.2	27.3	27.3	42.7	Trace	2.0	12.9
MW-Os	6/11/2014	15:50	40.9		21.7				19.2
PW-1d	6/11/2014	16:00	44.0		26.9				17.1
PW-2d	6/11/0214	15:45	41.8		27.7				14.1

Table 4-2 - Groundwater and NAPL Elevations: September 25, 2014
McCormick and Baxter Superfund Site
Portland, Oregon

Well ID[a]	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft)	Depth to water (ft)	Depth to DNAPL (ft)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL Corrected (ft NAVD88)
EW-1s	9/25/2014	15:00	40.1		26.9	40.4		7.6	13.2
EW-2s	9/25/2014	12:28	42.4		33.8				8.6
EW-8s	9/25/2014	14:39	40.5		27.9	52.8		1.9	12.6
EW-10s	9/25/2014	11:39	29.4	21.1	21.2	42.1	0.1	0.6	8.4
EW-15s	9/25/2014	13:18	43.0	32.1	36.4	48.5	4.3	Trace	10.8
EW-18s	9/25/2014	14:23	40.7		28.1	42.7		2.0	12.7
EW-19s	9/25/2014	11:30	25.9		17.0				8.9
EW-23s	9/25/2014	13:12	37.6	27.2	30.5	35.2	3.4	0.1	10.4
MW-1r	9/25/2014	--	37.6		26.8				10.8
MW-7 WC	9/25/2014	16:37	36.7		26.1				10.6
MW-10r	9/25/2014	14:00	41.9	29.2	29.5		0.3		12.6
MW-15s	9/25/2014	13:26	43.3		31.0				12.2
MW-17s	9/25/2014	13:13	41.3		29.3				12.0
MW-20i	9/25/2014	12:20	41.4	33.5	33.5	72.1	Trace	2.6	8.0
MW-22i	9/25/2014	14:10	42.3		33.9	51.8		7.1	8.4
MW-23d	9/25/2014	14:38	41.1		33.0				8.1
MW-32i	9/25/2014	15:20	39.3		28.5				10.8
MW-34i	9/25/2014	13:21	32.7		25.1				7.6
MW-35r	9/25/2014	16:19	32.3		23.3				9.0
MW-36d	9/25/2014	11:26	30.5		22.2				8.3
MW-36i	9/25/2014	11:31	30.2		21.9				8.3
MW-36s	9/25/2014	11:35	30.7		20.3				10.5
MW-37d	9/25/2014	11:50	26.1		18.0				8.1
MW-37i	9/25/2014	11:47	25.9		17.8				8.1
MW-37s	9/25/2014	11:44	24.9		16.3				8.6
MW-38d	9/25/2014	12:27	31.8		23.9				8.0
MW-38i	9/25/2014	12:24	32.1		23.4				8.7
MW-38s	9/25/2014	12:22	32.3		21.5				10.8
MW-39d	9/25/2014	12:20	29.8		21.8				8.0
MW-39i	9/25/2014	12:16	30.1		22.1				8.0
MW-39s	9/25/2014	12:13	29.8		21.0				8.8
MW-40d	9/25/2014	12:57	28.7		20.8				7.9
MW-40i	9/25/2014	12:53	28.7		20.4				8.3
MW-40s	9/25/2014	12:50	28.3		16.9				11.4
MW-41d	9/25/2014	12:48	27.4		19.6				7.9
MW-41i	9/25/2014	12:43	27.1		19.1				8.0
MW-41s	9/25/2014	12:41	27.8		19.2				8.6
MW-42d	9/25/2014	13:06	32.2		24.4				7.8
MW-42i	9/25/2014	13:09	32.7		24.7				8.0
MW-42s	9/25/2014	13:12	32.4		20.1				12.3
MW-43d	9/25/2014	13:15	28.3		20.6				7.8
MW-43i	9/25/2014	13:18	30.3		22.5				7.8
MW-43s	9/25/2014	13:20	31.1		22.8				8.3
MW-44d	9/25/2014	13:33	29.6		21.6				8.1
MW-44i	9/25/2014	13:40	29.3		21.2				8.2
MW-44s	9/25/2014	13:38	29.6		17.1				12.5
MW-45d	9/25/2014	13:45	27.9		20.2				7.7
MW-45i	9/25/2014	13:43	28.0		20.2				7.8
MW-45s	9/25/2014	13:48	28.2		19.6				8.6
MW-46s	9/25/2014	14:10	35.5		22.9				12.6
MW-47s	9/25/2014	14:00	35.5		27.1				8.4
MW-48s	9/25/2014	14:53	38.7		25.4				13.3
MW-49s	9/25/2014	14:45	37.6		20.9				16.7
MW-50s	9/25/2014	13:39	39.3		26.1				13.2

Table 4-2 - Groundwater and NAPL Elevations: September 25, 2014
McCormick and Baxter Superfund Site
Portland, Oregon

Well ID[a]	Date	Time	Measuring Point Elevation (ft NAVD88)	Depth to LNAPL (ft)	Depth to water (ft)	Depth to DNAPL (ft)	LNAPL Thickness (ft)	DNAPL Thickness (ft)	Groundwater Elevation LNAPL Corrected (ft NAVD88)
MW-51s	9/25/2014	13:35	39.5		22.8				16.7
MW-52s	9/25/2014	15:36	40.7		28.2				12.5
MW-53s	9/25/2014	15:34	40.4		24.7				15.7
MW-54s	9/25/2014	15:38	41.8		29.3				12.4
MW-55s	9/25/2014	15:40	41.0		28.6				12.5
MW-56s	9/25/2014	13:40	43.5	32.2	33.2		1.0		11.3
MW-57s	9/25/2014	15:45	42.0		33.9				8.1
MW-58d	9/25/2014	16:35	41.4		33.6				7.8
MW-58i	9/25/2014	16:10	41.0		33.4				7.6
MW-58s	9/25/2014	16:25	41.5		33.0				8.5
MW-59s	9/25/2014	14:25	35.9		22.7				13.2
MW-60d	9/25/2014	11:38	40.1		31.9				8.2
MW-61s	9/25/2014	16:05	43.6		31.0				12.6
MW-62i	9/25/2014	13:09	42.6		34.9				7.8
MW-As	9/25/2014	15:20	39.3		22.8				16.5
MW-Ds	9/25/2014	12:44	42.9		34.3	36.3		2.3	8.6
MW-Gs	9/25/2014[a]	12:00	40.2	31.7	31.7	43.8	Trace	0.9	8.5
MW-Os	9/25/2014	13:48	40.9		24.2				16.8
PW-1d	9/25/2014	13:53	44.0		33.2				10.8
PW-2d	9/25/2014	13:46	41.8		30.9				10.9

LNAPL specific gravity estimated as 0.981 g/cm^3

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

[a] Due to an erroneous DNAPL measurement in MW-Gs on September 25, 2014, the well was re-measured on October 30, 2014. The re-measured DNAPL measurement is shown in this table, on the LNAPL and DNAPL Distribution Map (Figure 4-13), and on the 2001 to 2014 NAPL Thickness Plot for Well MW-Gs (Figure 4-17).

Table 4-3: Net Annual Vertical Gradients in Monitoring Well Clusters: 2014
2014 O&M Annual Report
McCormick and Baxter Superfund Site

Monitoring Well Cluster ID	2014 Net Annual Vertical Gradient From Shallow to Deep Zone
MW-36 (Interior)	-0.008[a]
MW-37 (Exterior)	-0.0009[b]
MW-44 (Interior)	-0.025[b]
MW-45 (Exterior)	-0.0023[b]

Notes:
Negative values indicate a net downward hydraulic gradient and positive values indicate a net upward hydraulic gradient.
Vertical gradients in each well cluster could only be calculated for the periods where transducers were present in both the shallow and deep well.

[a] The vertical gradient calculation reflects data collected from October 1, 2013 through June 10, 2014.

[b] The vertical gradient calculation reflects data collected from October 1, 2013 through September 25, 2014

Table 4-4: Groundwater O&M Activities in 2014
2014 O&M Annual Report
McCormick and Baxter Superfund Site

O&M Activity	Frequency in 2014
NAPL Monitoring:	
Manual gauging of site wells	June, September
Groundwater Monitoring:	
Downloading continuous water level data from transducers	June, September
Manual water level measurements from site wells	June, September
Routine Maintenance of Equipment:	
Transducers	June, September
Utilities Service:	
Water, electric, phone, alarm, solid waste, toilet	Ongoing

Table 7-1: Soil Cap O&M Activities Planned through 2021
2014 O&M Annual Report
McCormick and Baxter Superfund Site

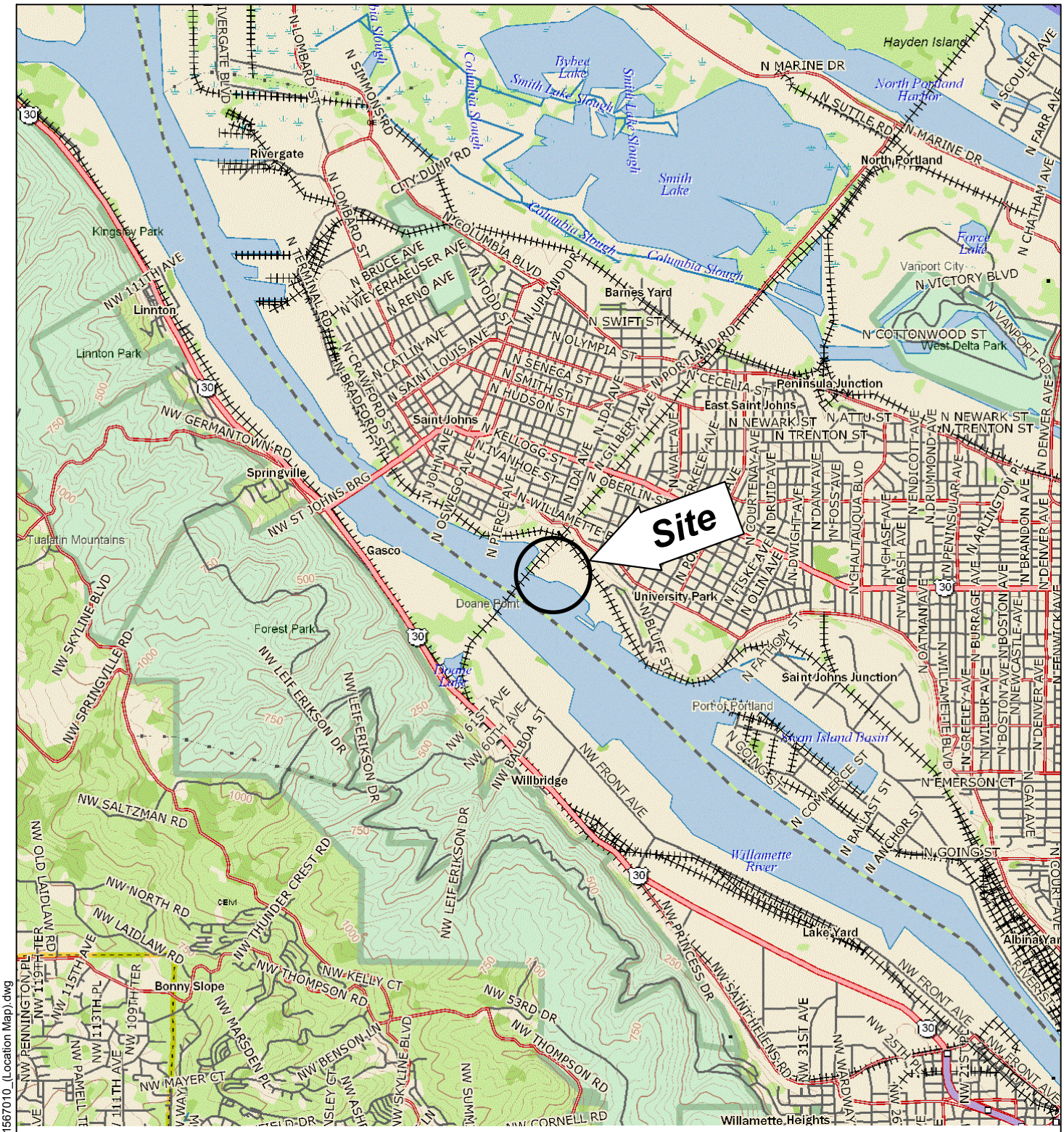
O&M Activity	Frequency
Visual Inspections:	
Cap surface	Quarterly
Subsidence near EW-1s	Quarterly
Stormwater conveyance system	Quarterly
Security fencing	Quarterly
Warning signs	Quarterly
Abundance and survival of vegetation	Quarterly
Routine Maintenance and Monitoring:	
Manual removal of invasive plant	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
Remove sediments from manholes	As needed
Replanting unsuccessful trees and shrubs	As needed
Utilities Service:	
Water, electric, phone, alarm, solid waste, toilet	Continuous

Table 7-2: Sediment Cap O&M Activities Planned through 2021
2014 O&M Annual Report
McCormick and 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 (starting in 2015)
Organoclay Core Sampling	In 2015, then determine frequency
Non-Routine Monitoring:	
Multibeam bathymetric surveys, side-scan sonar survey	Every 10 years, starting in 2020; perform as needed (unforeseen natural event)
Diver Inspection	If necessary, will be conducted every 10 years starting in 2020, after bathymetry
Non-Routine Maintenance:	
Replacement of buoys	As needed
Additional armoring placement	Schedule for 2020, if needed. After unforeseen event, if needed
Additional organoclay capping	As needed
ACB 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 2021
2014 O&M Annual Report
McCormick and 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	2020, Subsequent frequency to be determined
Infiltration pond (MW-59s)	Every 5 years
Routine Maintenance of Equipment:	
Interface probes, pumps, vehicle, data loggers / transducers, etc.	As needed



0 4,000 □,000

Scale in Feet

N

McCormick and Baxter Superfund Site

6□00 N Edgewater Street, Portland, Oregon

Site Location Map

7/15

HARTCROWSER

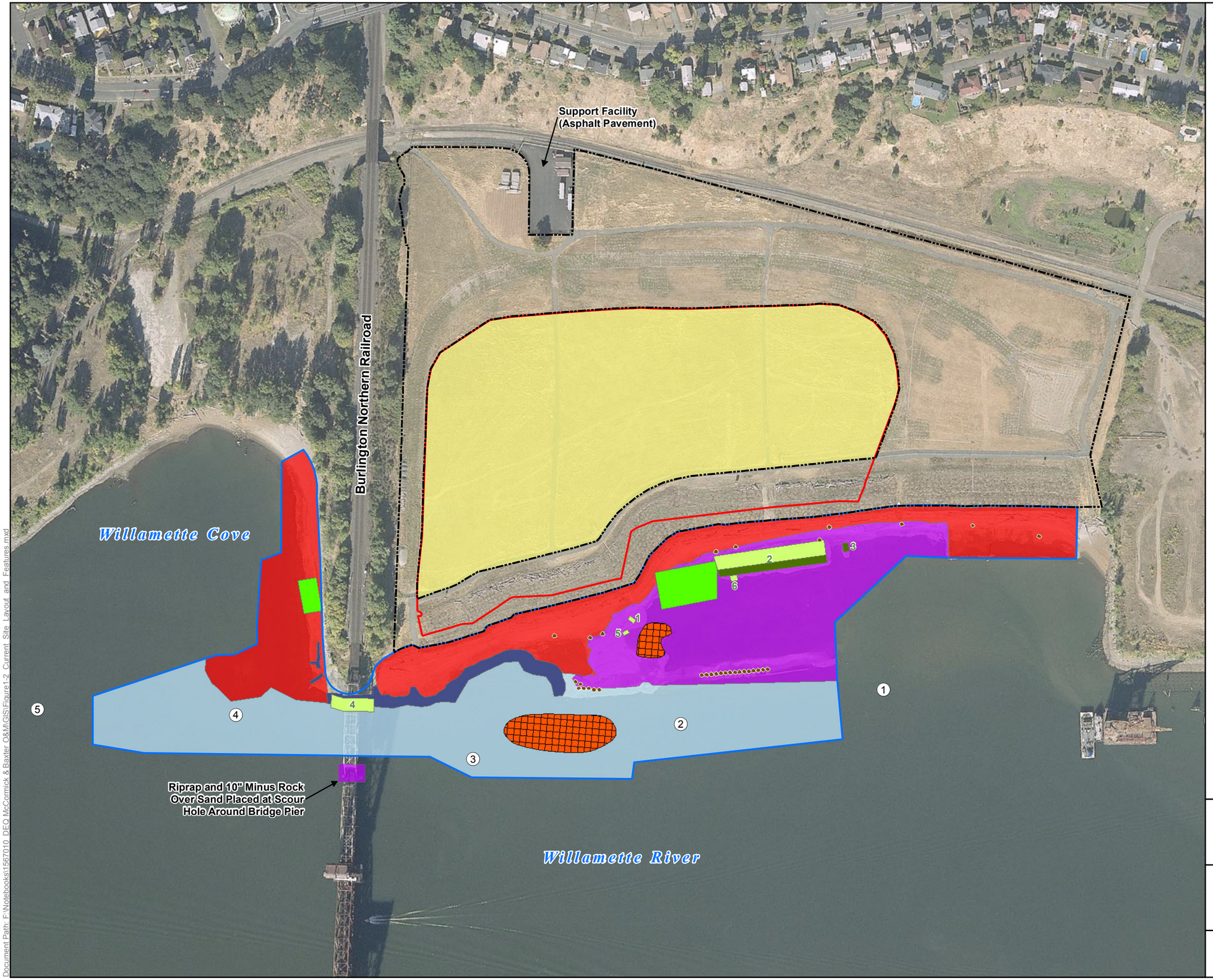
GSI Water Solutions, Inc.

Figure

1-1

Source: DeLorme Topo □SA.

F:\Notebooks\1567010_DEQ McCormick & Baxter O&M\CAD\1567010_(Location Map).dwg



LEGEND

- Subsurface Barrier Wall
- Sediment Cap Boundary
- Granular Organophilic Clay
- Organoclay™ Reactive Core Mats (Double)
- Organoclay™ Reactive Core Mats (Single)
- Thickened Sand Layer
- Boulder Clusters
- Buoy Locations
- Riprap Armor
- Articulated Concrete Block
- 6-inch Minus Rock Armor
- 10-inch Minus Rock Armor
- Impermeable Cap
- Earthen Soil Cap Boundary

NOTE:
Aerial photo taken on September 22, 2006.

0 250 500
Scale in feet

McCormick & Baxter Superfund Site
Portland, Oregon

Current Site Layout and Features

7/15

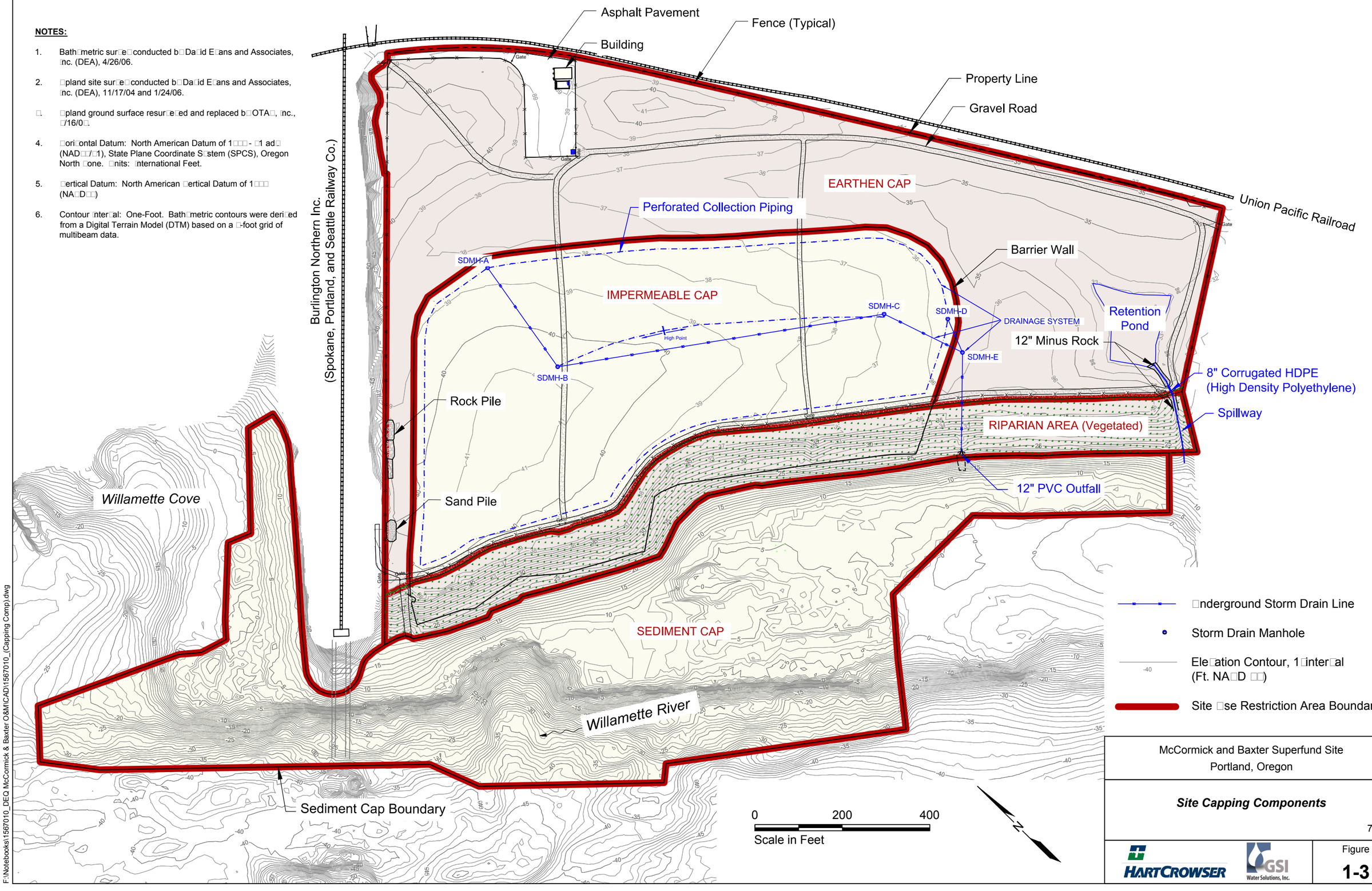
HARTCROWSER GSI Water Solutions, Inc.

