Operation and Maintenance Report
January 2013 to December 2013
McCormick and Baxter
Superfund Site
Portland, Oregon

Prepared for
Oregon Department of
Environmental Quality

April 9, 2014
15670-10/Task 4

GSI Water Solutions, Inc.

HARTCROWSER

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ACRONYMS AND ABBREVIATIONS

ACB	articulated concrete block
ACLs	alternate concentration limits
AWQC	ambient water quality criteria
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.
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
ng/L	nanograms per liter
O&M	Operation and Maintenance
PAH	polycyclic aromatic hydrocarbons
PCP	pentachlorophenol
RCRA	Resource Conservation and Recovery Act
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

OPERATION AND MAINTENANCE REPORT
JANUARY 2013 THROUGH DECEMBER 2013
MCCORMICK & BAXTER SUPERFUND SITE

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, 2013, and December 31, 2013.

O&M activities are identified in the Draft O&M Plan (DEQ/US Environmental Protection Agency [EPA] 2013), prepared by the DEQ and EPA. The Draft 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] 2010a) 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 scope and frequency of O&M activities conducted at the site were reduced in 2011, compared to activities conducted between 2005 and 2010. The 2013 Draft O&M Plan reflects the reduction in monitoring requirements.

The purpose of this O&M Report is to document the operation, monitoring, and maintenance activities that occurred in calendar year 2013. 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 soil cap O&M performance standards and activities are provided in Section 2, the sediment cap O&M performance standards and activities are provided 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 2014. 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. Hard copies of the O&M Report have been provided to the DEQ along with electronic documents on digital video disc (DVD).

Routine operation, monitoring, and maintenance activities in 2013 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 the following Hart Crowser subcontractors:

- Pacific Soil and Water, wellhead repair
- Instrumentation Northwest, data logger repair
- Native Ecosystems Northwest, Inc., noxious weed control
- Huser Sales and Service, fire extinguisher maintenance
- All Seasons Backflow, backflow testing of fire hydrant piping

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 PERFORMACE 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, 2013, through December 31, 2013, and a summary of remedy performance as related to the performance standards. The Draft O&M Plan (DEQ/EPA 2013) provides a description of the remedial action objectives and the soil operable unit remedy. Table 2-1 provides the soil cap activities conducted in 2013.

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 (NOAA 2004).

2.2 Soil Cap Observations

Site observations were conducted according to the Draft O&M Plan (DEQ/EPA 2013). As directed by the DEQ, the inspection frequency was reduced from monthly to quarterly in April 2010. Three site inspections were conducted in 2013 (March, June, and October) by the DEQ and HC/GSI. This was deemed sufficient because of the consistent conditions at the site. 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 2013 was kept and is included in Appendix B.

2.2.1 Visual Inspection

The upland soil cap provides habitat for rabbits, ground squirrels, Canada geese, 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 routinely and are not of major concern (Photograph 1, Appendix A).

Evidence of ground squirrel activity was observed at several locations south of the site trailers and in various areas throughout the upland soil cap (Photograph 2, Appendix A). 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. There are no indications that any of these burrows extend below the depth of the 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 chain, provides access for two railroads, 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 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 degrees Celsius [°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 oxygen from reaching the unsaturated zone. Since the well was sealed, the subsidence has slowed and in the past few years has become insignificant. The temperature dropped to approximately 23°C and has remained stable for the past 3 years. 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 casing at well MW-23d relative to the outer casing of the well. The inner casing extends to 182 feet bgs and, therefore, 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 was no change in distance as measured in 2012, and a decrease of 0.06 inch was measured in October 2013 (representing a decrease in the distance measured between the inner and outer casing from 2.56 to 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 three times during 2013 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

Soil cap maintenance activities were limited to a non-routine fence repair. A segment of the site perimeter fence, parallel to the Union Pacific Railroad tracks, was repaired in September 2013. A tension wire that runs along the bottom of the fence had broken and allowed the fence to stretch, creating a gap along the bottom of the fence approximately 1 foot high. No signs of foul play or entry

were observed. West-Meyer Fence of Portland, Oregon, was contacted to make the fence repairs (Photograph 8, Appendix A).

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. A Draft O&M Plan with descriptions of O&M activities and schedule for the next 5 years was prepared by the DEQ with assistance from the EPA, GSI, and Hart Crowser (DEQ/EPA 2013). Initial planning to decommission nonessential and obsolete equipment, including the irrigation system, began in 2012 and will continue in 2014.

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 2014 via a transducer in EW-1s that measures temperature and water level; by taking inner and outer casing measurements at well MW-23d; and by monitoring stormwater flow at the outfall during quarterly inspections.

3.0 SEDIMENT CAP PERFORMANCE STANDARDS AND ACTIVITIES

This section summarizes sediment cap observation and maintenance activities for the reporting period January 1, 2013, through December 31, 2013. Site observations and maintenance activities were conducted according to the Draft O&M Plan (DEQ/EPA 2013). As directed by the DEQ, the frequency of inspections was reduced from monthly to quarterly in April 2010. Soil and sediment cap inspections were conducted in March, June, and October 2013 by the DEQ and HC/GSI. 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 2013.

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 three times in 2013 in conjunction with three 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 2013. Limited ebullition was observed primarily within the two areas of the sediment cap where granular organophilic clay is present. This relatively low ebullition rate was also observed during the October 2013 site visit when the Willamette River was at its seasonal low.

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 tidal fluctuations 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 2013; however, some has washed down steeper shorelines and has settled onto lower ACB surfaces, as expected. 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 placed during high river-stage events. The amount of woody debris at the site appears to remain 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 also were 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 2013. The highest Willamette River stage occurred in May 2013 and reached 15 feet NAVD88.

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 2013.

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

3.2.2 Vandalism and Trespassing

The shoreline along the site and in Willamette Cove is accessible and is often used by the public for various forms of recreation. Throughout 2013, various amounts of shoreline trash and graffiti were observed.

Numerous dilapidated boats (used as dwellings) were seen beached in Willamette Cove during every site visit (Photograph 15, Appendix A). No visible effects on 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 buoys warn boaters of the danger of the sediment cap. All buoys were in place and visible in 2013.

3.3 Sediment Cap Maintenance Activities

Sediment cap maintenance activities were minimal, but included cutting exposed ACB cables and removing a creosote-treated telephone pole that washed onto the shoreline.

Cable loops used to install and adjoin ACB armoring sheets were observed sticking out of the armoring (Photograph 16, Appendix A). 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.

A creosote-treated telephone pole washed onto the shore (Photograph 17, Appendix A) and was removed from the shoreline, cut into manageable lengths, and staged (wrapped in plastic) in the site staging area. Trashco Services properly disposed of the pole in early 2014 at a Subtitle D landfill.

An excess roll of organophilic clay reactive core mat has remained in storage at the site since the construction of the sediment cap in 2005. The roll was donated to the City of Portland for a shoreline capping project (South Waterfront ECSI #5277), constructed approximately 5 miles up the Willamette River in September 2013.

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. Porewater and surface water sampling is scheduled to be conducted in 2015, before the 2016 Fourth Five-Year Review Report. The sampling approach is provided as an Appendix to the Draft O&M Plan (DEQ/EPA 2013). Details regarding the sampling will be developed in 2014 and will include 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. Wildlife commonly seen include Canada geese, blue herons, osprey, crawfish, squirrels, and rabbits; evidence of coyotes has been observed. The public frequents the shoreline for recreation, most commonly for walking dogs. Infrequent and minor instances of vandalism and littering have been noted. Habitat 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

Sections 4.1 and 4.2 present the performance standards and the groundwater and NAPL O&M activities and observations. Section 4.3 presents maintenance activities performed on transducers and monitoring wells related to the groundwater remedy. A discussion of the barrier wall and groundwater remedy performance is provided in Section 4.4.

4.1 Groundwater Performance Standards

The groundwater remedy consists of groundwater monitoring, NAPL recovery, a subsurface barrier wall surrounding approximately 18 acres within the upland soil cap, and ICs. ICs have not been 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 does not pose a threat to the Willamette River and its sediment.