Figure
1-2

Document Path: F:\Notebooks\1567010_DEQ McCormick & Baxter O&M\GIS\Figure1-2_Current_Site_Layout_and_Features.mxd

NOTES:

1. Bath□metric sur□e□conducted b□Da□id E□ans and Associates, □nc. (DEA), 4/26/06.
2. □pland site sur□e□conducted b□Da□id E□ans and Associates, □nc. (DEA), 11/17/04 and 1/24/06.
3. □pland ground surface resur□e□ed and replaced b□OTA□, □nc., □/16/0□.
4. □ori□ontal Datum: North American Datum of 1□□□ - □1 ad□ (NAD□□/□1), State Plane Coordinate S□stem (SPCS), Oregon North □one. □nits: □nternational Feet.
5. □ertical Datum: North American □ertical Datum of 1□□□ (NA□D□□)
6. Contour □nter□al: One-Foot. Bath□metric contours were deri□ed from a Digital Terrain Model (DTM) based on a □-foot grid of multibeam data.



McCormick and Baxter Superfund Site
Portland, Oregon

Site Capping Components

7/15

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Figure
1-3

F:\Notebooks\1567010_DEQ McCormick & Baxter O&M\CAD\1567010_(Capping Comp).dwg

NOTES:

1. Bath□metric sur□e□ conducted b□ Da□id E□ans and Associates, □nc. (DEA), 4/26/06.
2. □pland site sur□e□ conducted b□ Da□id E□ans and Associates, □nc. (DEA), 11/17/04 and 1/24/06.
3. □pland ground surface resur□e□ed and replaced b□ OTA□, □nc., □/16/0□.
4. □ori□ontal Datum: North American Datum of 1□□□ - □1 ad□ (NAD□□/□1), State Plane Coordinate S□stem (SPCS), Oregon North □one. □nits: □nternational Feet.
5. □ertical Datum: North American □ertical Datum of 1□□□ (NA□D□□)
6. Contour □nter□al: One-Foot. Bath□metric contours were deri□ed from a Digital Terrain Model (DTM) based on a □-foot grid of multibeam data.
7. Additional rock was placed at the 6" minus rock placement areas on 6/26/07. These areas ha□e not been sur□e□ed and the contours of this figure do not reflect the additional rock placement.

Burlington Northern Inc.
(Spokane, Portland, and Seattle Railway Co.)

Building
A2'
Asphalt Pavement
Property Line
Fence (Typ.)
Union Pacific Railroad
EARTHEN CAP
Gravel Road
Perforated Collection Piping
Subsuface Barrier Wall
SDMH-A
SDMH-C
SDMH-D
DRAINAGE SYSTEM
Retention Pond
High Point
SDMH-E
12" Minus Rock
SDMH-B
IMPERMEABLE CAP
8" Corrugated HDPE (High Density Polyethylene)
Rock Pile
Spillway
12" PVC Outfall
Sand Pile
SEDIMENT CAP
Willamette Cove
A2
A2
Sediment Cap Boundary
Willamette River
DSL Easement (#31530-EA)

-40 Ele□ation Contour, 1□nter□al (Ft. NA□D □□)
Boulder Clusters/Rock Mound
Riprap Armor
Organocla□ Mat (Double La□er)
Organocla□ Mat (Single La□er)
□ranular Organocla□
□ot Spot Treatment (Thickened Sand La□er)
Articulated Concrete Block
6-□nch Minus Rock Armor
10-□nch Minus Rock Armor
Turf Reinforcement Mat Placed O□er Earthen Cap
A2 A2' Cross Section Line (for Figure 1-6)

0 200 400
Scale in Feet

McCormick and Baxter Superfund Site
Portland, Oregon

Current Site Layout with Surface Elevations

7/15

HARTCROWSER GSI Water Solutions, Inc.

Figure
1-4

F:\Notebooks\1567010_DEQ McCormick & Baxter O&M\CAD\1567010_(Current Site La□out-surfele□).dwg

Residential Area

Site Entrance

Bunker Oil Area

Parking Lot

North Edgewater Street

Treated Log Storage

Treated Log Storage

Office

Paint Shed

□ra□el Dri□ewa□

Central Process Area

□ater Treatment Plant

Lab

Stacker Shed

Retort 2 Pit

Retort 1 Pit

Former Tank Farm

Butt Tank 1

Southeast Disposal Trench Area

Butt Tank 1

Retort □ Pit

Cellon □ ash Area

Tank Farm Area (TFA)

Treated Log Storage

Framing Shed

Retort 4 Pit

PCP Mixing Shed

Former Creosote Tank 4

Burlington Northern Railroad

Former Disposal Location

Rail Spurs

Former □ aste Disposal Area (F□ DA)

O□TFALL 001 (Former Cooling □ ater)

O□TFALL 00□ (Stormwater)

O□TFALL 004 (Stormwater)

WILLAMETTE RIVER

O□TFALL 002 (Stormwater Treated □ ater)

Sand□Beach

Creosote Dock

Union Pacific Railroad

Fence

Former Feature

0 200 400

Scale in Feet

N

McCormick and Baxter Superfund Site
Portland, Oregon

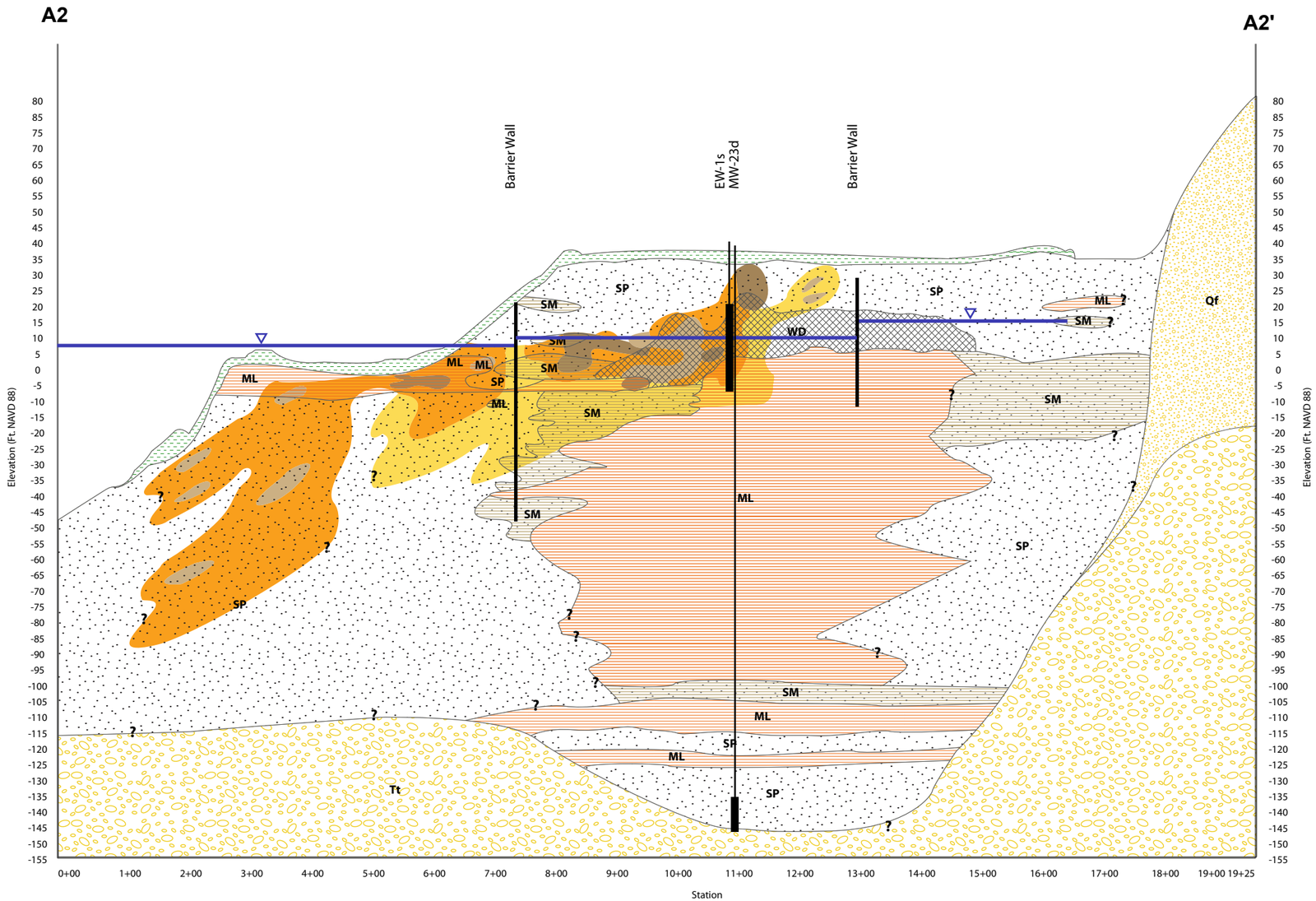
Historical Contaminant Source Areas

7/15

HARTCROWSER GSI Water Solutions, Inc.

Figure
1-5

F:\Notebooks\1567010_DEQ McCormick & Baxter O&M\CAD\1567010_(□istoric Contamination).dwg



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

McCormick and Baxter Superfund Site
Portland, Oregon

Historical NAPL Distribution Cross Section

7/15

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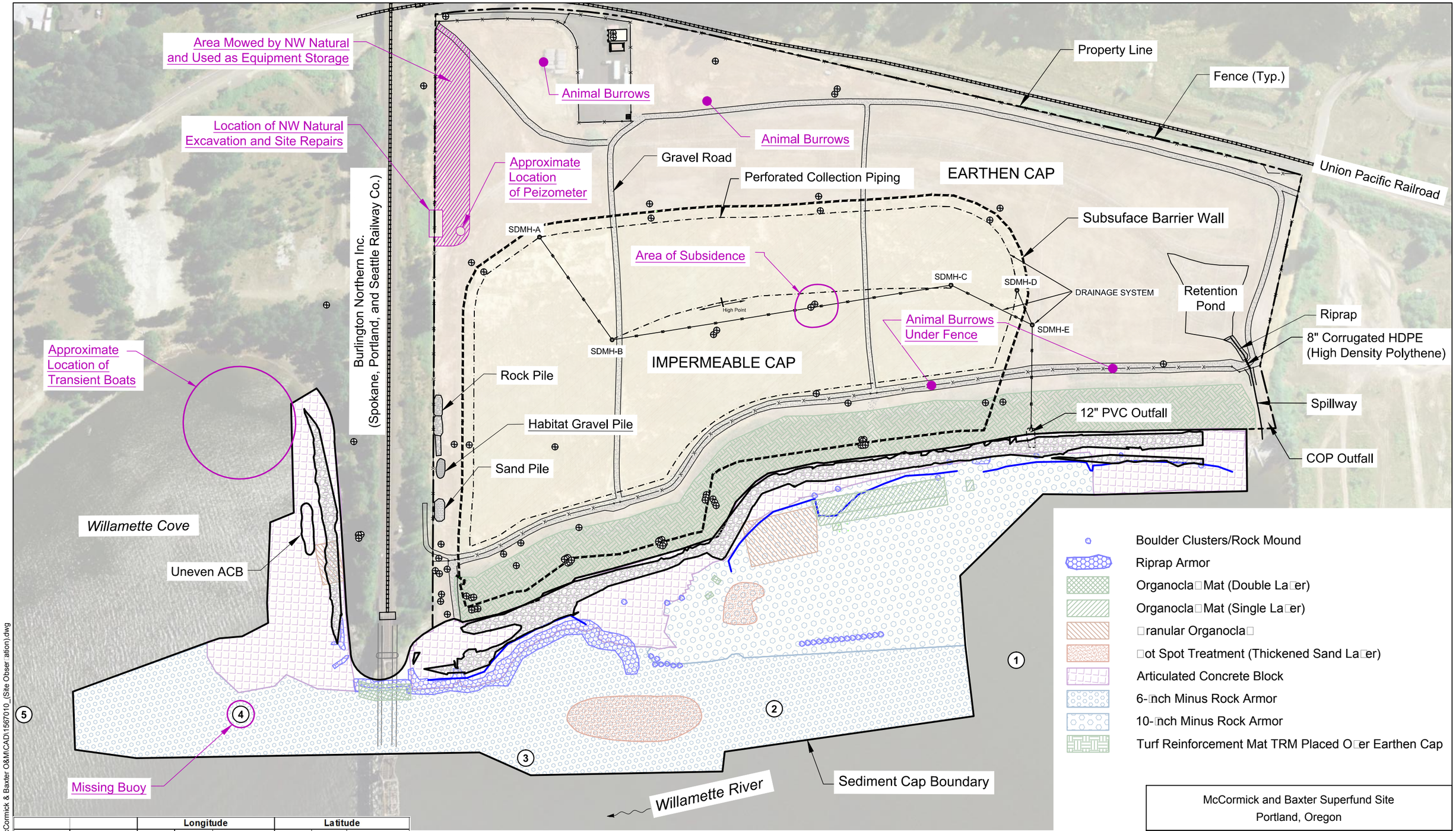
Figure
1-6

F:\Notebooks\1567010_DEQ McCormick & Baxter O&M\CAD\1567010_(NAPL X-Sect).pdf



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
Coordinate projection: GCS_North_American_1983							

McCormick and Baxter Superfund Site
Portland, Oregon

Site Observation Summary

7/15

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Figure **2-1**

F:\Notebooks\1567010_DEQ McCormick & Baxter O&M\CAD\1567010_(Site Obser ation).dwg

LEGEND

- Groundwater Monitoring Wells
- Groundwater Monitoring Wells with Transducers
- Subsurface Barrier Wall

NOTE:
Aerial photo taken on September 22, 2006.

0 200 400
Scale in feet

McCormick and Baxter Superfund Site
Portland, Oregon

Groundwater Monitoring Well Location Map

7/15

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Figure
4-1

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project GIS\Project mxds\2014 Annual Report\Figure4-1 Monitoring Well Location Map.mxd

LEGEND

- Groundwater Monitoring Wells (Groundwater Elevation)
- Groundwater Monitoring Wells with Transducers (Groundwater Elevation)
- Groundwater Elevation Contours (dashed where inferred)
- Willamette River Level During Sampling Event (12.2 feet)
- Subsurface Barrier Wall

NOTES:

1) Elevations shown in NAVD 88.
2) Aerial photo taken on September 22, 2006.
3) Water levels measured between 13:35 and 17:30.
4) Willamette River low tide at 15:00 at 12.2 feet NAVD 88.
5) MW-51s field measurements not included due to suspect measurement error.

0 200 400

Scale in feet

McCormick and Baxter Superfund Site
Portland, Oregon

Groundwater Contour Map for June 11, 2014 Sampling Event

7/15

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Figure **4-2**

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project_GIS\Project_mxds\2014_Annual_Report\Figure4-2_GW_Elevations_June11_2014.mxd

LEGEND

- Groundwater Monitoring Wells (Groundwater Elevation)
- Groundwater Monitoring Wells with Transducers (Groundwater Elevation)
- Groundwater Elevation Contours (dashed where inferred)
- Willamette River Level During Sampling Event (6.9 feet)
- Subsurface Barrier Wall

NOTES:

1) Elevations shown in NAVD 88.
2) Aerial photo taken on September 22, 2006.
3) Water levels measured between 11:30 and 16:40.
4) Willamette River low tide at 15:15 at 6.9 feet NAVD 88.

0 200 400

Scale in feet

McCormick and Baxter Superfund Site
Portland, Oregon

Groundwater Contour Map for September 25, 2014 Sampling Event

7/15

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Figure
4-3

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project_GIS\Project_mxds\2014_Annual_Report\Figure4-3_GW_Elevations_Sept25_2014.mxd

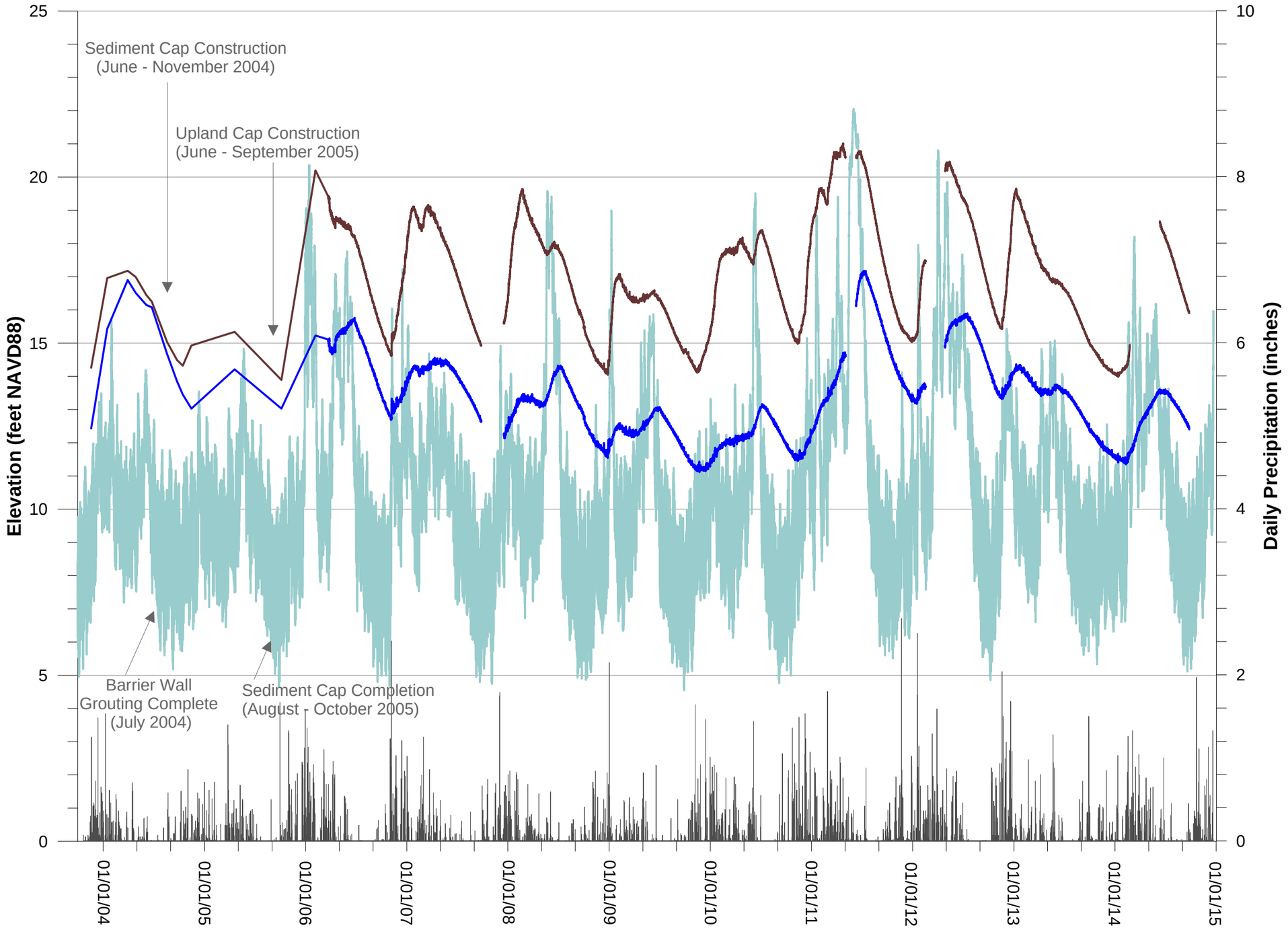


Figure 4-4:
Post-Barrier Wall Groundwater Elevations
Monitoring Wells MW-52s and MW-53s

McCormick and Baxter Superfund Site
Portland, OR

LEGEND

- MW-52s (Interior)
- MW-53s (Exterior)
- River
- Precipitation

Notes:
MW-52s is located inside the barrier wall and MW-53s is located outside the barrier wall.

Top of Barrier wall (not shown) is about 31 ft NAVD.

Prior to March 23, 2006 water level measurements are manual and intermittent.

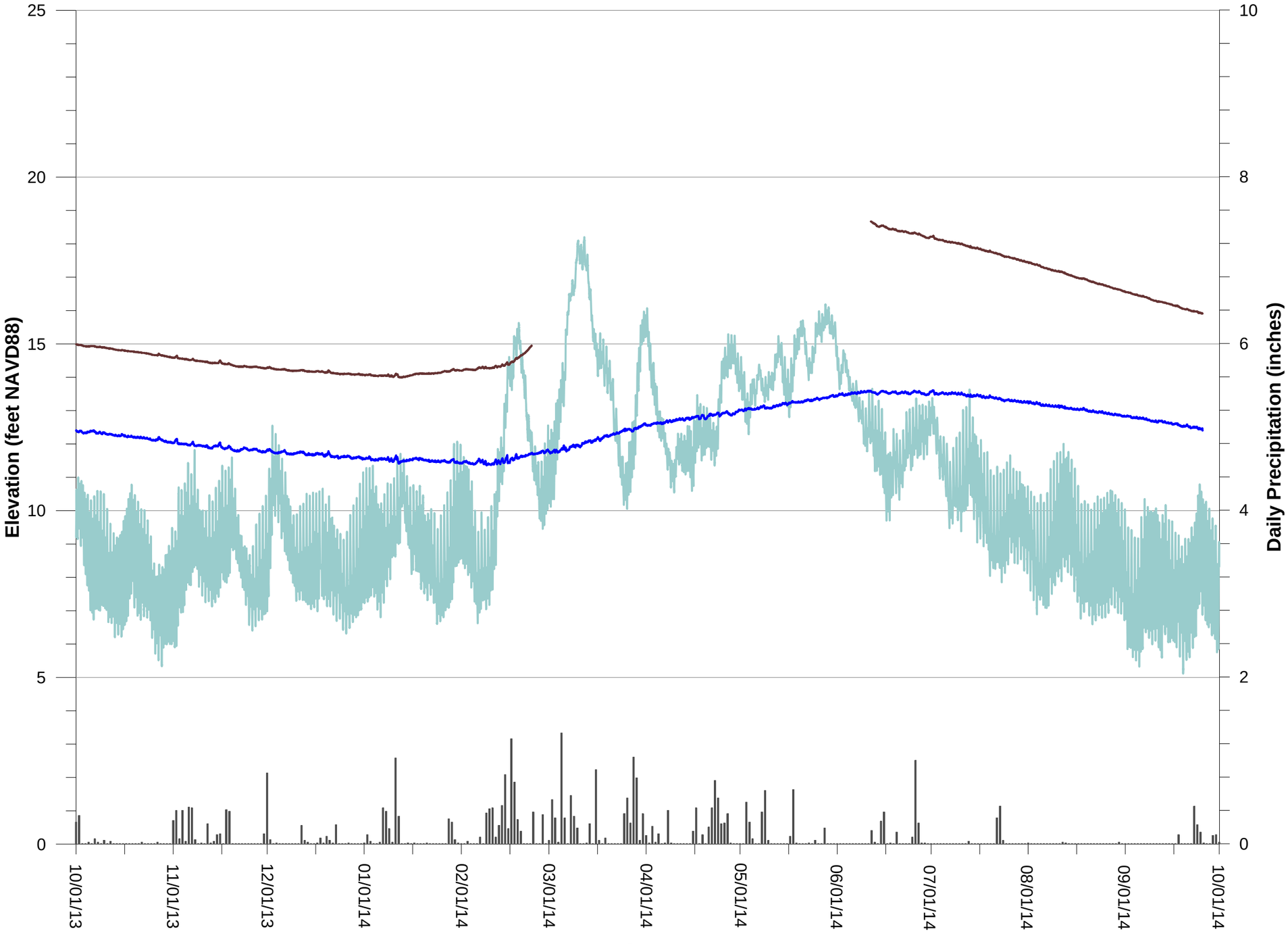
Breaks in transducer data are the result of removal for calibration, removal for well modification, or a transducer was not collecting accurate pressure readings.

HARTCROWSER

GSI Water Solutions, Inc.

Figure 4-5:
2014 Groundwater Elevations
Monitoring Wells MW-52s and MW-53s

McCormick and Baxter Superfund Site
Portland, OR



LEGEND

- MW-52s (Interior)
- MW-53s (Exterior)
- River
- Precipitation

Notes:
MW-52s is located inside the barrier wall and MW-53s is located outside the barrier wall.

Top of Barrier wall (not shown) is about 31 ft NAVD.

Breaks in transducer data are the result of removal for calibration, removal for well modification, or a transducer was not collecting accurate pressure readings.

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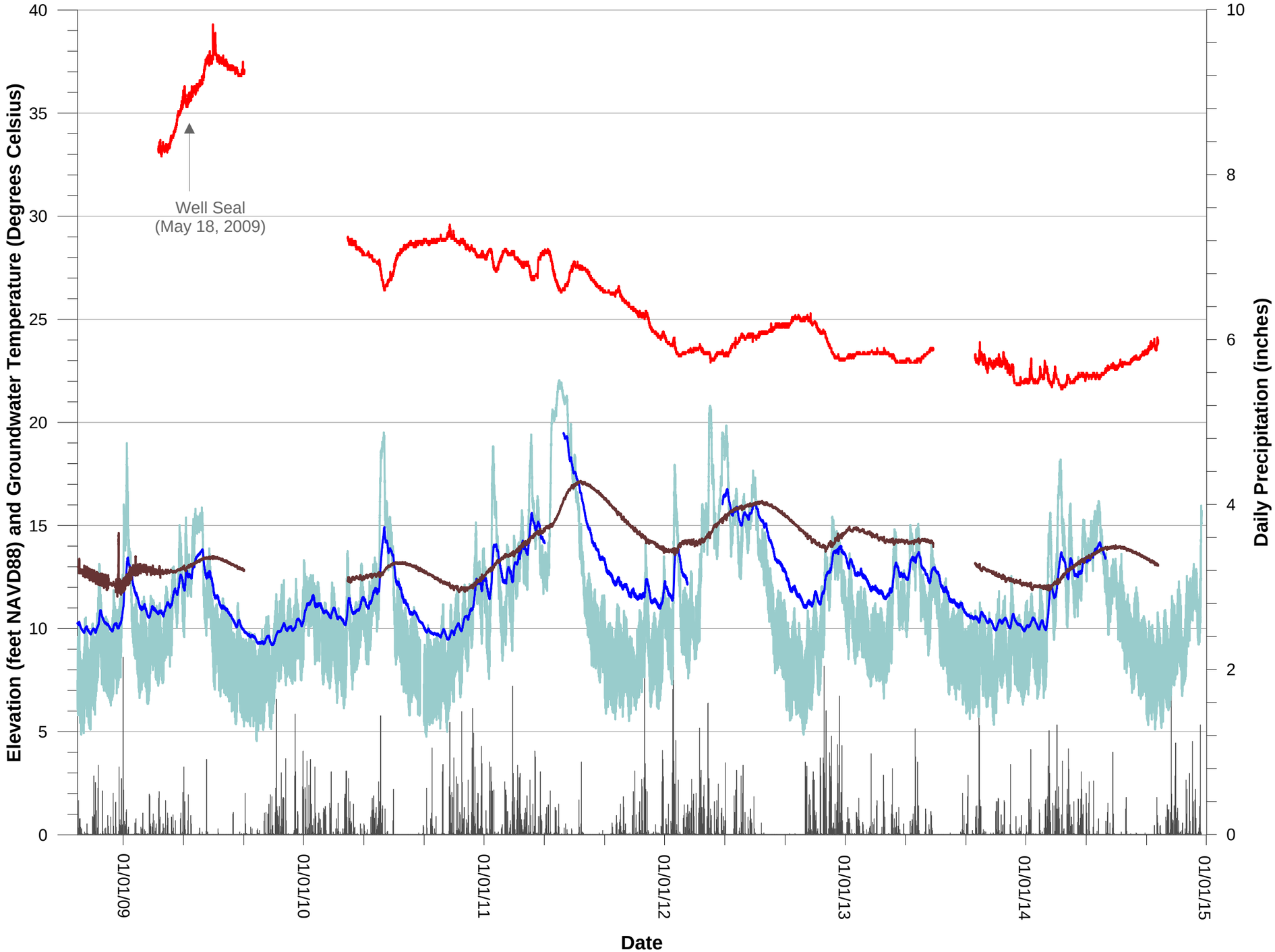

Figure 4-6:
2008 to 2014 Groundwater Temperature in Montoring Well EW-1s and Groundwater Elevations
Monitoring Wells MW-36s and EW-1s

McCormick and Baxter Superfund Site
Portland, OR

LEGEND

- EW-1s Temperature
- EW-1s Water Elevation
- MW-36s Water Elevation
- River Elevation
- Precipitation

Notes:
Monitoring wells EW-1s and MW-36s are located inside the barrier wall.

Breaks in transducer data are the result of removal for calibration, removal for well modification, or a transducer was not collecting accurate pressure readings.

Groundwater elevation manually adjusted 0.25 ft up between 17:00 on May 6, 2010 and 14:00 on June 15, 2010 due to apparent displacement from field activities.

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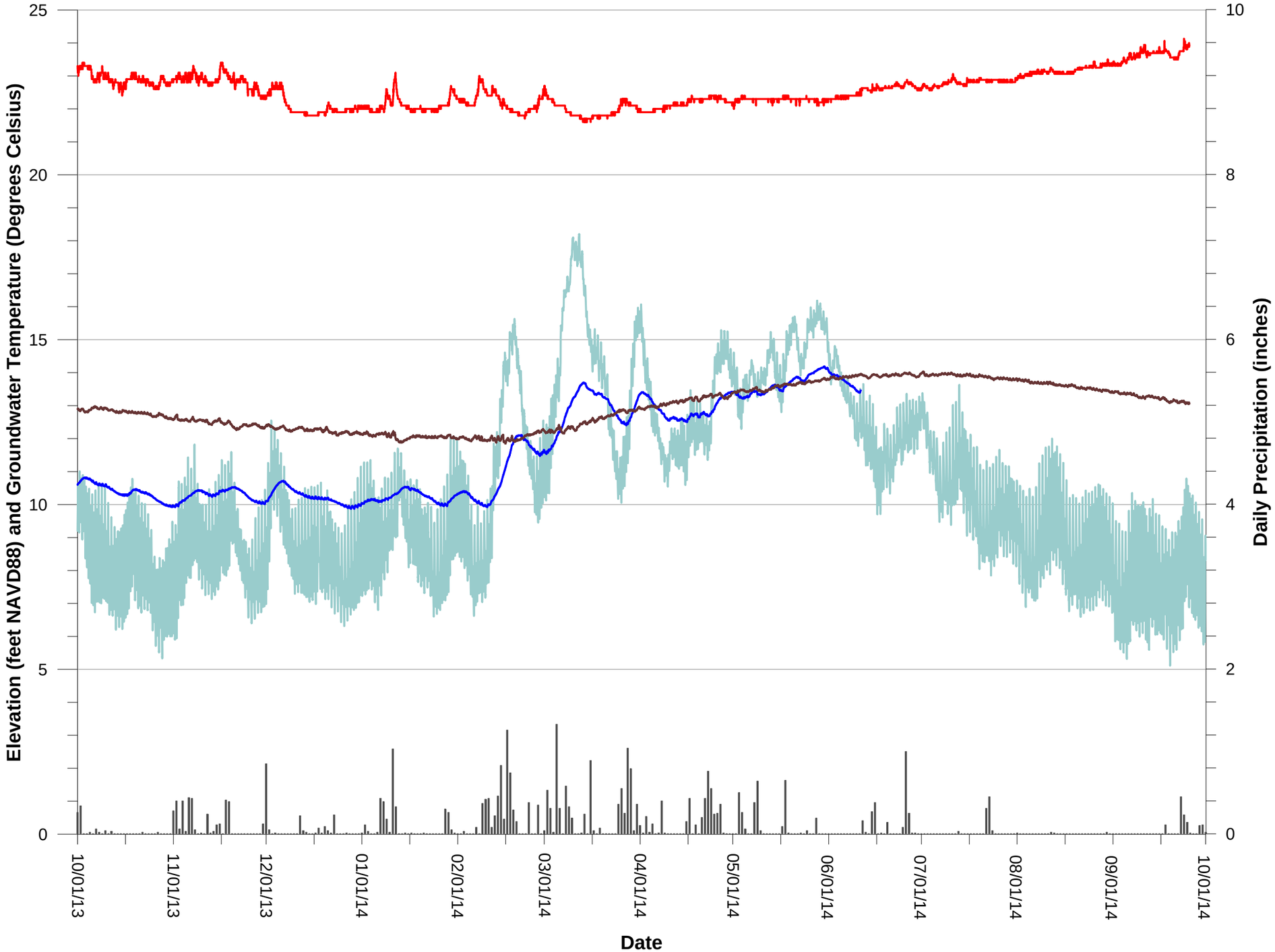
Figure 4-7:
2014 Groundwater Temperature in Montoring Well EW-1s and Groundwater Elevations Monitoring Wells MW-36s and EW-1s

McCormick and Baxter Superfund Site
Portland, OR



LEGEND

- EW-1s Temperature
- EW-1s (Interior)
- MW-36s (Interior)
- River
- Precipitation

Notes:
Monitoring wells EW-1s and MW-36s are located inside the barrier wall.

Breaks in transducer data are the result of removal for calibration, removal for well modification, or a transducer was not collecting accurate pressure readings.

File Path: \\PDX\Projects\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project_GIS\Project_mxds\Misc_Maps\Base_Grapher.mxd

HARTCROWSER

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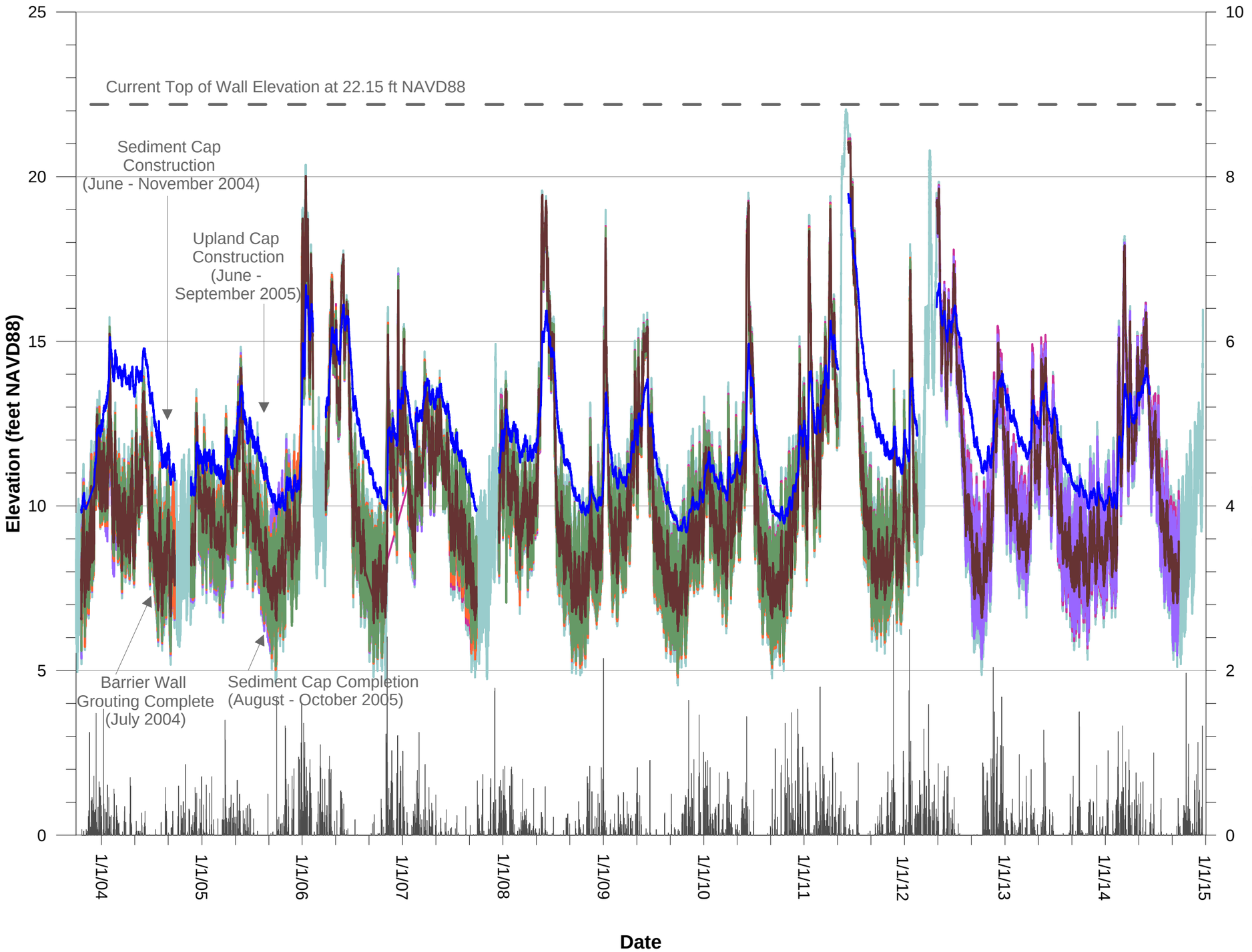

Figure 4-8:
Post-Barrier Wall Groundwater Elevations in Monitoring Wells MW-36 and MW-37

McCormick and Baxter Superfund Site
Portland, OR

LEGEND

- MW-36s (Interior)
- MW-36i (Interior)
- MW-36d (Interior)
- MW-37s (Exterior)
- MW-37i (Exterior)
- MW-37d (Exterior)
- River
- Precipitation

Notes:
MW-36 wells are located inside the barrier wall and MW-37 wells are located outside the barrier wall.

Breaks in transducer data are the result of removal for calibration, removal for well modification, or a transducer that was not collecting accurate pressure readings. Transducers in MW-36i and MW-37i were removed on February 16, 2012.

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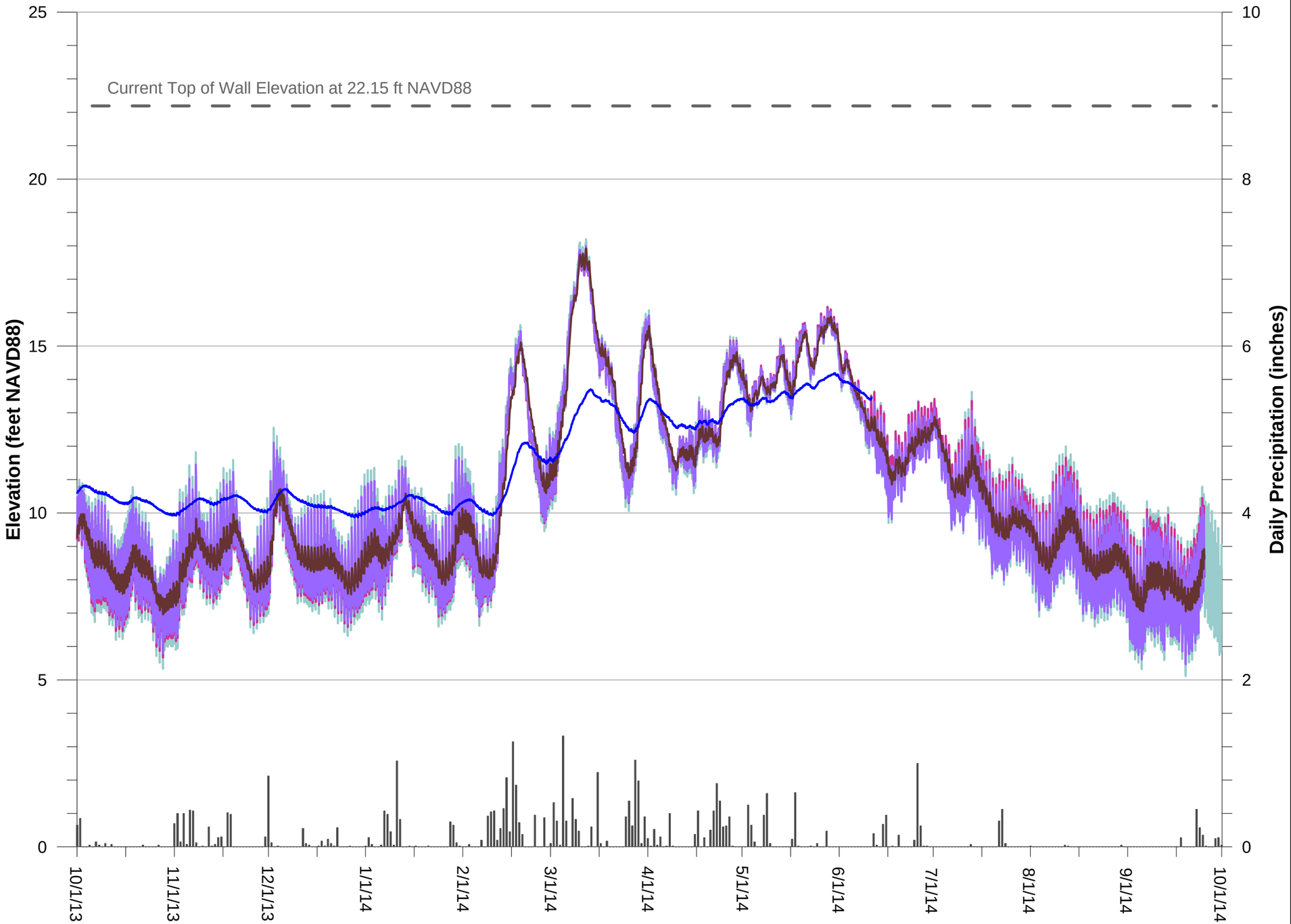

Figure 4-9:
2014 Groundwater Elevations in Monitoring Wells MW-36 and MW-37

McCormick and Baxter Superfund Site
Portland, OR

LEGEND

- MW-36s (Interior)
- MW-36d (Interior)
- MW-37s (Exterior)
- MW-37d (Exterior)
- River
- Precipitation

Notes:
MW-36 wells are located inside the barrier wall and MW-37 wells are located outside the barrier wall.

Breaks in transducer data are the result of removal for calibration, removal for well modification, or a transducer was not collecting accurate pressure readings.

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GSI Water Solutions, Inc.

Current Top of Wall Elevation at 23.35 ft NAVD88

Sediment Cap Construction (June - November 2004)

Upland Cap Construction (June - September 2005)

Barrier Wall Grouting Complete (July 2004)

Sediment Cap Completion (August - October 2005)

Elevation (feet NAVD88)

Daily Precipitation (inches)

Date

Figure 4-10:
Post-Barrier Wall Groundwater Elevations in Monitoring Wells MW-44 and MW-45

McCormick and Baxter Superfund Site
Portland, OR

LEGEND

- MW-44s (Interior)
- MW-44i (Interior)
- MW-44d (Interior)
- MW-45s (Exterior)
- MW-45i (Exterior)
- MW-45d (Exterior)
- River
- Precipitation

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

Breaks in transducer data are the result of removal for calibration, removal for well modification, or a transducer was not collecting accurate pressure readings. Transducers were removed from MW-44i and MW-45i on February 16, 2012.