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, PAHs, and

NAPL 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 indicated 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 2016. After new groundwater cleanup goals are established in a ROD Amendment, the Draft O&M Plan (DEQ/EPA 2013) will be revised to reflect the new cleanup goals.

4.2 Groundwater Observations

Manual NAPL and groundwater level data were collected during the site-wide semiannual monitoring events conducted on June 27, 2013, and September 19,

2013; continuous water levels were also collected from selected monitoring wells. The current monitoring well network is shown on Figure 4-1. The groundwater monitoring and NAPL results are presented in Section 4.2.1 and Section 4.2.3 of this report, respectively.

4.2.1 Groundwater Flow Direction and Gradient Assessment

This section summarizes groundwater flow based on the 2013 water level measurements.

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 (Figures 4-2 and 4-3, respectively). The groundwater and NAPL elevation data are included in Tables 4-1 (June 27, 2013) and 4-2 (September 19, 2013).

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 Willamette Cove. When the Willamette River reaches peak stage (more than about 15 feet NAVD88), which typically occurs in June each year, it partially reverses gradient within the northwest corner of the barrier wall. This is because of the deep hydraulic connection through sand at the base of the wall and the change in hydraulic head caused by the high river level. In June 2013 (Figure 4-2), the Willamette River stage was lower than normal so this partial reversal of gradient was not observed within the barrier wall and the groundwater conditions were similar to those observed throughout the remainder of 2013.

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 Figures 4-2 and 4-3 and include two shallow and deep paired well clusters (MW-36s/37s, MW-36d/37s, 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 sets, river stage elevation[1], and precipitation data[2]. The hydrographs show water levels in wells through the September 19, 2013, semiannual monitoring event. Water level data beyond this date will be included in the 2014 Annual Report.

The hydrographs document groundwater elevation level differences and assess barrier wall performance over time.

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. 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.

The muted or nonexistent response of the 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. In contrast to the muted response of well MW-36s to changes in daily river stage elevation, water levels in the shallow interior wells MW-44s and EW-1s (Figures 4-10, 4-11, 4-6, and 4-7, respectively) are virtually non-responsive to the tidal changes in Willamette River stage. 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 amount of infiltration is minimal. Between the

[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).

barrier wall and the river, precipitation inputs are vastly overshadowed by the response of groundwater to variations in river stage. The shallow zone upgradient or cross-gradient from the barrier wall appears to react subtly to precipitation and is less connected to the river because of its distance from the river and the presence of the barrier wall, which is sealed into the underlying silt. One location where infiltration may influence groundwater elevation and flow path is in the retention pond (Figure 1-3) that receives diverted runoff from the soil cap. Historical water level data indicate 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 the vertical gradient measured in 2008 through 2012. The net downward gradient is greater inside the barrier wall (MW-36/37 and MW-44/45 clusters) 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 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 between April and July 2013. The vertical gradients in 2013 were comparable (in both direction and magnitude) to the gradients observed in 2008 through 2012.

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 low-tide monitoring events.

NAPL was 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 2013. 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 2013 monitoring events, respectively. Tables 4-2 and 4-3 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. 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.

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 2013, measureable quantities of NAPL were observed in four wells (EW-10s [LNAPL], MW-20i [DNAPL], MW-Ds [DNAPL], and MW-Gs [DNAPL]). As shown on Figures 4-14 through 4-17, the LNAPL thickness in well EW-10s and DNAPL thickness in wells MW-20i, MW-Ds, and MW-Gs measured in 2013 are consistent with the stable or decreasing trends observed 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.

Inside the Barrier Wall

During semiannual monitoring, measurable LNAPL was present in four wells within the barrier wall: EW-15s, EW-23s, MW-10r[3], and MW-56s. Figures 4-18 through 4-20 show the elevation of LNAPL and shallow groundwater in wells EW-15s, EW-23s, and MW-56s versus time, 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 is consistent from mid-2006 through the end of 2013 because LNAPL was not recovered inside of

[3] During the June 27, 2013, semiannual monitoring event, monitoring well MW-10r had an LNAPL thickness of 0.4 foot. Despite the appearance of 0.2 feet of LNAPL in June 2012, LNAPL has not been observed in this well since March 2009. LNAPL was not observed in the September 2012 semiannual monitoring event and trace NAPL was observed during the September 2013 semiannual monitoring event. An NAPL thickness figure has not been prepared for well MW-10r because of the limited appearance of LNAPL in this well.

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 is consistent or decreasing.

DNAPL was detected during the 2012 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.

The DNAPL thickness in well EW-1s (Figure 4-21) has been increasing slowly to a thickness of approximately 7 feet since mid-2011, after termination of a temporary recovery period[4] in April 2011. As shown on Figure 4-22, the DNAPL in well MW-22i continues to be approximately 6 feet thick; however, historically, these measurements have been shown through extraction to be triggered by the presence of floating pin-sized globules of DNAPL and not a 6-foot-thick layer of pure DNAPL. The DNAPL thickness has been stable and has settled in the sump of wells EW-8s and EW-18s since 2012, as shown on Figures 4-23 and 4-24.

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 and General Upland Maintenance Activities

Table 4-3 provides the groundwater and general upland O&M activities and maintenance conducted in 2013. Maintenance activities included City of Portland fire code inspection and a backflow prevention device inspection. Additional maintenance activities included alarm system upgrades and well monument and fence repairs. In addition to activities performed by Hart Crowser, maintenance activities also were performed by Instrumentation Northwest, Native Ecosystems Northwest, Huser Sales and Services, West-Meyer Fence, and Pacific Soil and Water. The following section discusses the groundwater maintenance and general upland maintenance tasks performed in 2013. Site support services, such as phone, alarm, solid waste, and wastewater were provided by Century Link, Phillips, Trashco Services, and Schulz-Clearwater Sanitation, respectively.

[4] DNAPL extraction from this well was initiated in 2009 to reduce the potential for vertical mobility resulting from decreased NAPL viscosity caused by high subterraneous temperatures (35 to 40 °C) in this area. In May 2009, this well was sealed to prevent oxygen from reaching the unsaturated zone and feeding aerobic degradation. The temperature decreased to approximately 25°C within a year and has remained between 23°C and 25°C in 2013. While the groundwater temperature at EW-1s is still elevated relative to groundwater from other site wells, it is well below the temperature observed when active aerobic degradation was resulting in ground subsidence, suggesting that the well seal continues to reduce the amount of oxygen reaching the subsurface.

Groundwater Remedy Maintenance Activities: Transducer data loggers were inspected in 2013 during low-tide monitoring events. The transducer in well MW-37d was removed on June 27, 2013, and sent to Instrumentation Northwest of Kirkland, Washington, for maintenance. At that time, a replacement transducer was installed in MW-37d to continue monitoring water levels. During the September low-tide monitoring event, it was discovered that the transducer in EW-1s was not functioning properly; the transducer was removed and sent to Instrumentation Northwest for maintenance. The transducer temporarily placed into MW-37d was removed and placed into EW-1s at that time.

The gravel surface around monitoring wells, MW-58s, MW-58i, and MW-58d had been slowly eroding away and was beginning to undercut the concrete surface seal of each of the wells. To protect the integrity of the wells, the well monuments were replaced, and the ground surface leveled. The MW-58 well cluster is located on a gravel access path located on a steep slope adjacent to the Burlington Northern Railroad north of the site (Figure 2-1). Hart Crowser staff met with a licensed drilling crew from Pacific Soil and Water of Tigard, Oregon, on October 9, 2013, to repair the monuments. The monuments and concrete surface seal were removed without making adjustments to the monitoring well casings. New concrete surface seals were constructed to 2 feet bgs over each of the three wells, and new steel flush-mounted well monuments were installed. The ground surface surrounding each of the monuments was re-graded and additional gravel placed to slow future erosion around the monuments. Erosion in the area is unavoidable due to the steep slope and soft subsurface surrounding the wells. The integrity of the MW-58 well cluster will continue to be observed during future site inspections. Photographs of the monument replacement can be viewed in the Photograph Log provided in Appendix A.