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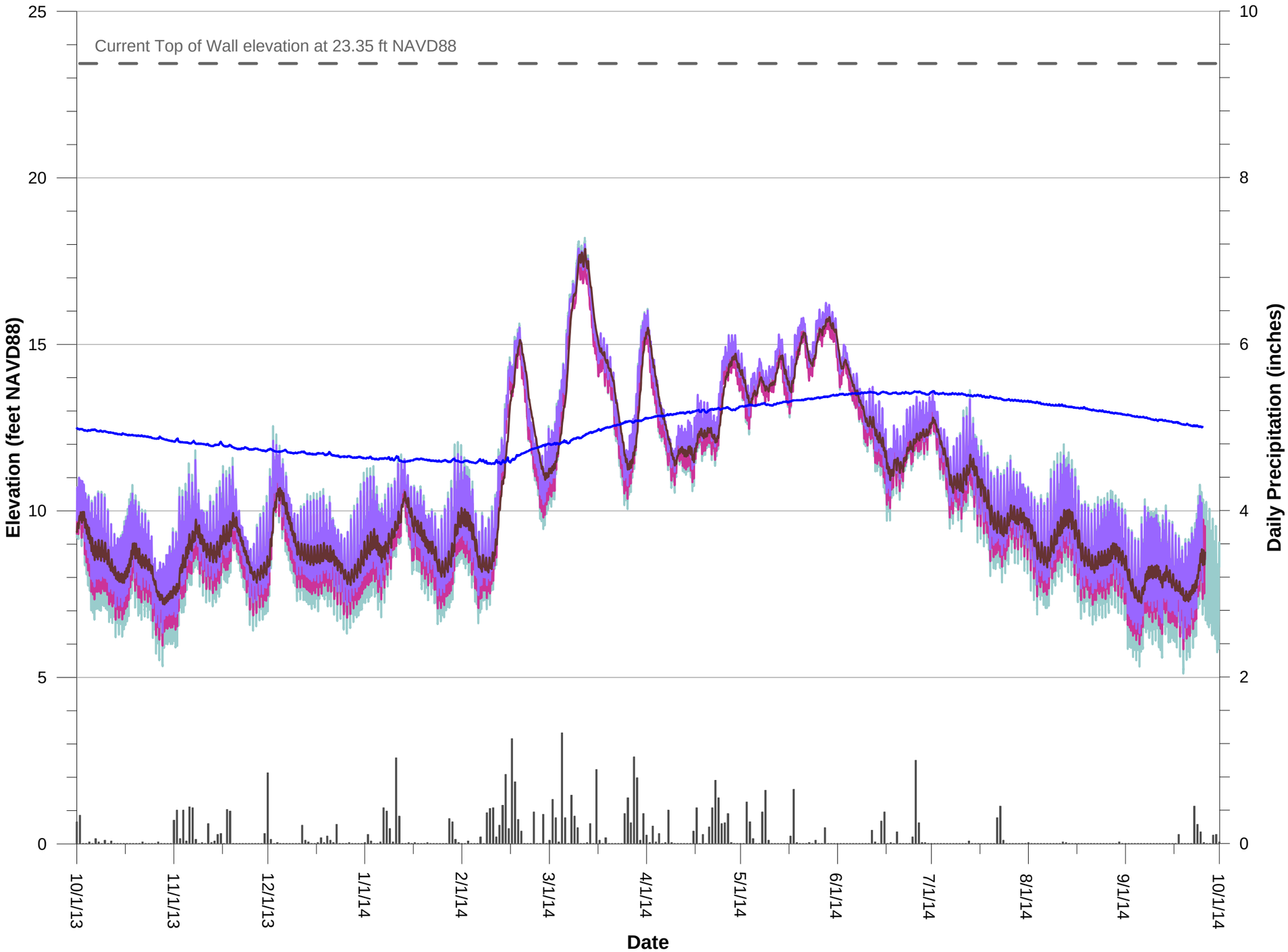


Figure 4-11:
2014 Groundwater Elevations in Monitoring Wells MW-44 and MW-45

McCormick and Baxter Superfund Site
Portland, OR

LEGEND

- MW-44s (Interior)
- MW-44d (Interior)
- MW-45s (Exterior)
- MW-45d (Exterior)
- River
- Precipitation

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

Breaks in transducer data are the result of removal for calibration, removal for well modification, or a transducer was not collecting accurate pressure readings.

HARTCROWSER

GSI Water Solutions, Inc.

LEGEND

Groundwater Monitoring Wells (Thickness of LNAPL or DNAPL)

- Wells with LNAPL
- Wells with DNAPL
- Wells with LNAPL and DNAPL
- Wells without LNAPL or DNAPL
- Subsurface Barrier Wall

NOTE:
Aerial photo taken on September 22, 2006.

0 200 400

Scale in feet

McCormick and Baxter Superfund Site
Portland, Oregon

LNAPL and DNAPL Distribution Map for June 11, 2014 Sampling Event

7/15

HARTCROWSER GSI Water Solutions, Inc.

Figure
4-12

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project GIS\Project mxds\2014 Annual Report\Figure4-12 LNAPL and DNAPL Map June11 2014.mxd

LEGEND

Groundwater Monitoring Wells (Thickness of LNAPL or DNAPL)

- Wells with LNAPL
- Wells with DNAPL
- Wells with LNAPL and DNAPL
- Wells without LNAPL or DNAPL
- Subsurface Barrier Wall

NOTES:

1) Aerial photo taken on September 22, 2006.
2) Due to an erroneous DNAPL measurement in MW-Gs on September 25, 2014, the well was re-measured on October 30, 2014 and that DNAPL thickness is shown.

0 200 400

Scale in feet

McCormick and Baxter Superfund Site
Portland, Oregon

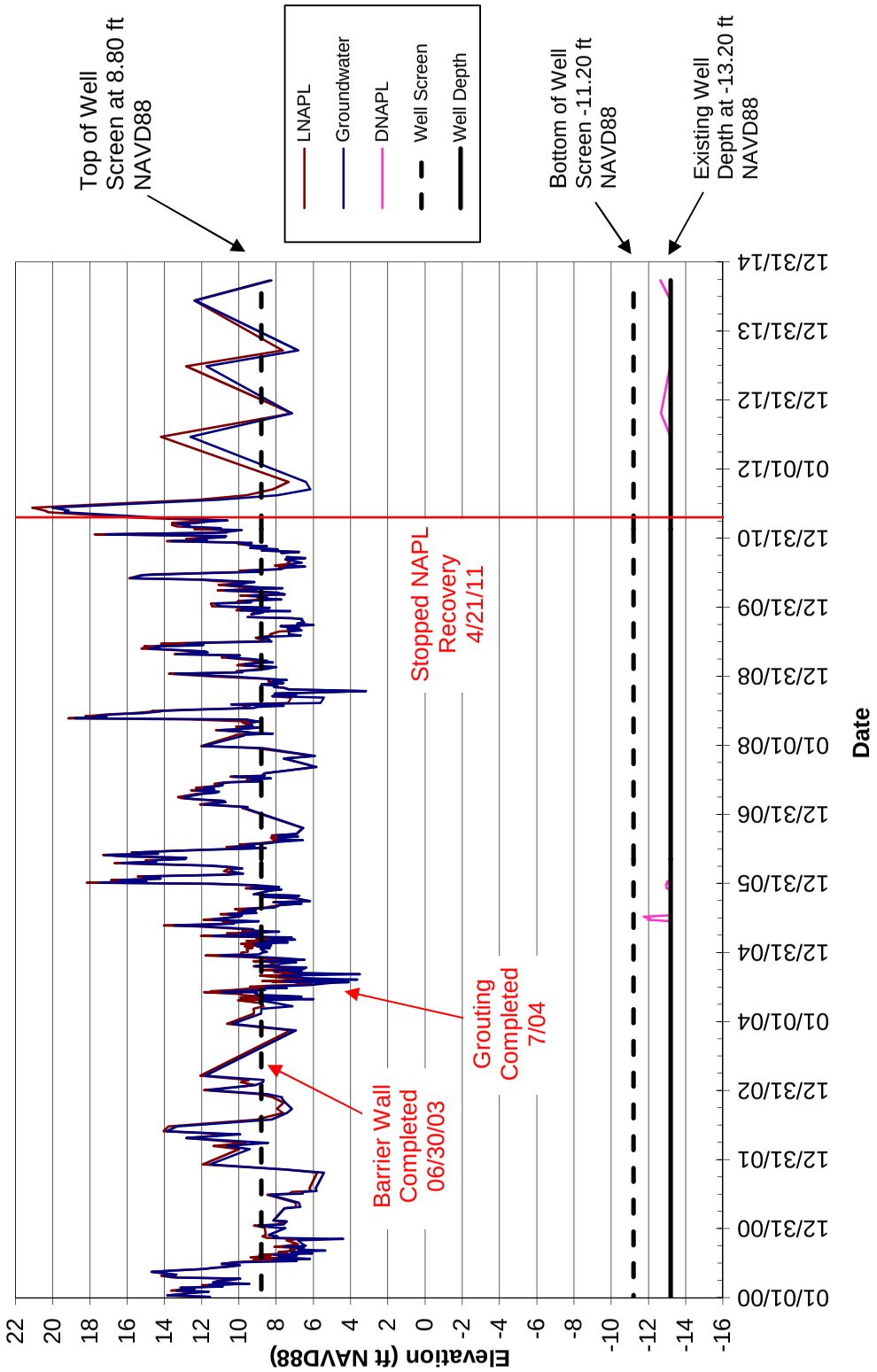
LNAPL and DNAPL Distribution Map for September 25, 2014 Sampling Event

7/15

HARTCROWSER GSI Water Solutions, Inc.

Figure
4-13

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project GIS\Project mxds\2014 Annual Report\Figure4-13 LNAPL and DNAPL Map Sept25 2014.mxd



McCormick and Baxter Superfund Site
Portland, Oregon

1999 to 2014 NAPL Thickness Plot for Well EW-10s

7/15

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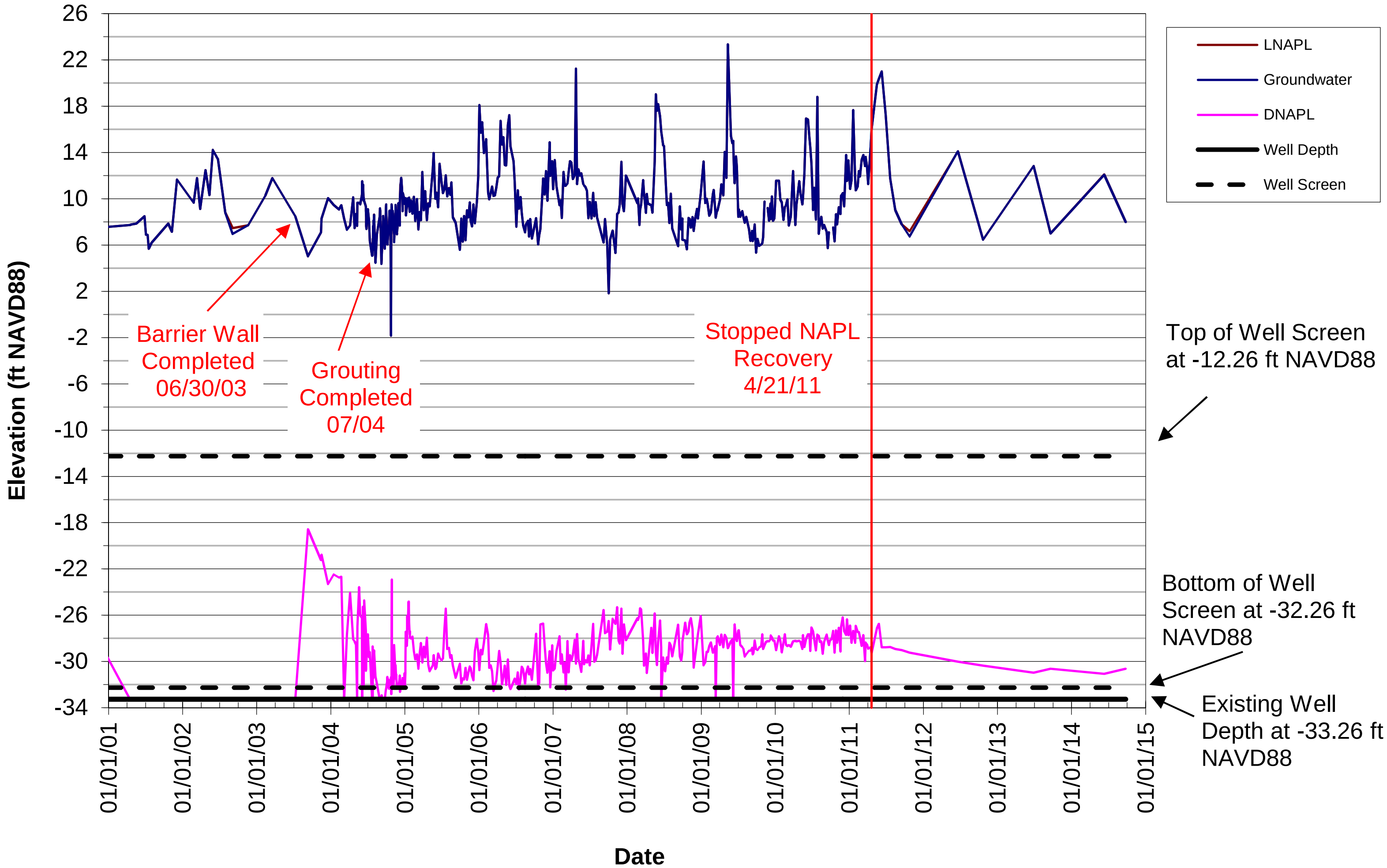
Figure

4-14



Note: 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.

McCormick and Baxter Superfund Site
Portland, Oregon

2001 to 2014 NAPL Thickness Plot for Well MW-20i

7/15

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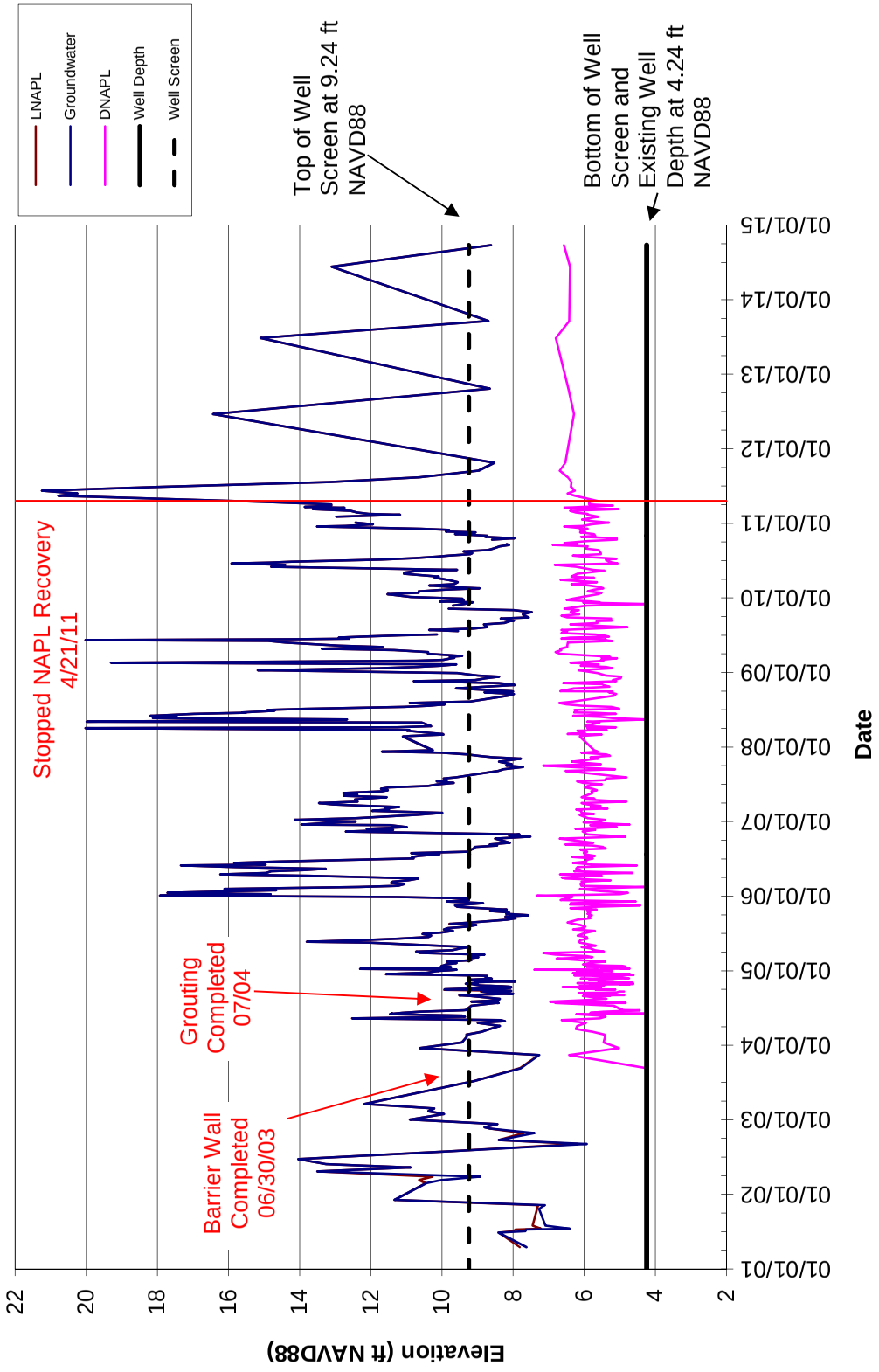
Figure
4-15



McCormick and Baxter Superfund Site
Portland, Oregon

2001 to 2014 NAPL Thickness Plot for Well MW-Ds

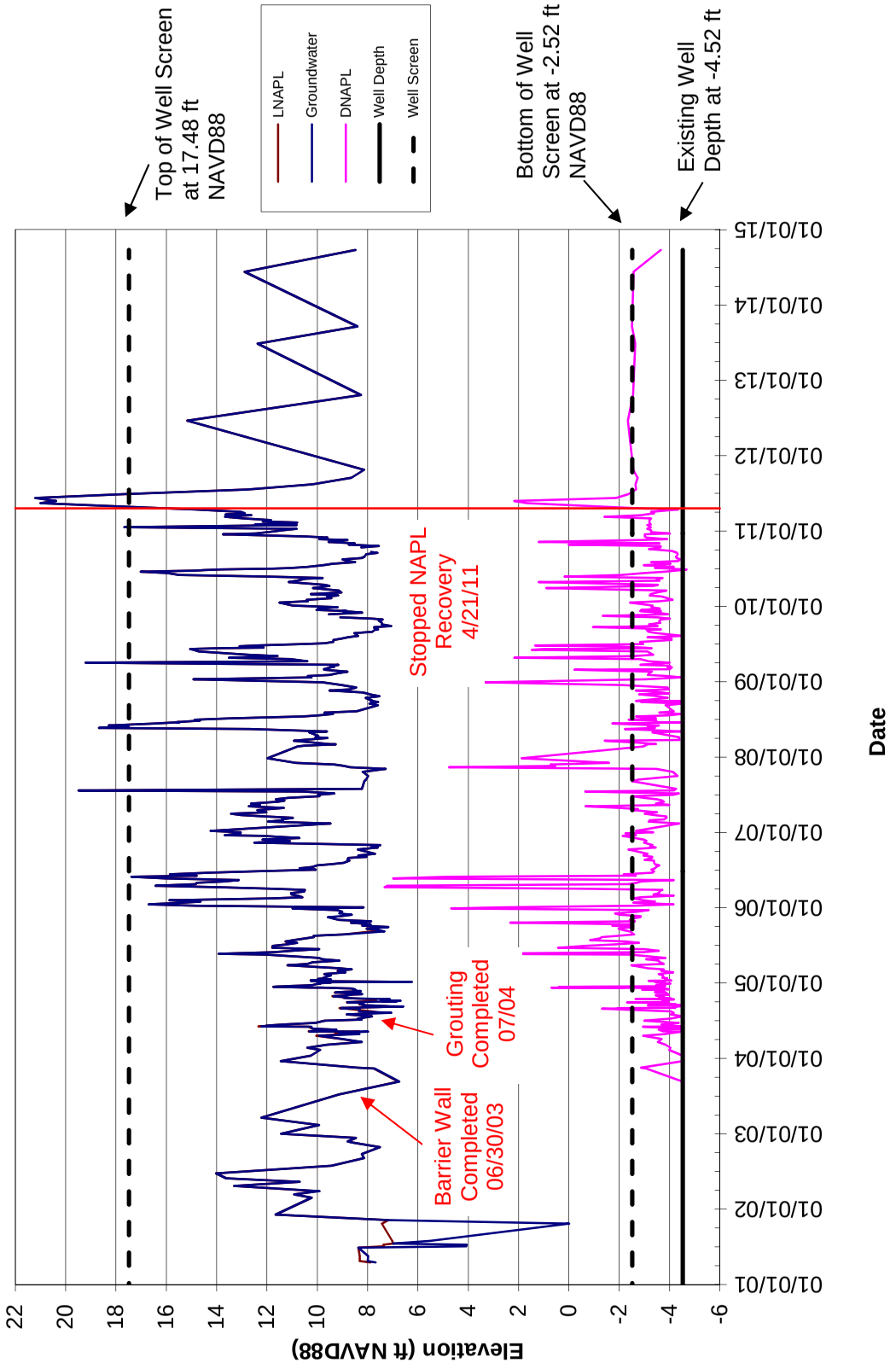
7/15

HARTCROWSER

GSI Water Solutions, Inc.