Investigation-derived waste (IDW) stored at the facility include soil, water, and monitoring well casing from monitoring well decommissioning in 2012. IDW soil obtained from historically non-hazardous areas of the site were analyzed for site contaminants of concern. Results indicated that the soil met clean fill criteria and could be placed on top of the site upland soil cap. The soil collected during decommissioning of wells MW-2 and MW-3 in 2012 were placed on the soil cap in March 2013. Hazardous IDW is scheduled for off-site disposal in May 2014.

General Upland Maintenance Activities: Following a couple of non-response alarms in early 2013, the alarm system was upgraded in March 2013 to use a wireless connection rather than a phone line. The previous alarm system used a phone line to communicate with the alarm company (Phillips). Every 30 days, the alarm company computers automatically call the alarm to check the status of

the alarm system. If Phillips cannot connect to the site system during one of these checks, a non-response alarm is called automatically. Following two consecutive non-response alarms, it was discovered that the phone line to the site was malfunctioning and may not have been operating properly for months. The system was upgraded to a wireless system to ensure continuous, uninterrupted service. The site no longer has a phone line connection; therefore, Century Link's services are no longer required.

Required City of Portland fire inspection and backflow prevention device testing were completed. A representative of the City of Portland Fire and Rescue completed a mandatory inspection of the site for potential fire hazards and fire preparedness. The site was found to be compliant with City codes, although the fire extinguishers were overdue for inspection. To address this concern, Huser Sales and Services of Portland, Oregon, was contacted to inspect the fire extinguishers. Separately, the water line to the site fire hydrant was scheduled for backflow prevention testing. All Seasons Backflow, of Beaverton, Oregon, completed the backflow test on August 12, 2013, and the line was found to be working correctly.

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 27 and September 19, 2013. 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. These wells either have an overall consistent trend in DNAPL thickness or are trending downward over time.

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 upgradient 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 walls 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 generally are 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 2013, 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 2013 through December 2013. 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 2-year period beginning in 2004 with the regrading 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 2014. Semiannual noxious weed control activities,

including herbicide application, were conducted by BES from spring 2006 through spring 2012. A private subcontractor (Native Ecosystems Northwest) provided herbicide services as needed starting in the fall of 2010. Native Ecosystems Northwest applied herbicide to targeted areas of noxious weeds in June 2013. Vegetation management has been conducted by Hart Crowser since 2011.

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 (Photograph 1, Appendix C).

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
- 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 microsites, 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.
- Streambanks 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 streambank.

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 are 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 Photo Stations 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 (Photo Stations 6 and 7, 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 2, 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 are well established, the area is flat, and erosion generally is not occurring, replanting grasses and herbs is 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 provide 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 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 July 2 and October 3, 2013, 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 noxious weed treatments. The Photograph Log shows select Photo Stations during the fall 2013 inspection and are paired with photographs from the June 2013 baseline inspection for a qualitative assessment of the site. Photo Stations are shown on Figure 5-1. 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 6 to 15 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. A few Oregon ash and black hawthorn plants showed signs of stress, likely attributed to dry conditions, which typically occur in the late summer to early fall. 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 fall 2013 inspection, water levels in the Willamette River were low, and the mid- to upper-beach face was exposed (Photograph 9, 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 was observed throughout the lower component, but had been treated with herbicide and was dead. Small quantities of knapweed and butterfly bush were present and did not appear to be colonizing other locations in the area; some had been treated with herbicide and were dead.

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 was observed along the entire length of the lower component of the Riparian Area in June and October 2013. Thistle was the most common noxious weed, with lesser quantities of knapweed and butterfly bush present. These weeds had been treated and were nearly all dead. However, 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.

Upper component. Native trees and shrubs in the upper component appeared to be performing well. Grand fir, madrone, Nootka rose, snowberry, Oregon-grape, and elderberry appeared well established and performing best within this component. Individual plants, including oceanspray, cascara, twinberry, and Pacific ninebark, appeared stressed because of dry conditions. 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. Similar to the lower component, thistle was the most notable noxious weed, with lesser quantities of knapweed and butterfly bush present in localized areas. These weeds had been treated and were nearly all dead.

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. This patch should be planted with river willow and/or rigid willow. Large woody debris was present along the shoreline to the middle of the bank near the break between the upper and lower components (Photograph 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 and were observed to be dead.

5.3.2 Upland Area

Earthen cap component. Tree and shrub plantings on the earthen cap were healthy and growing well (Photograph 3, Appendix C). Ponderosa pine, Oregon-grape, elderberry, and serviceberry were performing the best. Nootka rose dominated the northwest portion of the earthen cap and appeared to have been previously stressed, but was regenerating. Trees and shrubs ranged in height from approximately 4 to 8 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 7, 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 southwestern 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 southwestern edge of the impermeable cap.

5.4 Vegetation Maintenance Activities

This section describes activities conducted to maintain vegetation in 2013. 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. Ongoing spot spraying and manual pulling are being completed semiannually and as needed by Ecosystems Northwest under subcontract to Hart Crowser. The scope of work includes applying (spot spraying) glyphosate herbicide and manual pulling to mitigate thistle, knapweed, dandelion, Scotch broom (*Cytisus scoparius*), sweet clover (*Melilotus sp.*), mustards (*Brassica sp.*), and other noxious weeds. Care is taken not to spray on windy days so that spraying of weeds does not affect desirable native plants such as alder or cascara. Noxious weed control activities were completed in June 2013. Based on the conditions observed during the fall 2013 vegetation site inspection, noxious weed control efforts were not completed. During the fall inspection, several areas of desirable native plants were observed to be stressed in the immediate vicinity of spot spraying activities. Noxious weed control should be continued in 2014 as needed. Additional care should be taken to limit the effects of the herbicide on native plant species.

5.4.2 Irrigation

Young trees planted in the Riparian Area in 2012 during shoreline enhancement activities were watered occasionally in July 2013, because of hot, dry conditions. Inspection of vegetation showed that additional irrigation was not needed in 2013.

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 2013 summer and fall conditions 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 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.

6.0 SUMMARY OF OVERALL REMEDY PERFORMANCE

Overall, the 2013 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 2014

The Draft O&M Plan with descriptions of O&M activities and schedule for the next 5 years was prepared by the DEQ with assistance from EPA, GSI, and Hart Crowser (DEQ/EPA 2013).

Table 7-1 presents the soil cap O&M activities planned through 2021. Soil cap O&M activities in 2014 will consist primarily of quarterly inspections and routine maintenance. It is also expected that hazardous waste will be disposed of in May 2014, and the irrigation system will be removed. Semiannual noxious weed control activities are recommended, primarily in the Riparian Area, to maintain a thriving and functional riparian habitat. Additionally, semiannual inspections should be continued in 2014 to assess and monitor vegetation planting areas, species identification (native, non-native, and invasive), growth, density, and general coverage throughout the site.

Table 7-2 presents the sediment cap O&M activities planned through 2016. In 2014, activities are expected to include quarterly inspections and routine maintenance. A Sampling and Analysis Plan will be prepared for the 2015 surface water and porewater compliance 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 2014 activities will be consistent with

those performed in 2013 and the next groundwater quality sampling event will occur in 2015. That event will involve the collection of groundwater samples from the monitoring well downgradient of the infiltration pond (monitoring well MW-59s) and select site-wide wells to support the Five-Year Review process. Routine maintenance of equipment, such as the data loggers, 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 2013
2013 O&M Annual Report
McCormick and Baxter Superfund Site

O&M Activity	Frequency in 2013
Visual Inspections:	
Cap surface	March, June, October
Subsidence near EW-1s	March, June, October
Stormwater conveyance system	March, June, October
Security fencing	March, June, October
Warning signs	March, June, October
Abundance and survival of vegetation	March, June, October
Routine Maintenance and Monitoring:	
Manual removal of invasive plant	None
Targeted application of herbicides	June
Non-Routine Maintenance:	
Repairs of fence	September
Filling of potential animal burrow into the earthen cap	Periodically along fence

Table 3-1: Sediment Cap O&M Activities in 2013
2013 Annual O&M Report
McCormick and Baxter Superfund Site

O&M Activity	Frequency in 2013
Visual Inspections (from shore):	
Warning buoys	March, June, October
Cap surface	March, June, October
Habitat quality	October
Routine Monitoring:	
Water Column and Interarmoring Water Sampling	None
Organoclay Core Sampling	None
Non-Routine Monitoring – such as:	
Multibeam bathymetric surveys, side-scan sonar survey	None
Diver Inspection	None
Non-Routine Maintenance:	
Cut ACB cable loops	March
Removed creosote log from shoreline	December

Table 4-1: Groundwater and NAPL Elevations: June 27, 2013
Operation and Maintenance Report
McCormick & Baxter Superfund Site

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	6/27/2013	11:02	40.1		26.2	41.3		6.7	13.9
EW-2s	6/27/2013	12:01	42.4		29.9				12.5
EW-8s	6/27/2013	11:22	40.5		26.8	52.9		1.8	13.7
EW-10s	6/27/2013	11:33	29.4	16.6	17.7	42.6	1.0	0.1	12.8
EW-15s	6/27/2013	12:15	43.0	29.9	31.2		1.3		13.1
EW-18s	6/27/2013	11:12	40.7		27.1	42.9		1.7	13.7
EW-19s	6/27/2013	11:30	25.9		13.3				12.6
EW-23s	6/27/2013	12:23	37.6	24.6	26.1		1.5		13.0
MW-1r	6/27/2013	10:36	37.6		24.7				13.0
MW-7 WC	6/27/2013	11:08	36.7		23.6				13.1
MW-10r	6/27/2013	10:51	41.9	28.3	28.3		Trace		13.6
MW-15s	6/27/2013	12:07	43.3		29.7				13.5
MW-17s	6/27/2013	12:00	41.3		27.8				13.4
MW-20i	6/27/2013	11:52	41.4		28.6	72.4		2.3	12.9
MW-22i	6/27/2013	10:56	42.3		29.3	50.8		8.1	13.0
MW-23d	6/27/2013	12:17	41.1		27.7				13.4
MW-32i	6/27/2013	--	39.3		26.4				13.0
MW-34i	6/27/2013	11:50	32.7		19.8				12.9
MW-35r	6/27/2013	10:50	32.3		19.3				13.0
MW-36d	6/27/2013	10:52	30.5		17.4				13.0
MW-36i	6/27/2013	10:46	30.2		17.1				13.1
MW-36s	6/27/2013	10:42	30.7		17.8				12.9
MW-37d	6/27/2013	11:06	26.1		13.1				13.0
MW-37i	6/27/2013	11:02	25.9		13.0				12.9
MW-37s	6/27/2013	10:58	24.9		12.1				12.8
MW-38d	6/27/2013	11:22	31.8		NM[a]				--
MW-38i	6/27/2013	11:20	32.1		19.0				13.0
MW-38s	6/27/2013	11:15	32.3		19.2				13.1
MW-39d	6/27/2013	11:32	29.8		16.9				13.0
MW-39i	6/27/2013	11:30	30.1		17.1				13.0
MW-39s	6/27/2013	11:27	29.8		17.3				12.4
MW-40d	6/27/2013	11:45	28.7		15.8				12.9
MW-40i	6/27/2013	11:42	28.7		15.8				13.0
MW-40s	6/27/2013	11:38	28.3		15.1				13.3
MW-41d	6/27/2013	11:53	27.4		14.5				12.9
MW-41i	6/27/2013	11:50	27.1		14.1				13.0
MW-41s	6/27/2013	11:47	27.8		15.2				12.6
MW-42d	6/27/2013	12:12	32.2		19.4				12.8
MW-42i	6/27/2013	12:09	32.7		19.8				12.9
MW-42s	6/27/2013	12:05	32.4		18.9				13.5
MW-43d	6/27/2013	12:20	28.3		15.5				12.8
MW-43i	6/27/2013	12:18	30.3		17.5				12.8
MW-43s	6/27/2013	12:15	31.1		18.3				12.8
MW-44d	6/27/2013	12:37	29.6		16.5				13.1
MW-44i	6/27/2013	12:32	29.3		16.7				12.6
MW-44s	6/27/2013	12:30	29.6		16.0				13.6
MW-45d	6/27/2013	12:47	27.9		15.1				12.8
MW-45i	6/27/2013	12:44	28.0		15.2				12.8
MW-45s	6/27/2013	12:41	28.2		15.6				12.6
MW-46s	6/27/2013	12:55	35.5		21.9				13.6
MW-47s	6/27/2013	12:59	35.5		22.8				12.7
MW-48s	6/27/2013	13:26	38.7		24.8				13.9
MW-49s	6/27/2013	13:21	37.6		19.9				17.7

Table 4-1: Groundwater and NAPL Elevations: June 27, 2013
Operation and Maintenance Report
McCormick & Baxter Superfund Site

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-50s	6/27/2013	12:31	39.3		25.2				14.0
MW-51s	6/27/2013	12:33	39.5		22.0				17.6
MW-52s	6/27/2013	12:47	40.7		27.1				13.7
MW-53s	6/27/2013	12:45	40.4		23.8				16.6
MW-54s	6/27/2013	11:38	41.8		28.2				13.6
MW-55s	6/27/2013	11:35	41.0		26.7				14.3
MW-56s	6/27/2013	10:44	43.5	30.3	30.3		Trace		13.2
MW-57s	6/27/2013	11:45	42.0		29.4				12.6
MW-58d	6/27/2013	10:58	41.4		28.3				13.2
MW-58i	6/27/2013	11:00	41.0		28.0				13.0
MW-58s	6/27/2013	10:59	41.5		28.9				12.7
MW-59s	6/27/2013	13:12	35.9		21.8				14.1
MW-60d	6/27/2013	10:37	40.1		36.9				3.2
MW-61s	6/27/2013	11:22	43.6		29.1				14.6
MW-62i	6/27/2013	11:55	42.6		29.6				13.0
MW-As	6/27/2013	--	39.3		22.0				17.2
MW-Ds	6/27/2013	12:06	42.9		30.6	36.1		2.5	12.3
MW-Gs	6/27/2013 [b]	11:46	40.2	27.8	27.8	42.8	Trace	1.9	12.4
MW-Os	6/27/2013	12:25	40.9		23.3				17.6
PW-1d	6/27/2013	12:40	44.0		31.0				13.0
PW-2d	6/27/2013	12:23	41.8		28.8				13.0

ND = not detected NM = not measured LNAPL specific gravity estimated as 0.981 g/cm^3

[a] Measurement was not taken in MW-38d due to inability to open well casing lock.

[b] Due to an erroneous DNAPL measurement in MW-Gs on June 27, 2013, the well was re-measured on July 12, 2013 that measurement is show in this table and on the groundwater contour map (Figure 4-2).