Figure

4-16



McCormick and Baxter Superfund Site
Portland, Oregon

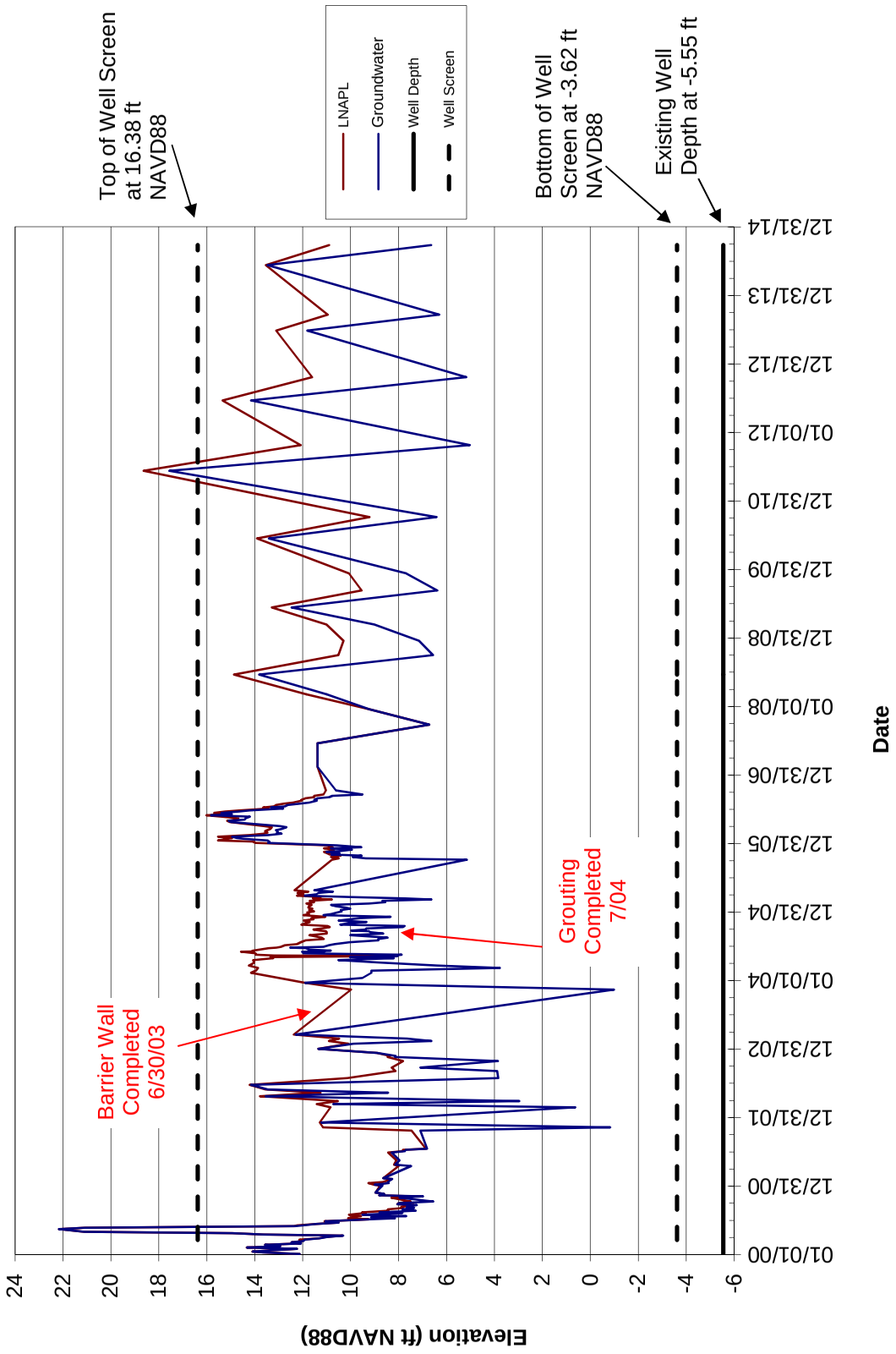
2001 to 2014 NAPL Thickness Plot for Well MW-Gs

7/15

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-17



McCormick and Baxter Superfund Site
Portland, Oregon

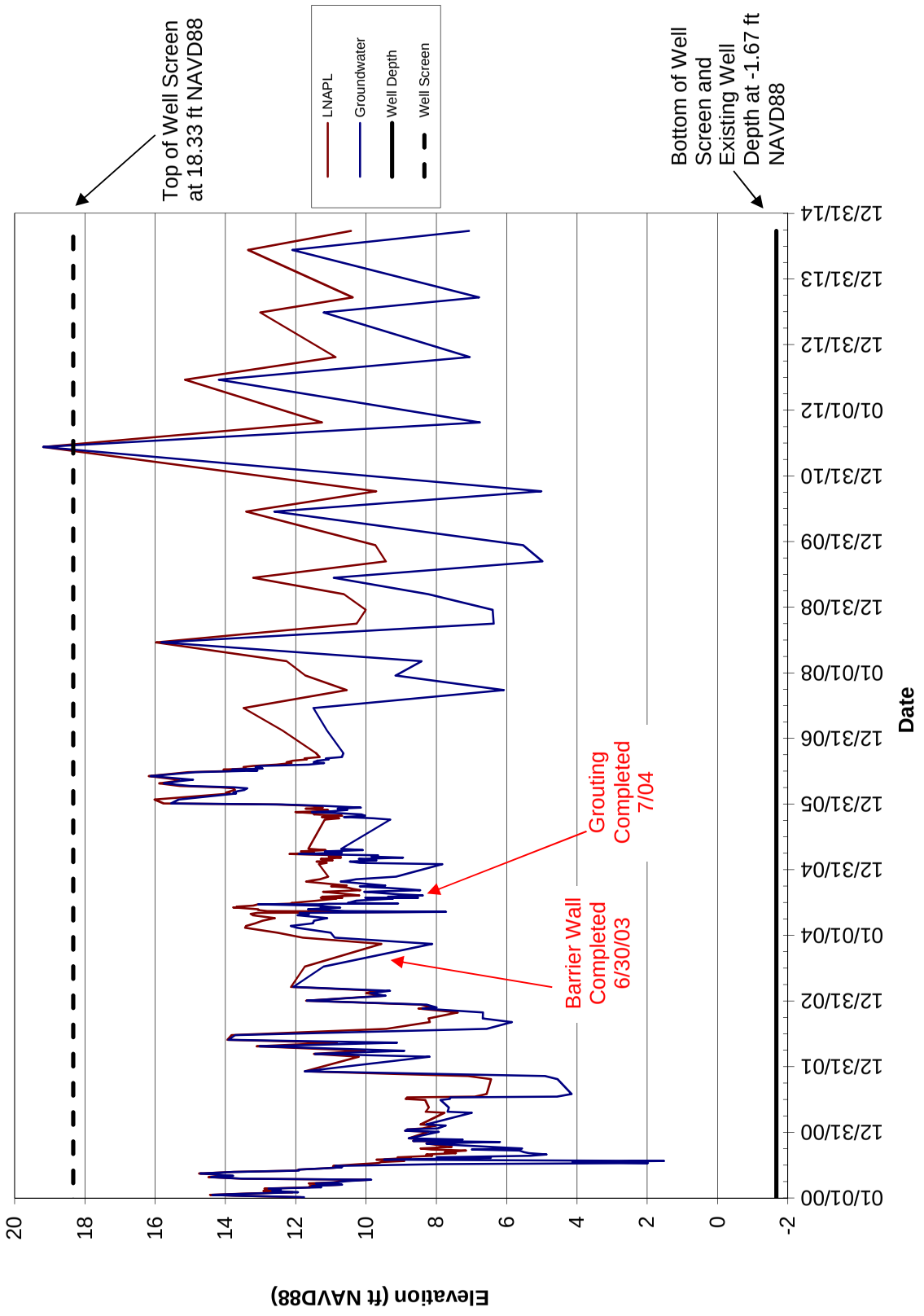
1999 to 2014 NAPL Thickness Plot for Well EW-15s

7/15

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-18



McCormick and Baxter Superfund Site
Portland, Oregon

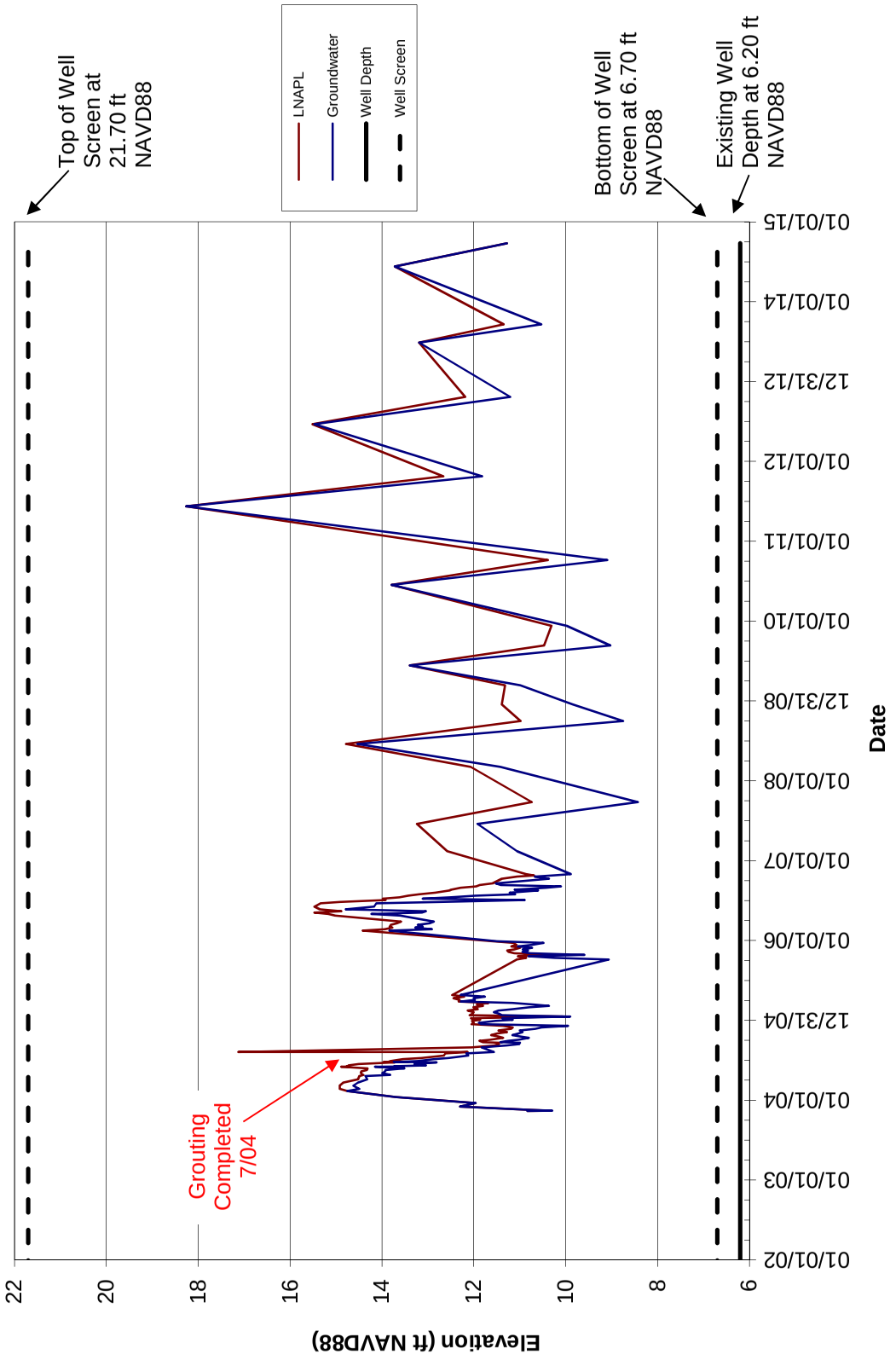
1999 to 2014 NAPL Thickness Plot for Well EW-23s

7/15

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-19



McCormick and Baxter Superfund Site
Portland, Oregon

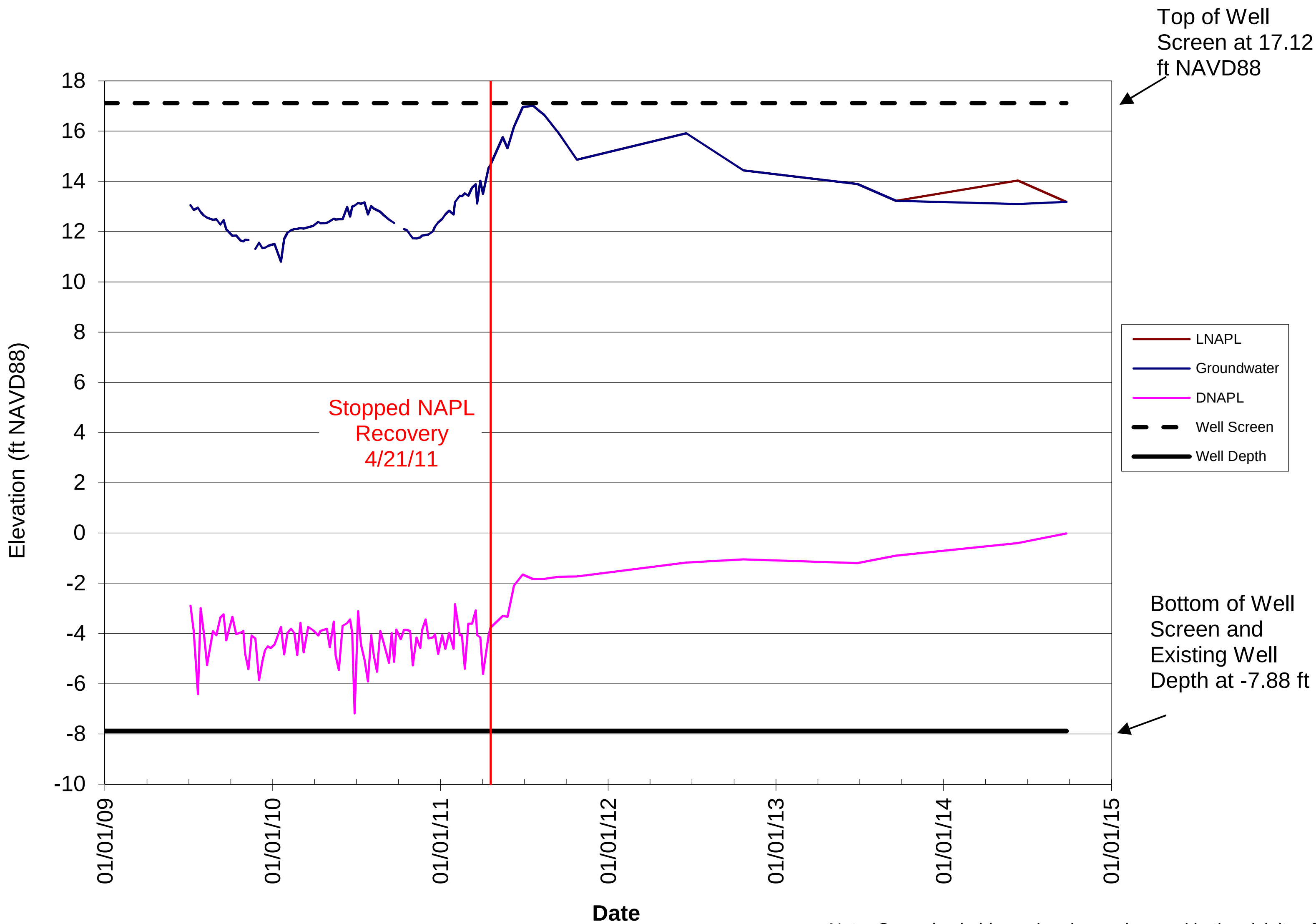
2003 to 2014 NAPL Thickness Plot for Well MW-56s

7/15

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-20



Note: 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 shown are approximate.

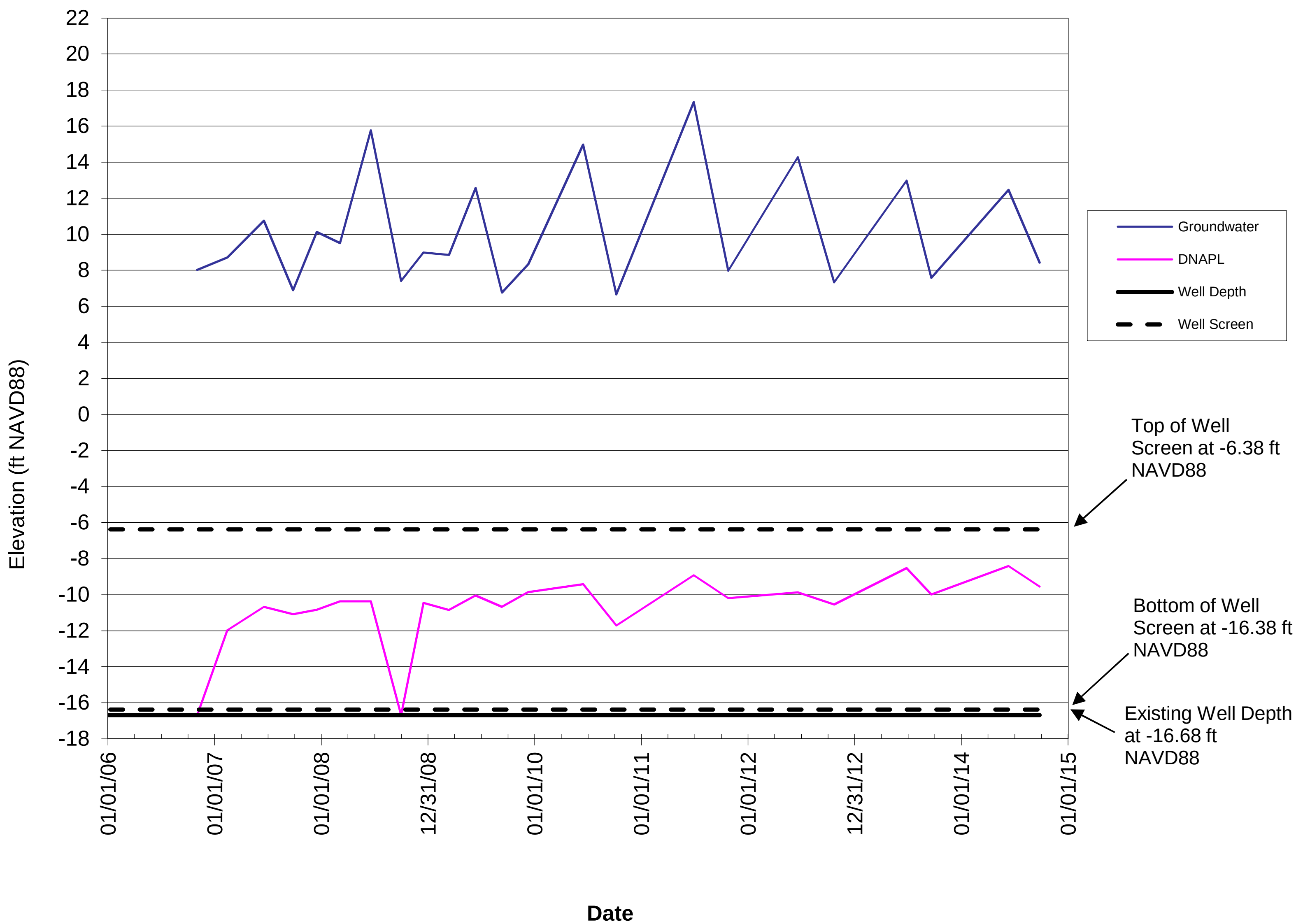
McCormick and Baxter Superfund Site
Portland, Oregon

2009 to 2014 NAPL Thickness Plot for Well EW-1s

7/15

Figure

4-21



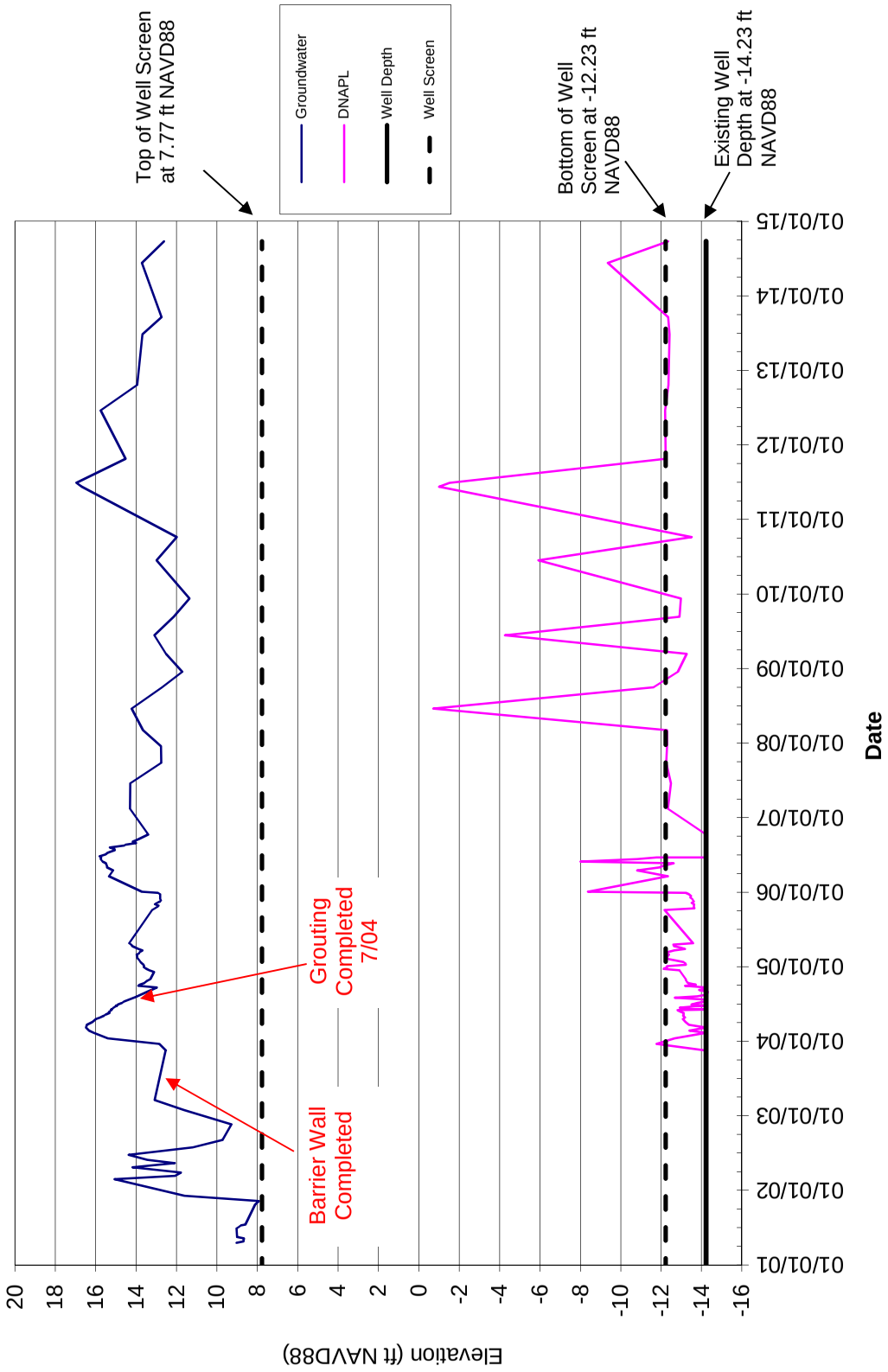
McCormick and Baxter Superfund Site
Portland, Oregon

2006 to 2014 NAPL Thickness Plot for Well MW-22i

7/15

HARTCROWSER
GSI Water Solutions, Inc.

Figure
4-22



McCormick and Baxter Superfund Site
Portland, Oregon

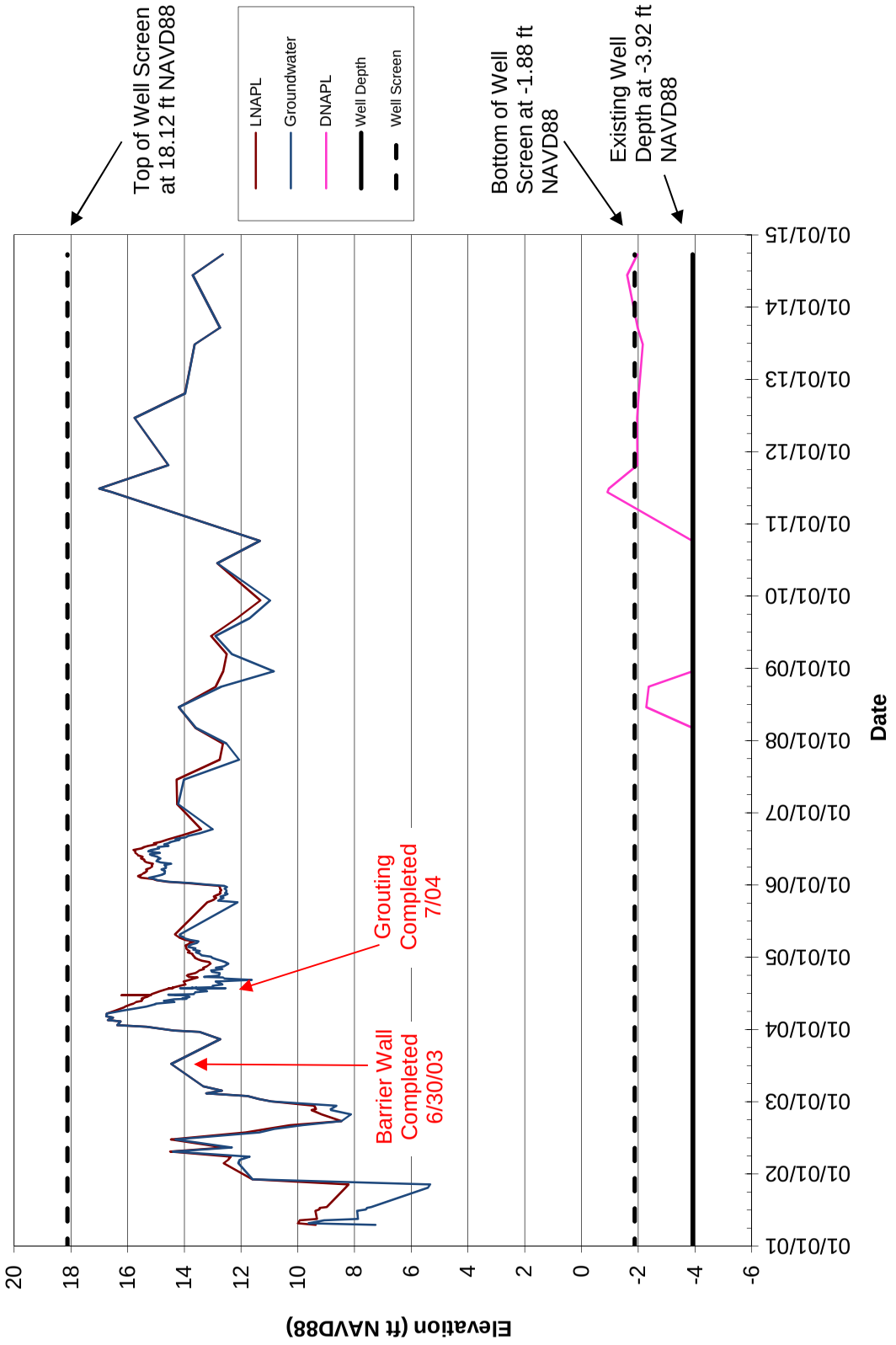
2001 to 2014 NAPL Thickness Plot for Well EW-8s

7/15

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-23



McCormick and Baxter Superfund Site
Portland, Oregon

2001 to 2014 NAPL Thickness Plot for Well EW-18s

7/15

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-24

ENTRANCE AREA
Fence (Typ.)
Property Line
Gravel Road
Union Pacific Railroad
DRAINAGE SWALE
EARTHEN CAP
Barrier Wall
Stormwater Retention Pond
Riprap
IMPERMEABLE CAP
Rock Pile
RIPARIAN AREA
Sand Pile
SEDIMENT CAP
Burlington Northern Inc.
(Spokane, Portland, and Seattle Railway Co.)
Willamette Cove
Willamette River
Gate
1
2
3
4
5
6
7
8
9

1 Photograph Location, Number, and Direction Taken

0 200 400
Scale in Feet

N

McCormick and Baxter Superfund Site
Portland, Oregon

Site Plan

7/15

HARTCROWSER
GSI Water Solutions, Inc.

Figure
5-1

F:\Data\Jobs\DEQ\15670-xx M&B\15670-10 Sed and Soil O&M\Task 4 - Annual Report\Figures\Section 5\156701004_5-1_(Site Plan).dwg

APPENDIX A
Photograph Log – Site Activities and Observations

Photograph 1 – Typical animal burrow underneath the site perimeter fence. Photograph taken near the entrance to the Support Facility.

Photograph 2 – Slightly larger animal burrow observed on the earthen cap.

Photograph 3 – Canada geese observed on the upland portion of the Site. Photograph taken facing west.

Photograph 4 – Subsurface drainage manhole (SDMH-B).

Photograph 5 – Subsurface drainage flow observations in SDMH-B within the impermeable cap.

Photograph 6 – Area mowed by NW Natural in preparation of gas line decommissioning. Photograph taken facing southwest.

Photograph 7 – Clean earthen cap soil excavated during gas line decommissioning. Soil is placed on, and covered with plastic. Photograph taken facing north.

Photograph 8 – Contaminated soil excavated during gas line decommissioning. Temporary construction fence can be seen behind the soil pile. Photograph taken facing northwest.

Photograph 9 – NW Natural gas line exposed during decommissioning.

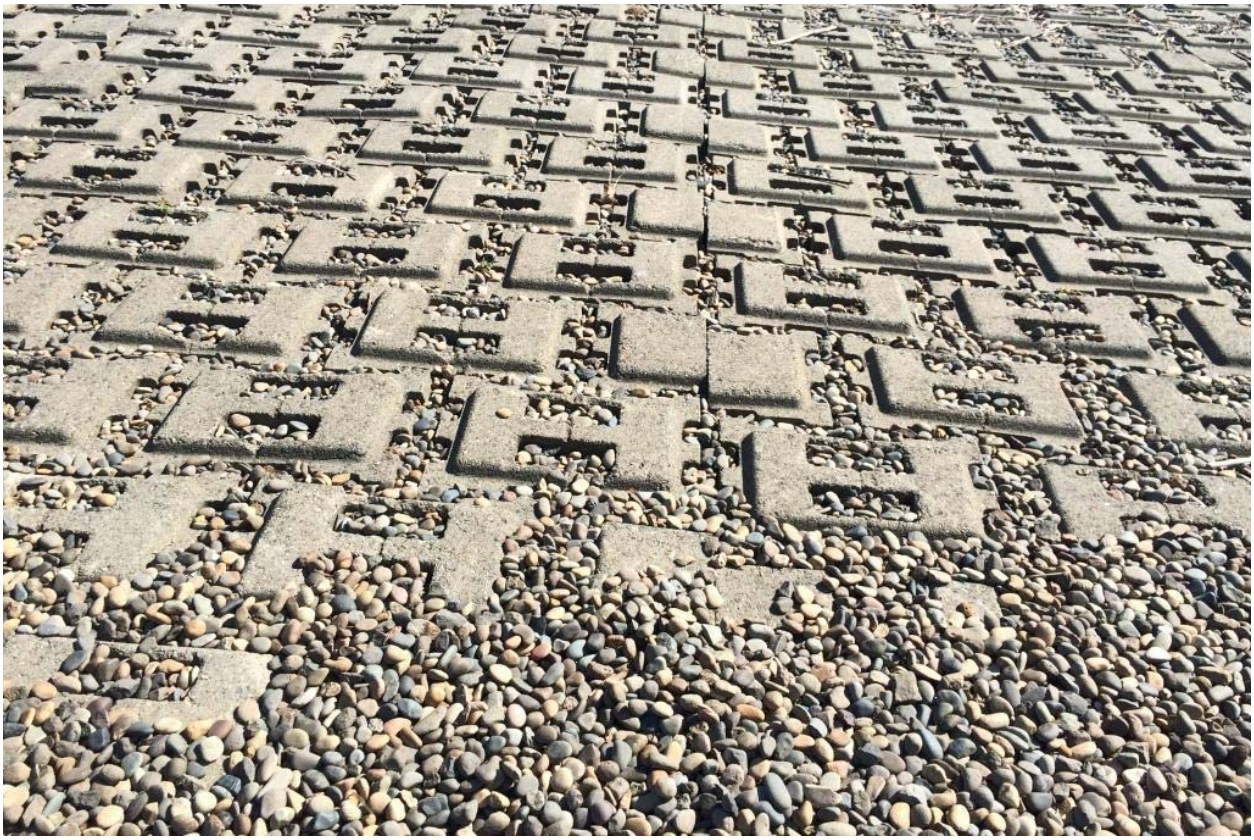
Photograph 10 – Overview of the site during gas line decommissioning. The boundary between the earthen and impermeable caps can be seen in the background. Photograph taken facing south.

Photograph 11 – Construction fence used as demarcation barrier to delineate the contaminated soil from the clean earthen cap material.

Photograph 12 – Location of the gas line work following decommissioning. Perimeter fence has been repaired. Photograph taken facing southwest.

Photograph 13 – Canada geese observed on the Riparian Area and over Sediment Cap. Photograph taken facing west.

Photograph 14 – Photograph showing variation in habitat gravel cover as it settled into ACB armoring along the shoreline. Photograph taken facing northeast.



Photograph 15 – Typical habitat gravel within ACB armoring.

Photograph 16 – Typical damage to TRM at the lower Riparian Area where TRM meets ACB armoring. Photograph taken facing south.

Photograph 17 – Photograph showing TRM overlapping ACB at lower Riparian Area. Void spaces have grown in some areas under the TRM. Photograph taken facing northeast.

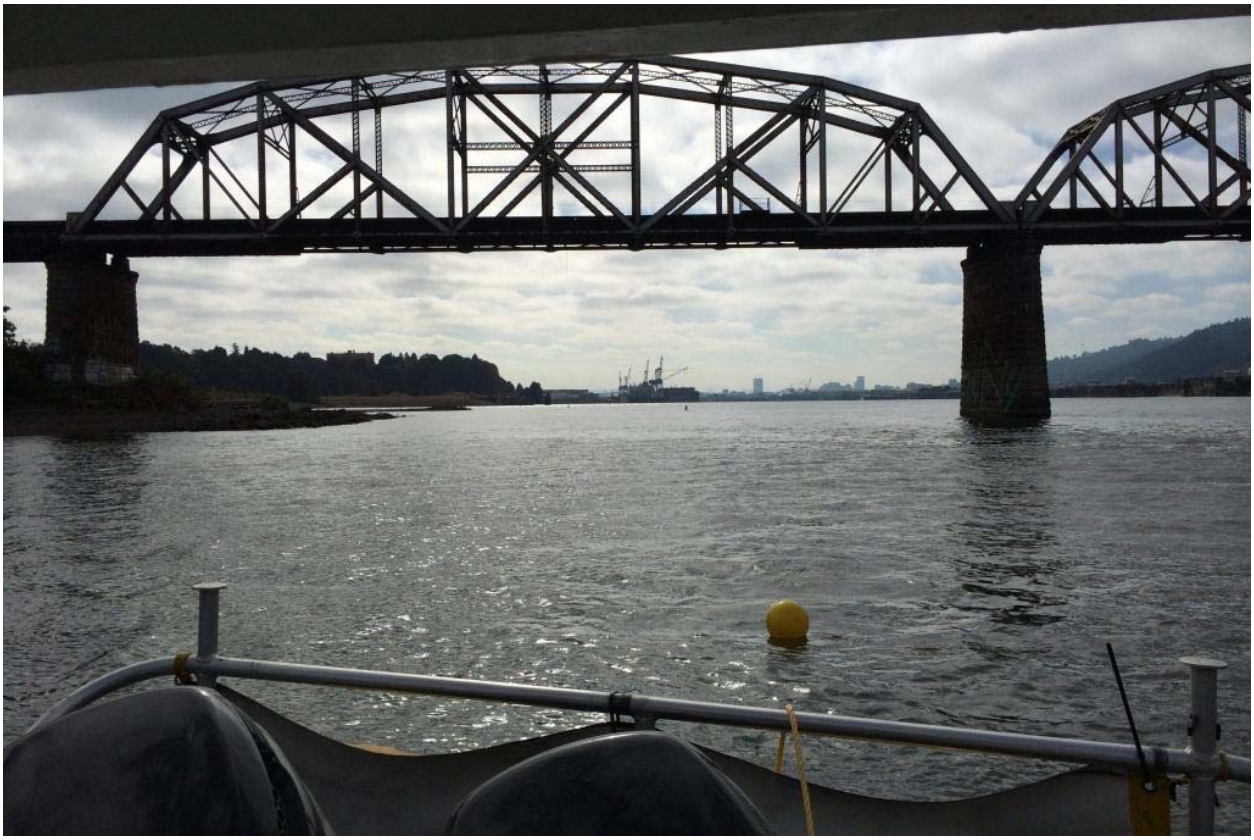
Photograph 18 – Stormwater drainage outfall.

Photograph 19 – Typical burrowing observed through TRM in the Riparian Area.

Photograph 20 – Transient boats observed in Willamette Cove. Photograph taken facing west.

Photograph 21 – Transient boat moored and resting on the edge of the sediment cap. Photograph taken facing west.

Photograph 22 – Diver searching for missing Buoy #4 at Willamette Cove. Photograph taken facing northeast.



Photograph 23 – Yellow buoy is attached to the missing Buoy #4 anchor block. Photograph taken facing southeast.

Photograph 24 – Buoy #5 remains in-place, used as a reference to assist divers in locating Buoy #4. Photograph taken facing west.

APPENDIX B
Site Activity Documentation

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.)
1/16/14	10:00	AM	1055	AM	Chris Martin	HC	Pick up waste/dispose of logs
1/16/14	10:00	AM	1055	AM	Jason Miles	HC	" "
1/29	9:30	AM	1145		Heidi Blischke	GSI	Site visit
1/29	9:30	AM	1145		Scott Manzano	DEQ	↓
1/29	9:30	AM	1145		Sarah Miller	DEQ	↓
1/29	9:30	AM	1200		Chris Mahin	HC	↓
4/16	1100	AM	1245		Chris Martin	HC	SITE VISIT
"	"	"	"		SCOTT MANZANO	DEQ	↓
"	"	"	"		SARAH MILLER	DEQ	↓
"	"	"	"		HEIDI BLISCHKE	GSI	↓
4/28	0955	a.m	1050	am	Jason Miles	HC	Met GeoEngineers for Utility Loc.
5/6	1300	PM	1550		Chris Martin	HC	Haz waste disposal
5/6	1345	pm	1500		Darrel	Waste Management	V
5/20	1155	am	1230		Jason Miles	HC (Check on Drums for Disposal)	(Place more bentonite in drum)
6/2	1005	am	1185	am	Jason Miles	HC	3 water drums being picked up
06/02	1105	am	1145	am	Darrel Whitmore	Chem Waste Mgmt	Waste Pickup
6/11	0900	am	1720	PM	Anthony Chavez	HC	Water Levels / Data logger

SD 9.12.4751

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.)
5/5/14	0910	AM	10:30	AM	AARON FREDERICK	GEOENGINEERS	DRILLING
5/5/14	9:11	AM	9:41	AM	John McDonald	NW Natural	Drilling
5/5/14	9:11	AM	9:41	AM	Corey Raspone	"	"
5/6/14	1300	PM	1800	PM	AARON FREDERICK	GEOENGINEERS	DRILLING
5/6/14	1:04	PM	19:00	PM	James Dennis	Western States Drilling	Drilling
5/6/14	1:05	Pm	1800	PM	Tyler St. Jall	WSSD	Drilling
5/6/14	1:06	PM	3:05	PM	John McDonald	NW Natural	Drilling
5/6/14	1:06	PM	3:06	PM	Corey Raspone	" "	" "
5/9/14	1230	pm	1300	pm	Chris Martin	Hart Crowser	IDW Transfer
5/9/14	↓	↓	1300	pm	Jason Miller	"	"
5/9/14	↓	↓	1500	pm	Renee Fowler	GSI	"
5/15/14	1420	AM	1450	PM	AARON FREDERICK	GEOENGINEERS	PZ READINGS

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.)
6/11	0900	am	1800	PM	Jason Miles	HC	Work here & Data logger
6/11	12:00	pm	5:15pm	pm	Dave Hennessy	HC	Veg. Monitoring
7/28	1000	am	12:10	PM	Chris McAin	HC	Site inspection
↓	↓	↓	↓	↓	Heidi Blischke	DEQ	↓
↓	↓	↓	↓	↓	Scott Manzari	DEQ	↓
↓	↓	↓	↓	↓	Sarah Miller	DEQ	↓
8/12	~~7:10~~	PM	5:33	PM	Erin Hughes	GSI	Field Trip - PSU
↓	↓	↓	↓	↓	Courtney Elliott	PSU	Field trip
↓	↓	↓	↓	↓	Kaleb Keefer	↓	↓
↓	↓	↓	↓	↓	Kandice Carlson	↓	↓
↓	↓	↓	↓	↓	MARK DUVALL	↓	↓
↓	↓	↓	↓	↓	Rachael Van Glubt	↓	↓
↓	↓	↓	↓	↓	Sarah van Glubt	↓	↓
↓	↓	↓	↓	↓	Rachel Hanna	↓	↓
↓	↓	↓	↓	↓	Wes Bric—	↓	↓
↓	↓	↓	↓	↓	DANIELE PETERS	↓	↓
↓	↓	↓	↓	↓	Shadi Sandi	PSU	Fie

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.)
					Abdulaziz Almenea	PSU	
					Fadhalah Al Fadhalah	PSU	
					Hamad Alsayegh	PSU	
					Abdullah Alhadad	PSU	
					Anuto Sr Asuncion	PSU	
					Fabiano De Nascimento	PSU	
					Mikael B. Ussondos	PSU	
					Debora Rodrigues	PSU	
					Yessica Rillelho Fontoura	PSU	
					Rafael Victor C. S.	PSU	
					Josh Gilchrist	PSU	
					Cindy Gleason	PSU	
					Christie Milligan	PSU	
					Bill Fish	PSU	
					CS Motti	PSU	
8/13	0930	am	1030	AM	Chris Martin	Hart Crowser	
8/13	0930		1030	AM	Kaylon Smyth	" "	

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.)
9/11/14	0900	AM	1030	am	Chris Martin	HC	NW Natural Precon meeting
9/24/14	0945	AM	1200	PM	"	"	NW Natural oversight / LTM prep
9/25/14	0945	AM	1700		"	"	Low tide NAPL gauging
9/25/14	0945	AM	1700		Kaylan Smyth	HC	low tide NAPL gauging
"	"	"	1800		Phil Cordell	HC	"
"	"	"	1600		Anthony Chavez	HC	"
9/26/14	0945	AM	1430		Phil Cordell	HC	Transducer Data + Maint
10/14/14	1300	PM	1515		Chris Martin	HC	Site Inspection Meeting
"	"	"	↓		Heidi Blicker	GSI	↓
"	"	"			Scott Manzano	DEQ	
"	"	"			Sarah Miller	DEQ	
12/16/15	1300	PM	1500		Sarah Miller	DEQ	Site Inspection
"	"	"	1500		Heidi Bisette	GSI	↓
"	"	"	1700		Renee Fowler	GST	
"	"	"	1730		Phil Cordell	HC	

McCormick & Baxter Operational & Functional Determination Period Status Meeting Report

Wednesday 1/29/2014
9:30 A.M.
6900 N. Edgewater Street
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Heidi Blischke	Note Taker:	Chris Martin
Attendees:	Scott Manzano	Project Officer	DEQ
	Sarah Miller	Capital Asset Tech	DEQ
	Chris Martin	Field Manager	Hart Crowser
	Heidi Blischke	Technical Manager	GSI

Site Status Meeting Notes

Site Walk and Inspection

Scott Manzano, Sarah Miller, Chris Martin, and Heidi Blischke completed a thorough inspection of the entire site on Wednesday, January 29, 2014. The next inspection is scheduled for April 2014.