Table 4-2: Groundwater and NAPL Elevations: September 19, 2013
Operation and Maintenance Report
McCormick & Baxter Superfund Site

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	9/19/2013	14:00	40.1	26.9	26.9	41.0	Trace	7.0	13.2
EW-2s	9/19/2013	13:14	42.4		33.8				8.6
EW-8s	9/19/2013	13:03	40.5		27.7	52.8		1.9	12.7
EW-10s	9/19/2013	12:18	29.4	21.8	22.6		0.8		7.6
EW-15s	9/19/2013	12:52	43.0	32.1	36.7		4.7		10.9
EW-18s	9/19/2013	13:50	40.7		28.0	42.7		1.9	12.7
EW-19s	9/19/2013	12:13	25.9		17.7				8.3
EW-23s	9/19/2013	12:47	37.6	27.2	30.8		3.6		10.3
MW-1r	9/19/2013	11:59	37.6	26.7	26.7		Trace		11.0
MW-7 WC	9/19/2013	14:08	36.7		26.2				10.5
MW-10r	9/19/2013	14:10	41.9	29.1	29.5		0.4		12.7
MW-15s	9/19/2013	13:45	43.3		30.9				12.4
MW-17s	9/19/2013	13:08	41.3		29.2				12.1
MW-20i	9/19/2013	12:24	41.4		34.5	72.1		2.6	7.0
MW-22i	9/19/2013	14:15	42.3		34.7	52.3		6.7	7.6
MW-23d	9/19/2013	15:25	41.1		33.6				7.4
MW-32i	9/19/2013	12:50	39.3		28.4				11.0
MW-34i	9/19/2013	12:12	32.7		25.6				7.1
MW-35r	9/19/2013	14:19	32.3		23.3				9.0
MW-36d	9/19/2013	12:13	30.5		23.4				7.1
MW-36i	9/19/2013	12:11	30.2		23.0				7.1
MW-36s	9/19/2013	12:09	30.7		20.2				10.5
MW-37d	9/19/2013	12:21	26.1		19.1				6.9
MW-37i	9/19/2013	12:18	25.9		18.9				7.0
MW-37s	9/19/2013	12:16	24.9		16.8				8.0
MW-38d	9/19/2013	--	31.8		NM[a]				--
MW-38i	9/19/2013	12:36	32.1		24.6				7.5
MW-38s	9/19/2013	12:38	32.3		21.6				10.8
MW-39d	9/19/2013	12:39	29.8		22.8				7.0
MW-39i	9/19/2013	12:37	30.1		23.1				7.0
MW-39s	9/19/2013	12:34	29.8		21.5				8.3
MW-40d	9/19/2013	12:55	28.7		21.7				7.0
MW-40i	9/19/2013	12:52	28.7		21.3				7.4
MW-40s	9/19/2013	12:50	28.3		17.1				11.2
MW-41d	9/19/2013	13:04	27.4		20.5				6.9
MW-41i	9/19/2013	13:01	27.1		19.6				7.5
MW-41s	9/19/2013	12:59	27.8		20.1				7.7
MW-42d	9/19/2013	13:10	32.2		25.3				6.9
MW-42i	9/19/2013	13:13	32.7		25.6				7.0
MW-42s	9/19/2013	13:48	32.4		19.9				12.4
MW-43d	9/19/2013	13:55	28.3		21.6				6.8
MW-43i	9/19/2013	13:53	30.3		23.5				6.8
MW-43s	9/19/2013	13:50	31.1		23.4				7.7
MW-44d	9/19/2013	14:05	29.6		22.5				7.2
MW-44i	9/19/2013	14:03	29.3		21.9				7.4
MW-44s	9/19/2013	14:00	29.6		16.6				13.0
MW-45d	9/19/2013	14:12	27.9		21.1				6.8
MW-45i	9/19/2013	14:08	28.0		21.0				7.0
MW-45s	9/19/2013	14:10	28.2		20.0				8.1
MW-46s	9/19/2013	14:23	35.5		22.7				12.8
MW-47s	9/19/2013	14:27	35.5		27.1				8.4
MW-48s	9/19/2013	14:35	38.7		25.1				13.6
MW-49s	9/19/2013	14:39	37.6		21.5				16.1

Table 4-2: Groundwater and NAPL Elevations: September 19, 2013
Operation and Maintenance Report
McCormick & Baxter Superfund Site

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-50s	9/19/2013	14:16	39.3		25.9				13.4
MW-51s	9/19/2013	14:13	39.5		23.5				16.1
MW-52s	9/19/2013	13:35	40.7		28.0				12.7
MW-53s	9/19/2013	13:30	40.4		25.2				15.2
MW-54s	9/19/2013	13:22	41.8		29.2				12.6
MW-55s	9/19/2013	13:26	41.0		28.8				12.2
MW-56s	9/19/2013	13:43	43.5	32.1	33.0		0.8		11.3
MW-57s	9/19/2013	13:16	42.0		32.9				9.2
MW-58d	9/19/2013	14:40	41.4		34.8				6.6
MW-58i	9/19/2013	14:30	41.0		34.5				6.5
MW-58s	9/19/2013	14:35	41.5		33.0				8.5
MW-59s	9/19/2013	14:55	35.9		23.0				12.9
MW-60d	9/19/2013	12:05	40.1		31.9				8.1
MW-61s	9/19/2013	13:53	43.6		31.3				12.3
MW-62i	9/19/2013	12:18	42.6		35.5				7.2
MW-As	9/19/2013	12:58	39.3		23.1				16.2
MW-Ds	9/19/2013	13:20	42.9		34.2	36.5		2.2	8.7
MW-Gs	9/19/2013	12:35	40.2	31.8	31.8	42.7	Trace	2.0	8.4
MW-Os	9/19/2013	15:02	40.9		24.8				16.1
PW-1d	9/19/2013	14:54	44.0		33.0				11.0
PW-2d	9/19/2013	15:05	41.8		30.7				11.1

ND = not detected NM = not measured LNAPL specific gravity estimated as 0.981 g/cm^3

[a] Measurement was not taken in MW-38d due to inability to open well casing lock.

Table 4-3: Groundwater O&M Activities in 2013
2013 O&M Annual Report
McCormick and Baxter Superfund Site

O&M Activity	Frequency
NAPL Monitoring:	
Manual gauging of site wells	June, September
Manual extraction from exterior wells	None
Groundwater Monitoring:	
Downloading continuous water level data from transducers	June, September
Manual water level measurements from site wells	June, September
Groundwater Sampling:	
Site-wide	None
Infiltration pond (MW-59s)	None
Routine Maintenance of Equipment:	
Transducers	June, September
Non-Routine Maintenance of Wells:	
Monument Repairs	October
Utilities Service:	
Water, electric, phone, alarm, solid waste, toilet	Upgrade Alarm System March

Table 7-1: Soil Cap O&M Activities Planned through 2021
2013 O&M Annual Report
McCormick and Baxter Superfund Site

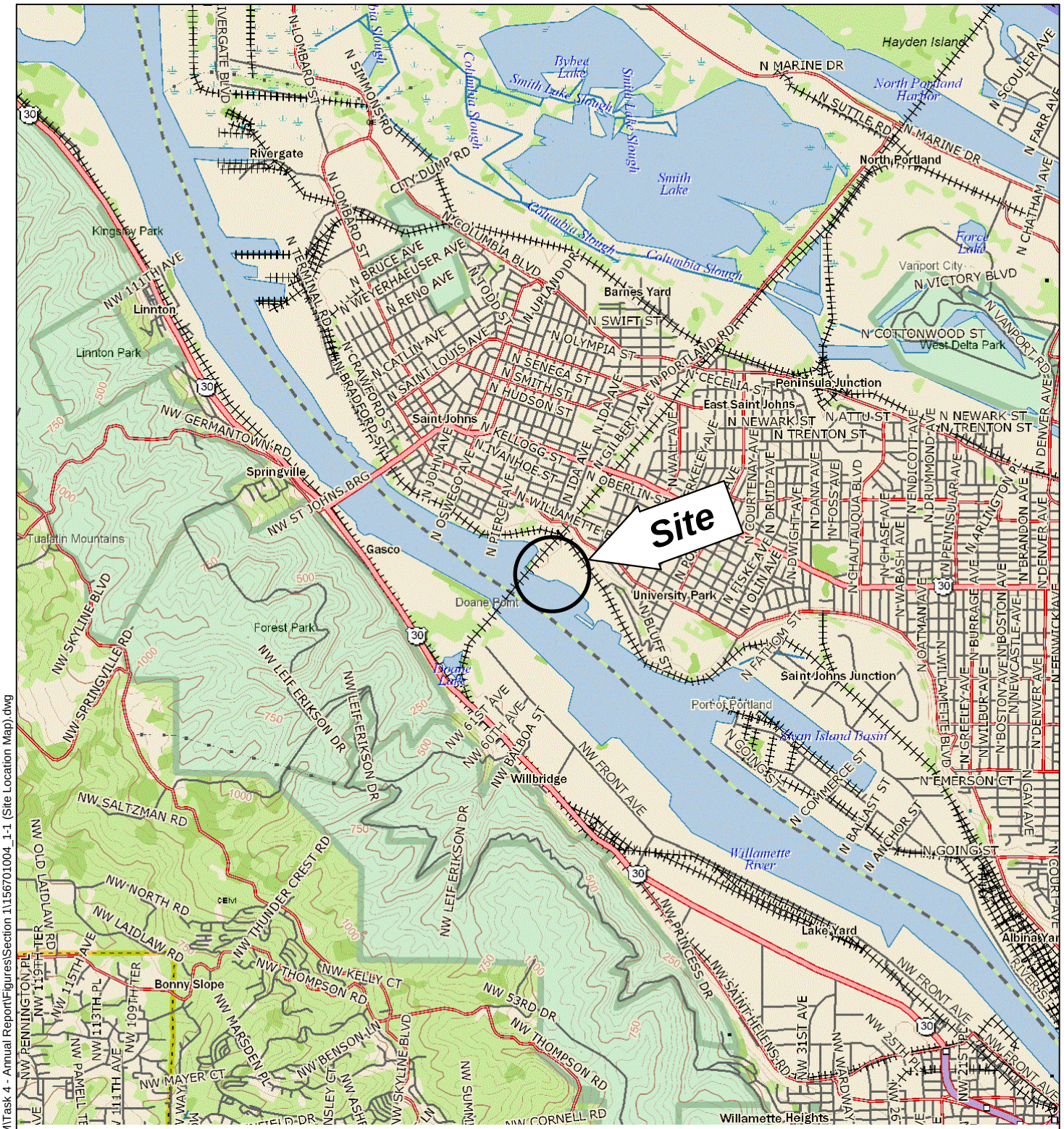
O&M Activity	Frequency
Visual Inspections:	
Cap surface	Quarterly
Subsidence near EW-1s	Quarterly
Stormwater conveyance system	Quarterly
Security fencing	Quarterly
Warning signs	Quarterly
Abundance and survival of vegetation	Quarterly
Routine Maintenance and Monitoring:	
Manual removal of invasive plant	Semiannually, if necessary
Targeted application of herbicides	Semiannually, if necessary
Non-Routine Maintenance – such as:	
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

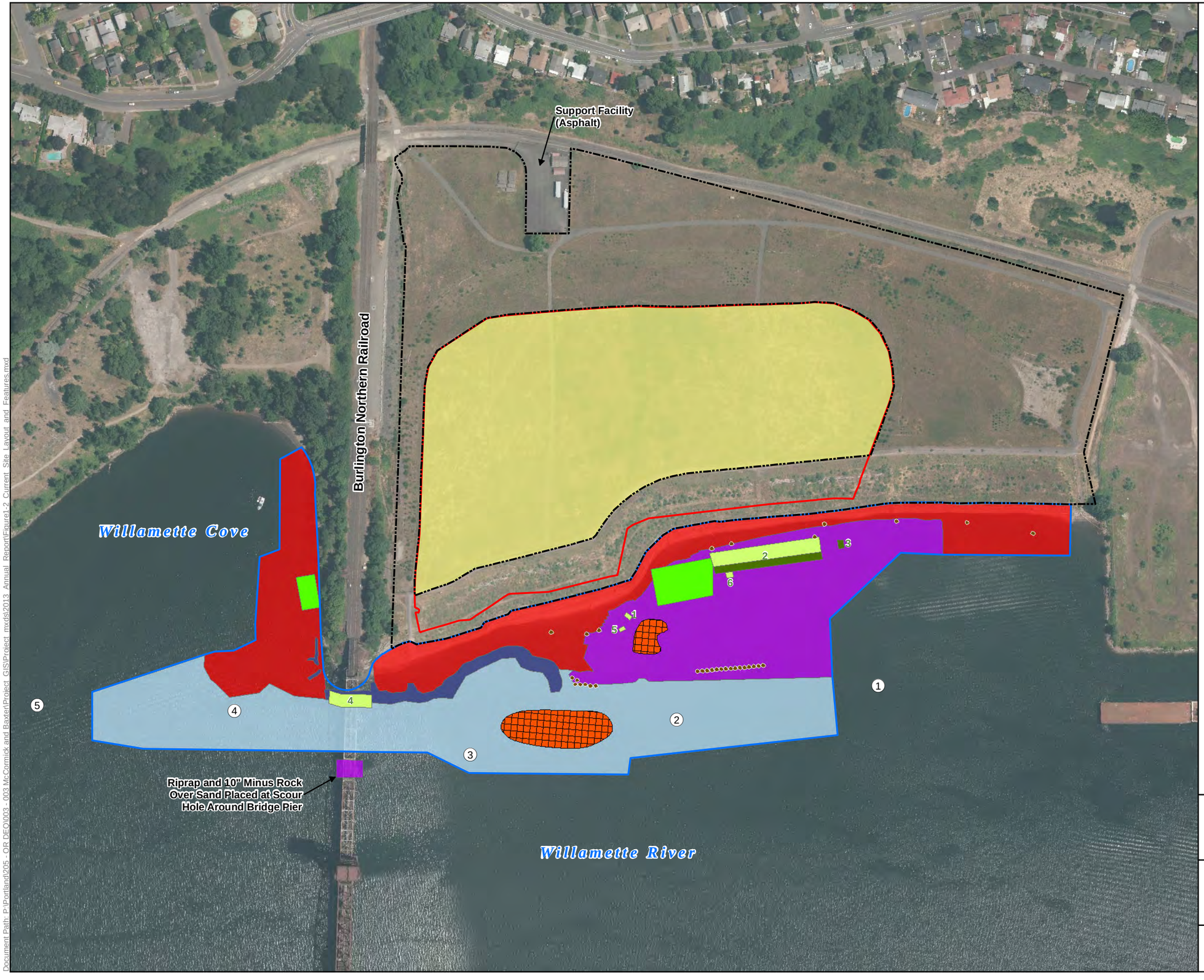
Table 7-2: Sediment Cap O&M Activities Planned through September 30, 2016
2013 Annual O&M Report
McCormick and Baxter Superfund Site

O&M Activity	Frequency
Visual Inspections (from shore):	
Warning buoys	Quarterly
Cap surface	Quarterly
Habitat quality	Annually
Routine Monitoring:	
Water Column and Interarmoring Water Sampling	Every 5 years (starting in 2015)
Organoclay Core Sampling	In 2015, then determine frequency
Non-Routine Monitoring – such as:	
Multibeam bathymetric surveys, side-scan sonar survey	Every 10 years, starting in 2020; perform as needed (unforseen natural event)
Diver Inspection	If necessary, will be conducted every 10 years starting in 2020, after bathymetry
Non-Routine Maintenance – such as:	
Replacement of buoys	As needed
Additional armoring placement	Schedule for 2020, and 2040, if needed. After unforseen 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
2013 Annual O&M 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	Every 5 years
Infiltration pond (MW-59s)	Every 5 years
Routine Maintenance of Equipment:	
Interface probes, pumps, vehicle, data loggers/transducers, etc.	As needed
Utilities Service:	
Water, electric, phone, alarm, solid waste, toilet	Continuous


Site
Hayden Island
N MARINE DR
North Portland Harbor
Rivergate
Kingsley Park
Linnton
Linnton Park
Barnes Yard
Peninsula Junction
East Saint Johns
Saint Johns
Springville
Tualatin Mountains
Gasco
Doane Point
University Park
Forest Park
Saint Johns Junction
Port of Portland
Swan Island Basin
Willbridge
Willamette River
Lake Yard
Bonny Slope
Willamette Heights
Smith Lake
Bybee Lake
Columbia Slough
Vanport City
West Delta Park
Forest Park
0
4,000
8,000
Scale in Feet
Portland
OREGON
N
McCormick and Baxter Superfund Site
6900 N Edgewater Street, Portland, Oregon
Site Location Map
4/14
Figure
1-1
HARTCROWSER
GSI Water Solutions, Inc.
Source: DeLorme Topo USA.
F:\Data\Jobs\DEQ\15670-xx M&B\15670-10 Sed and Soil O&M\Task 4 - Annual Report\Figures\Section 1\156701004_1-1 (Site 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 in the fall of 2012