Site Walk – Shoreline

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

- Willamette River and Willamette Cove shoreline conditions.
- Gravel overlay on ACB.
- Enhanced planting condition.
- Buoy locations.
- Stormwater discharge.

Gravel from the shoreline enhancement task (completed in October 2012) remains settled in the voids of the ACB armoring. Tidal fluctuations have distributed gravel from the top of the ACB, where it was originally applied, to where it has settled along the toe of the bank. Gravel has not settled into the mid-bank portion of the ACB armoring in some areas where the slope is steeper. Some trees planted as part of the shoreline enhancement plan appear to be budding in preparation for spring.

The Willamette River at the time of inspection (between 9:30 and 11:30 AM) was between 5.4 and 4.8 feet NAVD88. Low tide was at approximately 11:45 AM with a tide of approximately 4.8 feet NAVD88. The southernmost buoy along Willamette Cove, (Buoy #4 from the Site Observation Summary figure attached), could not be seen. No indications that the buoy was still present could be observed.

Discharge from the outfall was moderate (approximately 20 gpm). The outfall was in good condition and free of weeds.

The number of derelict boats anchored within Willamette Cove has increased. At least six boats were observed during the site walk. One boat was beached near ACB armoring. Trash and temporary structures attributed to homeless occupancy within Willamette Cove were observed throughout the Willamette Cove shoreline.

Site Walk – Upland

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

- Site perimeter and fence, and drainage basin.
- Soil cap (burrows, erosion, etc.).
- EW-1s and MW-23d area of subsidence.

- MW-58 well cluster monument repairs.
- Stormwater conveyance manhole conditions.

The site perimeter fence was intact, with some areas of burrowing identified (rodent sized burrows), and the drainage basin was wet, but not saturated. A small amount of ponding was observed on the earthen cap near the drainage basin.

The distance between the inner and outer casing was 2.6 inches. In October 2013, the distance was 2.50 inches and prior to that, it was 2.56 inches. These differences are likely manual measurement error. The distance will continue to be measured to assess whether there is a trend or significant change suggesting ground movement.

The monuments and surface seals for the cluster of MW-58 monitoring wells (MW-58s, MW-58i, and MW-58d) on the railroad property adjacent to Willamette Cove were repaired on October 9, 2013. The repaired well monuments were observed during the site inspection meeting and appeared in good condition.

Manholes B and C associated with the stormwater conveyance system were observed to have water flowing in from all observed inlets to each vault with no sediment accumulation observed.

Action Items:	**Person Responsible**	**Deadline**
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Martin	Quarterly
■ Dispose of hazardous waste accumulated from site investigations	Chris Martin	February 2014
■ Discuss alternative bid requests options with Steve Campbell.	Scott Manzano	Spring 2014
■ Request Metro combination lock for backup access to upper gate.	Scott Manzano	February 2014
■ Call Metro about derelict boats in Willamette Cove.	Scott Manzano	February 2014
■ Call Northwest Underwater Construction about potentially looking for missing buoy.	Heidi Blischke	February 2014

Site Activities / Miscellaneous Field Activities

Deliverables

Action Item:	**Person Responsible:**	**Deadline:**
2013 Annual O&M Report	Heidi Blischke	Early February

Budget Status: November 2013 through January 2014 were at/or below the anticipated budget.

Meeting Status:

Date / Time	TBD – April 2014	
Location	McCormick & Baxter Facility	Site Office

McCormick & Baxter Operational & Functional Determination Period Status Meeting Report

Wednesday 4/16/2014
11:00 A.M.
6900 N. Edgewater Street
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Heidi Blischke	Note Taker:	Chris Martin
Attendees:	Scott Manzano	Project Officer	DEQ
	Sarah Miller	Capital Asset Tech	DEQ
	Chris Martin	Field Manager	Hart Crowser
	Heidi Blischke	Technical Manager	GSI

Site Status Meeting Notes

Site Walk and Inspection

Scott Manzano, Sarah Miller, Chris Martin, and Heidi Blischke completed a thorough inspection of the entire site on Wednesday, April 16, 2014. The next inspection is scheduled for July 2014.

Site Walk – Shoreline

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

- Willamette River and Willamette Cove shoreline conditions.
- Gravel overlay on ACB.
- Buoy locations.
- Stormwater discharge.

Gravel from the shoreline enhancement task (completed in October 2012) remains settled in the voids of the ACB armoring. Tidal fluctuations have distributed gravel from the top of the ACB, where it was originally applied, to where it has settled along the toe of the bank. Gravel has not settled into the mid-bank portion of the ACB armoring in some areas where the slope is steeper.

The Willamette River at the time of inspection (between 11:00 AM and 12:30 PM) was between 7.19 and 6.94 feet NAVD88. Low tide was at approximately 4:00 PM with a tide of approximately 6.53 feet NAVD88. The southernmost buoy along Willamette Cove (not observed during the January site inspection meeting) was still not visible during the April 2014 inspection. Buoy #4 was not visible from the shoreline – this is the same buoy that was not visible in January 2014.

Discharge from the outfall was low (approximately 5-10 gpm). The outfall was in good condition and free of weeds.

The number of derelict boats anchored within Willamette Cove has decreased. Approximately three boats were observed during the site walk. The shoreline is significantly cleaner than during the January 2014 inspection although water levels during the site inspection covered most of the beach.

Wildlife spotted along the shoreline included Canada geese, kingfisher, osprey, and a hawk.

Site Walk – Upland

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

- Site perimeter and fence, and drainage basin.
- Soil cap (burrows, erosion, etc.).
- EW-1s and MW-23d area of subsidence.

The site perimeter fence was intact, with some areas of burrowing identified (small mammal sized burrows). The drainage basin was wet, as it was raining, but ponded water was not present.

The distance between the inner and outer casing of MW-23d was 2.5 inches, similar to previous measurements. No additional movement occurred this quarter.

Wildlife spotted in the upland portion of the cap included Canada geese and a small rabbit.

Action Items:	**Person Responsible**	**Deadline**
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Martin	Quarterly
■ Dispose of hazardous waste accumulated from site investigations	Chris Martin	May 2014
■ Prepare BAP to address additional tasks.	Heidi Blischke	Summer 2014
■ Call Northwest Underwater Construction about potentially looking for missing buoy.	Heidi Blischke	Summer 2014

Site Activities / Miscellaneous Field Activities

- Low-tide monitoring will be conducted in June 2014.
- Vegetative inspection and an additional shoreline planting plan will be completed in June 2014.

Deliverables

Action Item:	**Person Responsible:**	**Deadline:**

Budget Status: Out-of-scope tasks related to implementing a sediment cap sampling and analysis plan were completed in March 2014. The out-of-scope work was reviewing materials, providing materials to Dr. Anderson, and attending an all-day meeting in Corvallis to see Dr. Anderson's lab and learn about her passive sampling technology. We currently have sufficient budget to cover these additional costs. A Budget and Assumption Proposal (BAP) will be completed to address this, and other upcoming maintenance items that are currently out of scope. Items that will be covered in the BAP include:

- Sediment Sampling and Analysis Plan,
- Shrub planting at the turf reinforced mat/articulated concrete block interface, and
- Oversight of the Northwest Natural pipeline abandonment on, and adjacent to the site.

Meeting Status:

Date / Time	TBD – July 2014	
Location	McCormick & Baxter Facility	Site Office

McCormick & Baxter Operational & Functional Determination Period Status Meeting Report

Monday 7/28/2014
10:00 A.M.
6900 N. Edgewater Street
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Heidi Blischke	Note Taker:	Chris Martin
Attendees:	Scott Manzano	Project Officer	DEQ
	Sarah Miller	Capital Asset Tech	DEQ
	Chris Martin	Field Manager	Hart Crowser
	Heidi Blischke	Technical Manager	GSI

Site Status Meeting Notes

Site Walk and Inspection

Scott Manzano, Sarah Miller, Chris Martin, and Heidi Blischke completed a thorough inspection of the entire site on Monday, July 28, 2014. The next inspection is scheduled for October 2014.

Site Walk – Shoreline

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

- Gravel overlay on ACB.
- Buoy locations.
- Stormwater discharge.
- Willamette River and Willamette Cove shoreline conditions.
- Ebullition from sediment cap.

Gravel from the shoreline enhancement task (completed in October 2012) remains settled in the voids of the ACB armoring. Tidal fluctuations have distributed gravel from the top of the ACB, where it was originally applied, to where it has settled along the toe of the bank. Gravel has not settled into the mid-bank portion of the ACB armoring in areas where the slope is steeper.

The Willamette River at the time of inspection (between 10:30 AM and 12:00 PM) was between 4.95 and 4.05 feet COP (or 9.95 – 9.05 NAVD88). Low tide was at approximately 10:00 AM with a tide of approximately 4.01 feet COP (or 9.01 NAVD88). Buoy #4 was not visible from the shoreline – this is the same buoy that was not visible in January or April 2014.

Discharge from the outfall was low (approximately < 5 gpm). The outfall is in good condition, although the discharge basin is full of weeds.

The number of derelict boats anchored within Willamette Cove has increased since April. Approximately 6 boats were observed during the site walk. The shoreline is relatively clean and free of debris.

Moderate ebullition was observed in the area above the granular organoclay along the Willamette River shoreline. Infrequent ebullition was observed in the above the granular organoclay within Willamette Cove.

Wildlife spotted along the shoreline included Canada geese, seagulls, crawdads, and ground squirrels.

Site Walk – Upland

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

- Site perimeter and fence, and drainage basin.
- Subsurface drainage (manholes).
- Soil cap (burrows, erosion, etc.).
- EW-1s and MW-23d area of subsidence.

The site perimeter fence was intact, with some areas of burrowing identified (small mammal sized burrows).

A small amount of subsurface drainage was directly observed by opening a manhole SDMH-B. Less than 5 gpm was flowing from the perforated pipe installed above the impermeable cap surface into the manhole sump.

The distance between the inner and outer casing of MW-23d was 2.59 inches, similar to previous measurements indicating no ground movement.

Various small birds and scat were spotted in the upland portion of the cap.

Action Items:	Person Responsible	Deadline
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Martin	Quarterly
■ Prepare O&F BAP.	Chris Martin	August 2014
■ Prepare work order and schedule Ballard to assess missing buoy and sediment cap.	Heidi Blischke/Chris Martin	August 2014
■ Oversight of NW Natural Gas Line Decommission	Chris Martin	August 2014

Site Activities / Miscellaneous Field Activities

- Low-tide monitoring and the vegetative inspection was conducted in June 2014. A draft shoreline planting plan was also prepared in June 2014.
- Hazardous waste has been removed from the site. Four drums of various media (soil and/or water) remain on the site from NW Naturals installation of piezometers. This excavated soil waste will be handled by NW Natural by returning to the excavation ensuring 2 feet of clean fill.
- NW Natural will begin decommissioning the gas line adjacent to the site. Hart Crowser will complete at least three site visits during the field activities to monitor progress – one at the start of work, one after the excavation is completed to assess the excavation and intersection with the soil cap, and one visit to observe the filling of the excavation.
- Hart Crowser will prepare a subcontractor procurement document to implement the Shoreline Planting Plan, spot spraying of invasive weeds, and decommissioning of the existing irrigation system.
- Hart Crowser will prepare a work order for Ballard to conduct the Buoy and sediment cap assessment.

Deliverables

- A draft version of the Shoreline Planting Plan was handed out to DEQ and GSI for review.

Action Item:	Person Responsible:	Deadline:

Budget Status: Out-of-scope tasks related to implementing a sediment cap sampling and analysis plan were completed in March 2014. The out-of-scope work was reviewing materials, providing materials to Dr. Anderson, and attending an all-day meeting in Corvallis to see Dr. Anderson's lab and learn about her passive sampling technology. We currently have sufficient budget to cover these additional costs. A Budget and Assumption Proposal (BAP) has been completed to address this (currently under review by DEQ), and other upcoming maintenance items that are currently out of scope. Items that will be covered in the BAP include:

- Sediment Sampling and Analysis Plan,
- Shrub planting at the turf reinforced mat/articulated concrete block interface, and
- Oversight of the Northwest Natural pipeline abandonment on, and adjacent to the site.
- 2014 Annual Report
- Routine O&M activities through February 2015

Meeting Status:

Date / Time	TBD – October 2014	
Location	McCormick & Baxter Facility	Site Office

McCormick & Baxter Operational & Functional Determination Period Status Meeting Report

Monday 10/14/2014
10:00 A.M.
6900 N. Edgewater Street
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Quarterly Progress Meeting
Facilitator:	Heidi Blischke	Note Taker:	Chris Martin
Attendees:	Scott Manzano	Project Officer	DEQ
	Sarah Miller	Capital Asset Tech	DEQ
	Chris Martin	Field Manager	Hart Crowser
	Heidi Blischke	Technical Manager	GSI

Site Status Meeting Notes

Site Walk and Inspection

Scott Manzano, Sarah Miller, Chris Martin, and Heidi Blischke completed a thorough inspection of the entire site on Tuesday, October 14, 2014. The next inspection is scheduled for January 2015.

Site Walk – Shoreline

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

- Gravel overlay on ACB.
- Buoy locations.
- Stormwater discharge.
- Willamette River and Willamette Cove shoreline conditions.
- Ebullition from sediment cap.

Gravel from the shoreline enhancement task (completed in October 2012) remains settled in the voids of the ACB armoring. Tidal fluctuations have distributed gravel from the top of the ACB, where it was originally applied, to where it has settled along the toe of the bank. Gravel has not settled into the mid-bank portion of the ACB armoring in areas where the slope is steeper.

The Willamette River at the time of inspection (between 1:00 PM and 2:00 PM) was between 2.75 and 3.25 feet COP (or 7.75 – 8.25 NAVD88). Low tide was at approximately 7:00 AM with a tide of approximately 1.75 feet COP (or 6.75 NAVD88).

There was no discharge from the outfall. The outfall is in good condition, although the discharge basin contains weeds.

The number of derelict boats anchored within Willamette Cove is approximately 6. The shoreline is relatively clean and free of debris.

Limited ebullition was observed in the area above the granular organophilic clay along the Willamette River shoreline.

Wildlife spotted along the shoreline included cormorant, Canada geese, seagulls, flicker, clam shells, and crawdads.

Site Walk – Upland

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

- Site perimeter and fence, and drainage basin.
- Subsurface drainage (manhole).
- Soil cap (burrows, erosion, etc.).
- EW-1s and MW-23d area of subsidence.

The site perimeter fence was intact, with some areas of burrowing identified (small mammal sized burrows).

No subsurface drainage was observed by opening a manhole SDMH-B as would be expected with the lack of rain in the previous weeks.

The distance between the inner and outer casing of MW-23d was 2.59 inches, similar to previous measurements indicating no ground movement.

Various birds and scat were spotted in the upland portion of the cap.

Action Items:	Person Responsible	Deadline
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Martin	Quarterly
■ Prepare Buoy replacement BAP.	Chris Martin	November 2014
■ Continue discussions with Kim Anderson regarding pore water sampling.	Scott Manzano	November 2014

Site Activities / Miscellaneous Field Activities

- Low-tide monitoring and the vegetative inspection was conducted in October 2014.
- NW Natural has decommissioned their underground line next to the site. The construction area has been cleaned up although one drum of decontamination water remains on the site.

Deliverables

- None

Action Item:	Person Responsible:	Deadline:
Hart Crowser will prepare a subcontractor procurement document to implement the Shoreline Planting Plan, spot spraying of invasive weeds, and decommissioning of the existing irrigation system.	Chris Martin	December 2014
Hart Crowser will finalize a Budget and Assumption Proposal (BAP) to complete buoy replacement and contract with Ballard to complete the work.	Chris Martin	November 2014
Hart Crowser and GSI will begin preparation of the 2014 O&M Annual Report.	Heidi Blischke	February 2014
GSI will prepare the Work Plan and SAP for Porewater sampling after receipt of Kim Anderson's scope.	Heidi Blischke	March 2014

Budget Status: August 2014 through October 2014 were at/or below the anticipated budget. A BAP will be completed to address the replacement of the missing buoy (Buoy #4).

Meeting Status:

Date / Time	TBD – January 2015	
Location	McCormick & Baxter Facility	Site Office

01/29/2014

Site Observations Form - Soil Cap
Quarterly

tbl_site_observations	
Category	**Observation**
Gate Conditions (quarterly)	All locked an04/16/2014d secure
Perimeter Fence (quarterly)	Good
Trespassers, Entry Point	None Observed
Avg. High Temp (week of observation)	47°F
Avg. Low temp (week of observation)	36°F
Wind Speed (day of observation)	Light wind 15 mph
Total Precipitation (week of observation)	0.70 inches
Erosion	
Around Manholes	None Observed
Headway Retention Pond	None Observed
Eastern Edge of Property	None Observed
Spillway Area	None Observed
Outfall Area	Fair
Animal Burrows / Disturbance	Old squirrel holes near buildings, extra ACB, and randomly throughout site
Manhole Conditions	Good
Debris, Flow, General Condition	No debris, moderate flow, approximately 10 gpm
Flow in Collection Piping	Moderate flow, approximately 10 gpm
Outfall and Spillway	
Note Approx. Flow Volume	Moderate flow, approximately 20 gpm
Sprinkler System	In place but not in use
Vegetation Conditions	Fair
Wildlife	Birds, geese
Daily Activities	Site Inspection
Obsevations or Notes	
Follow Up Inspection	☐ Yes ☒ No Date:

04/16/2014

Site Observations Form - Soil Cap
Quarterly

tbl_site_observations	
Category	**Observation**
Gate Conditions (quarterly)	All locked and secure
Perimeter Fence (quarterly)	Good
Trespassers, Entry Point	None Observed
Avg. High Temp (week of observation)	63°F
Avg. Low temp (week of observation)	44°F
Wind Speed (day of observation)	Light wind 7 mph
Total Precipitation (week of observation)	0.46 inches
Erosion	
Around Manholes	None Observed
Headway Retention Pond	None Observed
Eastern Edge of Property	None Observed
Spillway Area	None Observed
Outfall Area	Fair
Animal Burrows / Disturbance	Old squirrel holes near buildings, extra ACB, and randomly throughout site
Manhole Conditions	Good
Debris, Flow, General Condition	No debris, moderate flow, approximately 5 gpm
Flow in Collection Piping	Moderate flow, approximately 5 gpm
Outfall and Spillway	
Note Approx. Flow Volume	Moderate flow, approximately 5 to 10 gpm
Sprinkler System	In place but not in use
Vegetation Conditions	Fair
Wildlife	Osprey, geese, kingfisher, hawks
Daily Activities	Site Inspection
Obsevations or Notes	
Follow Up Inspection	☐ Yes ☒ No Date:

07/28/2014

Site Observations Form - Soil Cap
Quarterly

tbl_site_observations	
Category	**Observation**
Gate Conditions (quarterly)	All locked and in good condition.
Perimeter Fence (quarterly)	Good
Trespassers, Entry Point	None Observed
Avg. High Temp (week of observation)	90°F
Avg. Low temp (week of observation)	62°F
Wind Speed (day of observation)	Light wind 6 mph
Total Precipitation (week of observation)	0.00 inches
Erosion	
Around Manholes	None Observed
Headway Retention Pond	None Observed
Eastern Edge of Property	None Observed
Spillway Area	None Observed
Outfall Area	Fair
Animal Burrows / Disturbance	Old squirrel holes near buildings, extra ACB, and randomly throughout site
Manhole Conditions	Good
Debris, Flow, General Condition	No debris, low flow, approximately 5 gpm
Flow in Collection Piping	Low flow, approximately 5 gpm
Outfall and Spillway	
Note Approx. Flow Volume	Low flow, less than 5 gpm
Sprinkler System	In place but not in use
Vegetation Conditions	Good
Wildlife	Birds, geese, ground squirrels
Daily Activities	Site Inspection
Obsevations or Notes	
Follow Up Inspection	☐ Yes ☒ No Date:

10/14/2014

Site Observations Form - Soil Cap
Quarterly

tbl_site_observations

Category	Observation
Gate Conditions (quarterly)	All locked and in good condition.
Perimeter Fence (quarterly)	Good
Trespassers, Entry Point	None Observed
Avg. High Temp (week of observation)	66°F
Avg. Low temp (week of observation)	53°F
Wind Speed (day of observation)	Light wind 8 mph
Total Precipitation (week of observation)	0.85 inches
Erosion	
Around Manholes	None Observed
Headway Retention Pond	None Observed
Eastern Edge of Property	None Observed
Spillway Area	None Observed
Outfall Area	Fair
Animal Burrows / Disturbance	Old squirrel holes near buildings, extra ACB, and randomly throughout site
Manhole Conditions	Good
Debris, Flow, General Condition	No debris, no flow
Flow in Collection Piping	No flow
Outfall and Spillway	
Note Approx. Flow Volume	No flow
Sprinkler System	In place but not in use
Vegetation Conditions	Good
Wildlife	Birds, geese,
Daily Activities	Site Inspection
Obsevations or Notes	
Follow Up Inspection	☐ Yes ☒ No Date:

1/29/2014

Site Observations Form - Sediment Cap
Quarterly

tbl_site_observations

Category	Observation
Gate Conditions (quarterly)	All locked and secure.
Avg. High Temp (week of observation)	47°F
Avg. Low Temp (week of observation)	36°F
Wind Speed (day of observation)	Light wind 15 mph
Total Precipitation (week of observation)	0.70 inches
Sheen Observations (see table below)	None Observed
Size and Location	None Observed
Source (gas bubble, debris, etc.)	None Observed
ACB and Riprap Armoring	Good
Changes in Location	Good
Displaced blocks	Good
Vandalism	None Observed
River relative to top of ACB	20 to 40 plus feet (~5 feet NAVD88)
Organoclay Mats (extreme low water)	None Observed
Edges of mats visible?	None Observed
Overlying Armoring conditions	Good
Evidence of movement?	None Observed
WC OC/Seep Area	Good
TFA OC/Seep Area	Good
Wildlife	
Fish / Crayfish / Clams	Clams
Other	Birds
Warning Signs Condition	Good
Buoy Condition / Location	Four of the five buoys visible and in good condition, Buoy #4 missing
Cove Shoreline (general)	Good
FWDA Shoreline (general)	Good
Bulkhead Shoreline (general)	Good
TFA Shoreline (general)	Good
Observations or Notes	
Follow Up Inspection	☐ Yes ☒ No Date:

Sheen Description

Location (TFA, FWDA, Willamette Cove) indicate if located on map and attach map	Character (NS, BS, SS, MS, HS)	Size and dimension (inches)	Odor (no odor, petroleum odor. creosote odor, other odor)

04/16/2014

Site Observations Form - Sediment Cap
Quarterly

tbl_site_observations

Category	Observation
Gate Conditions (quarterly)	All locked and secure
Avg. High Temp (week of observation)	63°F
Avg. Low Temp (week of observation)	44°F
Wind Speed (day of observation)	Light wind 7 mph
Total Precipitation (week of observation)	0.46 inches
Sheen Observations (see table below)	None Observed
Size and Location	None Observed
Source (gas bubble, debris, etc.)	None Observed
ACB and Riprap Armoring	Good
Changes in Location	Good
Displaced blocks	Good
Vandalism	None Observed
River relative to top of ACB	20 to 40 plus feet (~7 feet NAVD88)
Organoclay Mats (extreme low water)	None Observed
Edges of mats visible?	None Observed
Overlying Armoring conditions	Good
Evidence of movement?	None Observed
WC OC/Seep Area	Good
TFA OC/Seep Area	Good
Wildlife	
Fish / Crayfish / Clams	Clams
Other	Birds
Warning Signs Condition	Good
Buoy Condition / Location	Four of the five buoys visible and in good condition, Buoy #4 is missing
Cove Shoreline (general)	Good
FWDA Shoreline (general)	Good
Bulkhead Shoreline (general)	Good
TFA Shoreline (general)	Good
Observations or Notes	
Follow Up Inspection	☐ Yes ☒ No Date:

Sheen Description

Location (TFA, FWDA, Willamette Cove) indicate if located on map and attach map	Character (NS, BS, SS, MS, HS)	Size and dimension (inches)	Odor (no odor, petroleum odor. creosote odor, other odor)

07/28/2014

Site Observations Form - Sediment Cap
Quarterly

tbl_site_observations

Category	Observation
Gate Conditions (quarterly)	All locked and secure
Avg. High Temp (week of observation)	90°F
Avg. Low Temp (week of observation)	62°F
Wind Speed (day of observation)	Light wind 6 mph
Total Precipitation (week of observation)	0.00 inches
Sheen Observations (see table below)	None Observed
Size and Location	None Observed
Source (gas bubble, debris, etc.)	Ebulation observed in areas above granular oganophilic clay.
ACB and Riprap Armoring	Good
Changes in Location	Good
Displaced blocks	Good
Vandalism	None Observed
River relative to top of ACB	20 to 40 plus feet (~4-5 feet NAVD)
Organoclay Mats (extreme low water)	None Observed
Edges of mats visible?	None Observed
Overlying Armoring conditions	Good
Evidence of movement?	None Observed
WC OC/Seep Area	Good
TFA OC/Seep Area	Good
Wildlife	
Fish / Crayfish / Clams	Crayfish
Other	Birds
Warning Signs Condition	Good
Buoy Condition / Location	Four of the five buoys in place and in good condition, Buoy #4 is missing
Cove Shoreline (general)	Good
FWDA Shoreline (general)	Good
Bulkhead Shoreline (general)	Good
TFA Shoreline (general)	Good
Observations or Notes	
Follow Up Inspection	☐ Yes ☒ No Date:

Sheen Description

Location (TFA, FWDA, Willamette Cove) indicate if located on map and attach map	Character (NS, BS, SS, MS, HS)	Size and dimension (inches)	Odor (no odor, petroleum odor. creosote odor, other odor)

10/14/2014

Site Observations Form - Sediment Cap
Quarterly

tbl_site_observations

Category	Observation
Gate Conditions (quarterly)	All locked and secure
Avg. High Temp (week of observation)	66°F
Avg. Low Temp (week of observation)	53°F
Wind Speed (day of observation)	Light wind 8 mph
Total Precipitation (week of observation)	0.85 inches
Sheen Observations (see table below)	None Observed
Size and Location	None Observed
Source (gas bubble, debris, etc.)	Ebulation observed in areas above granular oganophilic clay.
ACB and Riprap Armoring	Good
Changes in Location	Good
Displaced blocks	Good
Vandalism	None Observed
River relative to top of ACB	20 to 40 plus feet. (3 feet NAVD)
Organoclay Mats (extreme low water)	None Observed
Edges of mats visible?	None Observed
Overlying Armoring conditions	Good
Evidence of movement?	None Observed
WC OC/Seep Area	Good
TFA OC/Seep Area	Good
Wildlife	
Fish / Crayfish / Clams	Crayfish and Clams
Other	Birds
Warning Signs Condition	Good
Buoy Condition / Location	Four of the five buoys in place and in good condition, Buoy #4 is missing
Cove Shoreline (general)	Good
FWDA Shoreline (general)	Good
Bulkhead Shoreline (general)	Good
TFA Shoreline (general)	Good
Observations or Notes	
Follow Up Inspection	☐ Yes ☒ No Date:

Sheen Description

Location (TFA, FWDA, Willamette Cove) indicate if located on map and attach map	Character (NS, BS, SS, MS, HS)	Size and dimension (inches)	Odor (no odor, petroleum odor. creosote odor, other odor)

NW Natural
220 NW 2ND AVENUE
PORTLAND, OR 97209
TEL 503.226.4211
www.nwnatural.com

16-Inch Pipeline Abandonment – Post Construction Report

6900 N. Edgewater Avenue
Portland, Oregon

1/22/2015
NW Natural

Prepared for:

Oregon DEQ
Scott Manzano
2020 SW 4th Avenue, Suite 400
Portland, OR 97201

EPA
Richard Muza
805 SW Broadway #500
Portland, OR 97205

Prepared by:
John McDonald
Environmental Specialist

NW Natural
220 NW Second Avenue
Portland, Oregon 97209
503-226-4211 ext.4342

Table of Contents

Appendices

1.0 Introduction

NW Natural is a local gas distribution company that operates in Oregon and Washington. This post construction report is being written to complete the requirements from the EPA/ DEQ Site Administrator to use the McCormick & Baxter Superfund Site as a construction staging and access area.

Due to the unique topography and railroad infrastructure of the construction location the McCormick & Baxter site presents itself as the only area where construction staging was feasible. The construction work was part of a Pipeline and Hazardous Materials Safety Administration (PHMSA) mandate to remove all steel pipe from our gas pipeline system.

2.0 Project Description and Timeframe

NW Natural abandoned approximately 600 feet of a 16-inch steel high pressure gas line which existed in the Burlington Northern Santa Fe (BNSF) Railroad right-of-way. The gas line abandonment procedure included cutting and capping both ends of the line and filling the entire length of the steel pipe with concrete slurry. This is a stub bare main that formerly supplied the McCormick & Baxter site, but was no longer in use and scheduled for abandonment. Immediately adjacent to this gas line and easement is the McCormick & Baxter Superfund Site. To abandon the gas line two excavation pits were dug to access each end of the pipeline. Excavation #1 was located within the Union Pacific right-of-way and outside of the McCormick & Baxter property. Excavation #2 is located within the McCormick & Baxter site where site access was necessary.

The construction phase of this project began September 11th, 2014 and was completed on November 24th, 2014. The first month of the project involved excavation and pipe work. The remainder of the time involved site restoration and spoils/ IDW removal.

2.1 Construction Activities

Following the preparation of the site, construction activities began by mobilizing the necessary equipment into the work zone areas. Equipment consisted of an excavator, a backhoe, a limited number of dump trucks, and additional support vehicles (i.e. supply trucks, welding vehicles). Thirty feet of fencing from the McCormick & Baxter property was temporarily removed to make room for excavation #2. During construction temporary fencing was in place to ensure site security.

All removed soils from Excavation #1, Union Pacific Railroad right-of-way, was directly loaded to dump trucks and disposed of at a RCRA subtitle D non-hazardous waste disposal facility in accordance with a permit secured prior to initiating the work. All removed soils from Excavation #2 which were generated from the McCormick and Baxter site was segregated and stockpiled onsite. Soil piles were staged on plastic and covered with plastic. Soil segregation was based on the approximate depth of the "clean" fill engineered cap (approximately 3-feet bgs) and visual confirmation of any subsurface demarcation features (i.e. orange construction fencing) previously placed during remedial actions. Any clean fill removed from the Excavation #2 engineered cap were segregated and re-used to ensure surficial backfill materials that are consistent and homogenous with the existing engineered cap. Subsurface materials (below three feet or the demarcation boundary) were segregated to a physically separated area from the clean fill such that comingling of soil materials was not possible. Excavation spoils generated from the McCormick & Baxter property amounted to 15 cubic yards of clean cap spoils and 15 yards of spoils from sub-soils below clean cap. Once gas pipe work was completed excavation materials were backfilled into excavation pit in the order that they were removed. The engineered liner was replaced at the same depth of the existing demarcation liner found at the McCormick & Baxter site.

Following the completion of the abandonment process all shoring equipment was removed from the ground. The previously segregated subsurface soils were re-used as subsurface backfill below the demarcation boundary, as these soils were shown to have low levels of contamination which would not adversely affect the current risk assessment status of the site or create any additional human health or environmental risks. Subsurface soils were placed in controlled lifts and compacted as appropriate to ensure stability. Upon reaching the demarcation boundary or a depth of three feet NW Natural replaced the demarcation materials with like kind and quality, and then proceeded by backfilling the upper three feet with the segregated engineered capping material.

2.2 Post-Construction Activities

At the time of construction completion NW Natural restored construction area to its pre-construction grading and re-vegetated the area with native grass seed mix. The 30 feet of removed fencing was re-installed with new fencing to match pre-existing conditions. The two piezometers installed on May 15, 2014 during the environmental investigation were later decommissioned on October 31, 2014. The Investigation-Derived Wastes (IDW) generated from the drilling activities were drummed up and sent to a RCRA subtitle C hazardous waste disposal facility based on the listed waste codes associated with the McCormick & Baxter Superfund Site.

Appendix 1: Site Photographs

Photo 1: Looking south, near proposed excavation #1, at McCormick & Baxter Northern Gate. Soil waste drums (on left) from piezometer abandonment have since been hauled off.

Photo 2: Looking south, near excavation #2. Notice fence and site conditions have been restored to pre-construction conditions.

Photo 3: Photo, near excavation #2, of mowed grass area where haul road existed during construction.

Appendix 2: Waste Manifests

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
[illegible]	1	800 [illegible]	007660728 FLE

5. Generator's Name and Mailing Address

NW Natural Gas-McCormick/Baxter Site
220 NW Second Ave
Portland, OR 97209

Generator's Phone: [illegible]

Generator's Site Address (if different than mailing address)

6900 N Edgewater Ave
Portland, OR 97203

6. Transporter 1 Company Name

Waste Watch, Inc

U.S. EPA ID Number: [illegible]

7. Transporter 2 Company Name

U.S. EPA ID Number:

8. Designated Facility Name and Site Address

US Ecology Idaho, Inc
20400 Lemley Rd
Grand View, ID 83624

Facility's Phone: [illegible]

U.S. EPA ID Number: IDD073114654

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
X	1. UN3082, Waste Environmentally hazardous substances, liquid, n.o.s. (pentachlorophenol), 9, PGIII	2	DM	85	G	F032
X	2. UN3077, Waste Environmentally hazardous substances, solid, n.o.s. (pentachlorophenol), 9, PGIII	2	DM	700	P	F032
	3.					
	4.					

14. Special Handling Instructions and Additional Information

a) [illegible], ERG 171 b) [illegible], ERG 171
[illegible]

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name | Signature | Month Day Year

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit: ____

Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name | Signature | Month Day Year

Transporter 2 Printed/Typed Name | Signature | Month Day Year

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) | U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) | Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name | Signature | Month Day Year

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

GENERATOR'S INITIAL COPY

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) 141120878Z

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
ORQ000034368	1	800-548-1513	007660728 FLE

GENERATOR

5. Generator's Name and Mailing Address
NW Natural Gas-McCormic/Baxter Site
220 NW Second Ave
Portland, OR 97209
Generator's Phone: 503 226-4211

Generator's Site Address (if different than mailing address)
6900 N Edgewater Ave.
Portland, OR 97203

6. Transporter 1 Company Name
Waste Watch, Inc.
U.S. EPA ID Number
ORQ000056221

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
US Ecology Idaho, Inc.
20400 Lemley Rd
Grand View, ID 83624
Facility's Phone: 800-274-1516
U.S. EPA ID Number
IDD073114654

9a. HM	9b. U.S. DOT Description (Including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
X	1. UN3082, Waste Environmentally hazardous substances, liquid, n.o.s., (pentachlorophenol), 9, PGIII	2 X (VR)	DM	85	G	F032
X	2. UN3077, Waste Environmentally hazardous substances, solid, n.o.s., (pentachlorophenol), 9, PGIII	2	DM	700	P	F032
	3.					
	4.					

14. Special Handling Instructions and Additional Information
a) USEI34493, ERG 171 b) USEI34898, ERG 171
JB 06370

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: John D. McDonald
Signature: John D. McDonald
Month: 11 Day: 24 Year: 14

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Tim Ferrick
Signature: Tim Ferrick
Month: 11 Day: 24 Year: 14

Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month: Day: Year:

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.
H132	H132		

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name: Arthur Rodriguez
Signature: Arthur Rodriguez
Month: 11 Day: 25 Year: 14

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

US Ecology, Inc. Land Disposal Restriction Form

US Ecology, Inc.

COPY

GENERATOR: NW Natural Gas-McCormic/Baxter Site EPA I.D. NUMBER: ORQ000034368

WASTE STREAM or PROFILE NUMBER: 34493 MANIFEST DOC. NO. 007660728FLE LINE NO. 1

WASTE IS A: ☐ WASTEWATER ☒ NON-WASTEWATER ☐ DEBRIS

NOTIFICATION FREQUENCY: ☐ ONE TIME ☐ REQUIRED WITH EACH SHIPMENT

EPA WASTE CODES (from 40 CFR 268.40) F032 _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____ _____

UHC's (Underlying Hazardous Constituents 40 CFR 268.48)? ☒ No ☐ Yes - List: _____

A. ☐ **Restricted Waste Meets Treatment Standards (40 CFR 268.7(a) (3))**

The restricted waste identified above meets the treatment standards in 40 CFR 268.40 or **Alternative LDR treatment standards for contaminated soil 40CFR268.49** and can be landfill disposed without further treatment. I have attached all supporting analytical data, where available.

I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

B. ☐ **Restricted Waste Treated To Treatment Standards (40 CFR 268.7(b) (I) & 268.7 (b) (2))**

The treatment residue, or extract of such residue, or the restricted waste identified above has been tested to assure that the treatment residues or extract meet all applicable treatment standards in 40 CFR 268.40 and/or performance standards in 40 CFR 268.45. I have attached all supporting analytical data, where available.

I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

C. ☐ **Restricted Waste With Technology Based Treatment Standards (40 CFR 268.7(b) (4))**

I certify under penalty of law that I personally have examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and that based on my inquiry of those individuals immediately responsible for obtaining this information. I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40, without impermissible dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

D. ☐ **Restricted Waste Decharacterized But Requires Treatment For UHC (40 CFR 268.9)**

I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic. This decharacterized waste contains Underlying Hazardous Constituents (UHC) that require further treatment to meet the universal treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

E. ☒ **Restricted Waste Subject To Treatment (40 CFR 268.7(a) (2))**

The restricted waste identified above must be treated to the applicable treatment standards in 40 CFR 268.40, or treated to comply with applicable prohibitions set forth in Part 268.32 or RCRA Section 3004(d). I have attached all supporting analytical data, where available.

F. ☐ **Hazardous Debris Subject To Treatment (40 CFR 268.45)**

This hazardous debris identified above must be treated to the alternative treatment standards in 40 CFR 268.45.

G. ☐ **Restricted Waste Subject To A Variance or Extension (40 CFR 268.7(a) (4))**

This restricted waste identified above is subject to a case by case exemption under 40 CFR 268.5, an exemption under 40 CFR 268.6 or a nationwide capacity variance under Subpart C of 40 CFR 268, and is not prohibited from land disposal. LDR prohibitions become effective on _____ (date) for this restricted waste. The corresponding treatment standard(s) are promulgated in 40 CFR 268.40. I have attached all supporting analytical data, where available.

H. ☐ **Restricted Waste Managed In A "Lab Pack" (40 CFR 268.7(a) (9))**

I certify under penalty of law that I personally have examined and am familiar with the waste and that the lab pack contains only waste that have been excluded under appendix IV to 40 CFR Part 268 and that this lab pack will be sent to a combustion facility in compliance with the alternative treatment standards for lab packs at 40 CFR 268.42(c). I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

I certify and warrant that the information that appears on this form, and appended documents, is true and correct. I have correctly indicated how my waste is to be managed in accordance with 40 CFR 268. My certification is based on personal examination of the information submitted, or is based on my inquiries of those individuals responsible for obtaining the information.

Authorized Signature _____ **Title** _____ **Date** _____

UHC list from 40 CFR Part 268.48 available upon request

US Ecology, Inc. Land Disposal Restriction Form

US Ecology, Inc. COPY

GENERATOR: NW Natural Gas-McCormic/Baxter Site EPA I.D. NUMBER: ORQ000034368

WASTE STREAM or PROFILE NUMBER: 34898 MANIFEST DOC. NO. 007660728FLE LINE NO. 2

WASTE IS A: ☐ WASTEWATER ☒ NON-WASTEWATER ☐ DEBRIS

NOTIFICATION FREQUENCY: ☐ ONE TIME ☐ REQUIRED WITH EACH SHIPMENT

EPA WASTE CODES (from 40 CFR 268.40) F032 _____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____ _____

UHC's (Underlying Hazardous Constituents 40 CFR 268.48)? ☒ No ☐ Yes - List: _____

A. ☐ **Restricted Waste Meets Treatment Standards (40 CFR 268.7(a) (3))**

The restricted waste identified above meets the treatment standards in 40 CFR 268.40 or Alternative LDR treatment standards for contaminated soil 40CFR268.49 and can be landfill disposed without further treatment. I have attached all supporting analytical data, where available.

I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

B. ☐ **Restricted Waste Treated To Treatment Standards (40 CFR 268.7(b) (I) & 268.7 (b) (2))**

The treatment residue, or extract of such residue, or the restricted waste identified above has been tested to assure that the treatment residues or extract meet all applicable treatment standards in 40 CFR 268.40 and/or performance standards in 40 CFR 268.45. I have attached all supporting analytical data, where available.

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I certify under penalty of law that I personally have examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and that based on my inquiry of those individuals immediately responsible for obtaining this information. I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40, without impermissible dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

D. ☐ **Restricted Waste Decharacterized But Requires Treatment For UHC (40 CFR 268.9)**

I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic. This decharacterized waste contains Underlying Hazardous Constituents (UHC) that require further treatment to meet the universal treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

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H. ☐ **Restricted Waste Managed In A "Lab Pack" (40 CFR 268.7(a) (9))**

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I certify and warrant that the information that appears on this form, and appended documents, is true and correct. I have correctly indicated how my waste is to be managed in accordance with 40 CFR 268. My certification is based on personal examination of the information submitted, or is based on my inquiries of those individuals responsible for obtaining the information.

Authorized Signature _____ **Title** _____ **Date** _____

UHC list from 40 CFR Part 268.48 available upon request

APPENDIX C
Photograph Log – Vegetation Observations

Photograph 1 – Slightly larger than typical burrow observed in the earthen cap area. (April 2014)

Photograph 2 – Earthen cap and drainage swale in the foreground with the impermeable cap in the background. Taken looking south from Photograph Location 1 comparing baseline and current conditions. (Left - June 2011, Right – June 2014)

Photograph 3 - Tree and shrub plantings on the earthen cap continue to spread. Taken looking southeast from Photograph Location 2. (June 2014)

Photograph 4 – Eastern edge of the earthen cap with perimeter road in foreground. Taken looking west from Photograph Location 3. (June 2014)

Photograph 5 – Stormwater pond scarcely vegetated although willow and alder continue to survive. Taken looking northeast from Photograph Location 4 comparing baseline and current conditions. (Left - June 2011, Right – June 2014)

Photograph 6 – Tree plantings on the earthen cap. Taken looking northwest from Photograph Location 5. (June 2014).

Photograph 7 – Impermeable cap dominated by grasses and herbaceous vegetation. Baseline photograph on the left taken looking east from Photograph Location 6 (June – 2011). Current conditions (Right – June 2014) show skeletonweed established on the impermeable cap.

Photograph 8 – Vegetation growth and wood debris within the lower riparian component. Taken looking southeast from Photograph Location 7 comparing baseline and current conditions. (Left - September 2011, Right – June 2014)

Photograph 9 – Upper riparian component with native trees and shrubs performing well. Taken looking southwest from Photograph Location 8. (June 2014)

Photograph 10 – Lower riparian component with large wood debris along the edge. Taken looking northwest from Photograph Location 9 comparing baseline and current conditions. (Left - June 2011, Right – June 2014)