0 250 500

Scale in feet

McCormick and Baxter Superfund Site
Portland, Oregon

Current Site Layout and Features

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure
1-2

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project GIS\Project mxds\2013 Annual Report\Figure1-2 Current Site Layout and Features.mxd

NOTES:

1. Bathymetric survey conducted by David Evans and Associates, Inc. (DEA), 4/26/06.
2. Upland site survey conducted by David Evans and Associates, Inc. (DEA), 11/17/04 and 1/24/06.
3. Upland ground surface resurveyed and replaced by OTAK, Inc., 9/16/08.
4. Horizontal Datum: North American Datum of 1983 - 91 adj. (NAD83/91), State Plane Coordinate System (SPCS), Oregon North Zone. Units: International Feet.
5. Vertical Datum: North American Vertical Datum of 1988 (NAVD88)
6. Contour Interval: One-Foot. Bathymetric contours were derived from a Digital Terrain Model (DTM) based on a 3-foot grid of multibeam data.

Asphalt Surface
Building
Fence (Typical)
Property Line
Gravel Road
Union Pacific Railroad
Burlington Northern Inc.
(Spokane, Portland, and Seattle Railway Co.)
EARTHEN CAP
Perforated Collection Piping
Barrier Wall
SDMH-A
IMPERMEABLE CAP
SDMH-C
SDMH-D
DRAINAGE SYSTEM
Retention Pond
12" Minus Rock
High Point
SDMH-E
SDMH-B
8" Corrugated HDPE
(High Density Polythene)
Rock Pile
Spillway
RIPARIAN AREA (Vegetated)
Sand Pile
12" PVC Outfall
Willamette Cove
SEDIMENT CAP
Willamette River
Sediment Cap Boundary

0 200 400
Scale in Feet

N

Underground Storm Drain Line
Storm Drain Manhole
Elevation Contour, 1' interval
(Ft. NAVD 88)
Site Use Restriction Area Boundary

McCormick and Baxter Superfund Site
Portland, Oregon

Site Capping Components

4/14

HARTCROWSER
GSI Water Solutions, Inc.

Figure
1-3

F:\Data\Jobs\DEQ\15670-xx M&B\15670-10 Sed and Soil O&M\Task 4 - Annual Report\Figures\Section 1\156701004_1-3_(Capping Comp).dwg

NOTES:

1. Bathymetric survey conducted by David Evans and Associates, Inc. (DEA), 4/26/06.
2. Upland site survey conducted by David Evans and Associates, Inc. (DEA), 11/17/04 and 1/24/06.
3. Upland ground surface resurveyed and replaced by OTAK, Inc., 9/16/08.
4. Horizontal Datum: North American Datum of 1983 - 91 adj. (NAD83/91), State Plane Coordinate System (SPCS), Oregon North Zone. Units: International Feet.
5. Vertical Datum: North American Vertical Datum of 1988 (NAVD88)
6. Contour Interval: One-Foot. Bathymetric contours were derived from a Digital Terrain Model (DTM) based on a 3-foot grid of multibeam data.
7. Additional rock was placed at the 6" minus rock placement areas on 6/26/07. These areas have not been surveyed and the contours of this figure do not reflect the additional rock placement.

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

Union Pacific Railroad

Property Line

Fence (Typ.)

Building

Asphalt Surface

A2'

Gravel Road

Perforated Collection Piping

EARTHEN CAP

Subsuface Barrier Wall

SDMH-A

SDMH-B

SDMH-C

SDMH-D

SDMH-E

High Point

DRAINAGE SYSTEM

Retention Pond

12" Minus Rock

8" Corrugated HDPE (High Density Polyethylene)

Spillway

IMPERMEABLE CAP

Rock Pile

12" PVC Outfall

Sand Pile

Willamette Cove

SEDIMENT CAP

A2

Sediment Cap Boundary

Willamette River

DSL Easement (#31530-EA)

0 200 400

Scale in Feet

N

-40 Elevation Contour, 1' Interval (Ft. NAVD 88)

Boulder Clusters/Rock Mound

Riprap Armor

Organoclay Mat (Double Layer)

Organoclay Mat (Single Layer)

Granular Organoclay

Hot Spot Treatment (Thickened Sand Layer)

Articulated Concrete Block

6-Inch Minus Rock Armor

10-Inch Minus Rock Armor

Turf Reinforcement Mat Placed Over Earthen Cap

A2 A2' Cross Section Line (for Figure 1-6)

McCormick and Baxter Superfund Site
Portland, Oregon

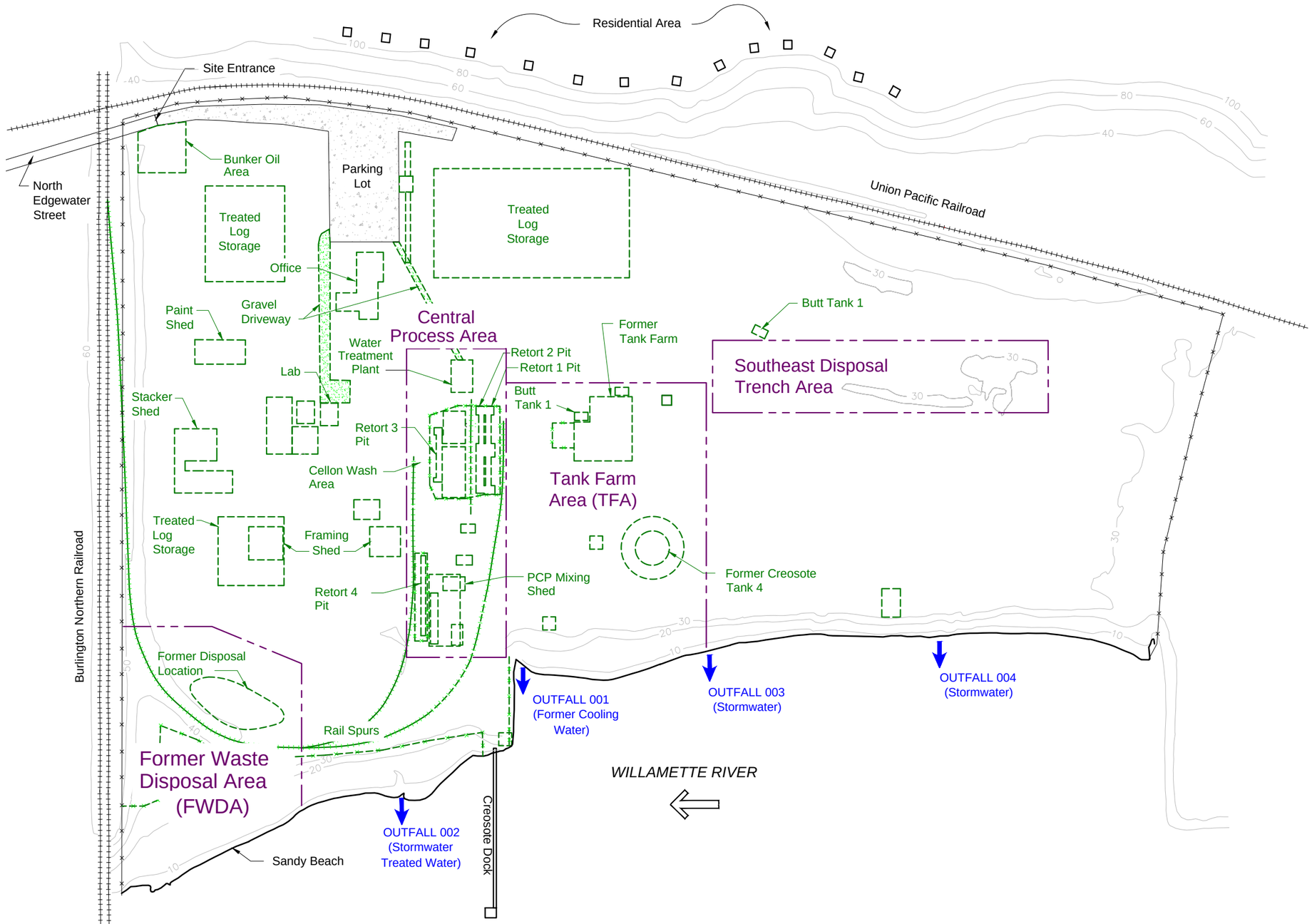
Current Site Layout with Surface Elevations

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure
1-4

F:\Data\Jobs\DEQ\115670-xx M&B\115670-10 Sed and Soil O&M\Task 4 - Annual Report\Figures\Section 1\115670100l4_1-4 (Current Site Layout-surfelev).dwg



McCormick and Baxter Superfund Site
Portland, Oregon

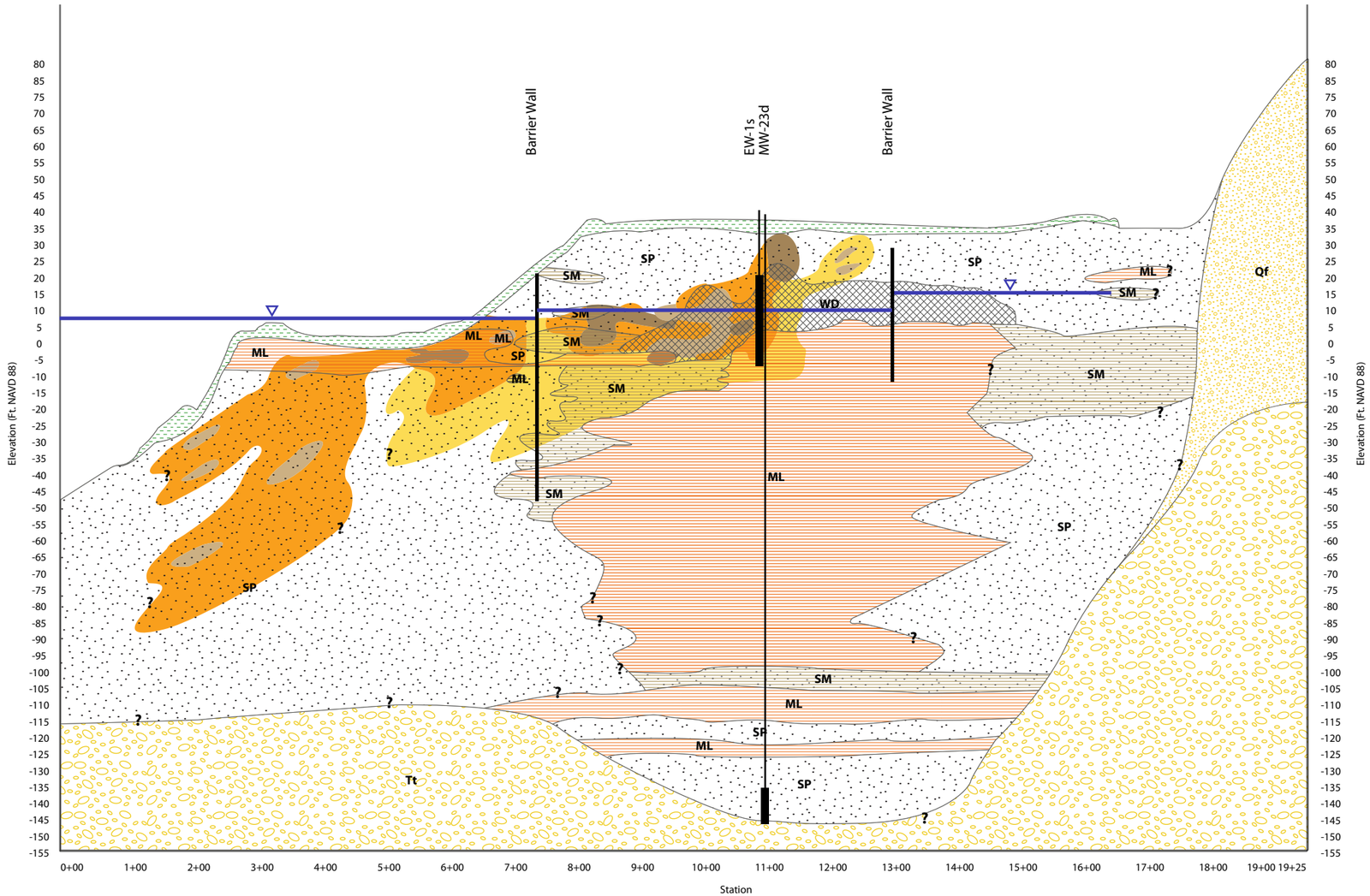
Historic Contaminant Source Areas

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure
1-5

F:\Data\Jobs\DEQ\15670-xx M&B\15670-10 Sed and Soil O&M\Task 4 - Annual Report\Figures\Section 1\1567010004_1-5 (Historic 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

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

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure

1-6

W:\Projects\205 - OR DEQ\003 - 003 McCormick and Baxter\Figures

Location of Fence Repair
Property Line
Fence (Typ.)
Animal Burrows
Animal Burrows
Gravel Road
Perforated Collection Piping
EARTHEN CAP
Union Pacific Railroad
Subsuface Barrier Wall
SDMH-A
Area of Subsidence
SDMH-C
SDMH-D
DRAINAGE SYSTEM
Retention Pond
High Point
Riprap
Animal Burrows Under Fence
SDMH-E
8" Corrugated HDPE (High Density Polythene)
SDMH-B
IMPERMEABLE CAP
Rock Pile
Transient Boat Locations
Habitat Gravel Pile
12" PVC Outfall
Spillway
Sand Pile
COP Outfall
MW-58 Well Cluster
Willamette Cove
Uneven ACB
Burlington Northern Inc. (Spokane, Portland, and Seattle Railway Co.)
1
2
3
4
5
Willamette River
Sediment Cap Boundary

- Boulder Clusters/Rock Mound
- Riprap Armor
- Organoclay Mat (Double Layer)
- Organoclay Mat (Single Layer)
- Granular Organoclay
- Hot Spot Treatment (Thickened Sand Layer)
- Articulated Concrete Block
- 6-Inch Minus Rock Armor
- 10-Inch Minus Rock Armor
- Turf Reinforcement Mat TRM Placed Over Earthen Cap

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							

(1) Buoy Location and Number
Monitoring Well Location
Gravel Layer

0 200 400
Scale in Feet

N

McCormick and Baxter Superfund Site
Portland, Oregon

Site Observation Summary

4/14

HARTCROWSER
GSI Water Solutions, Inc.

Figure
2-1

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LEGEND

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

NOTES:

1) 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

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure
4-1

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project GIS\Project mxds\2013 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 (12.3 feet)
- Subsurface Barrier Wall

NOTES:

1) Elevations shown in NAVD 88
2) Aerial photo taken on September 22, 2006
3) Water levels measured between 10:30 and 13:30
4) Willamette River low tide at 05:45 at 12.3 feet NAVD 88

0 200 400

Scale in feet

McCormick and Baxter Superfund Site
Portland, Oregon

Groundwater Contour Map for June 27, 2013 Monitoring Event

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure **4-2**

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project GIS\Project mxds\2013 Annual Report\Figure4-2 GW Elevations June27 2013.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 (6.2 feet)
- Subsurface Barrier Wall

NOTES:

1) Elevations shown in NAVD 88
2) Aerial photo taken on September 22, 2006
3) Water levels measured between 11:50 and 15:25
4) Willamette River low tide at 14:15 at 6.2 feet NAVD 88
5) Reading not included in groundwater elevation contours

0 200 400

Scale in feet

McCormick and Baxter Superfund Site
Portland, Oregon

Groundwater Contour Map for September 19, 2013 Monitoring Event

4/14

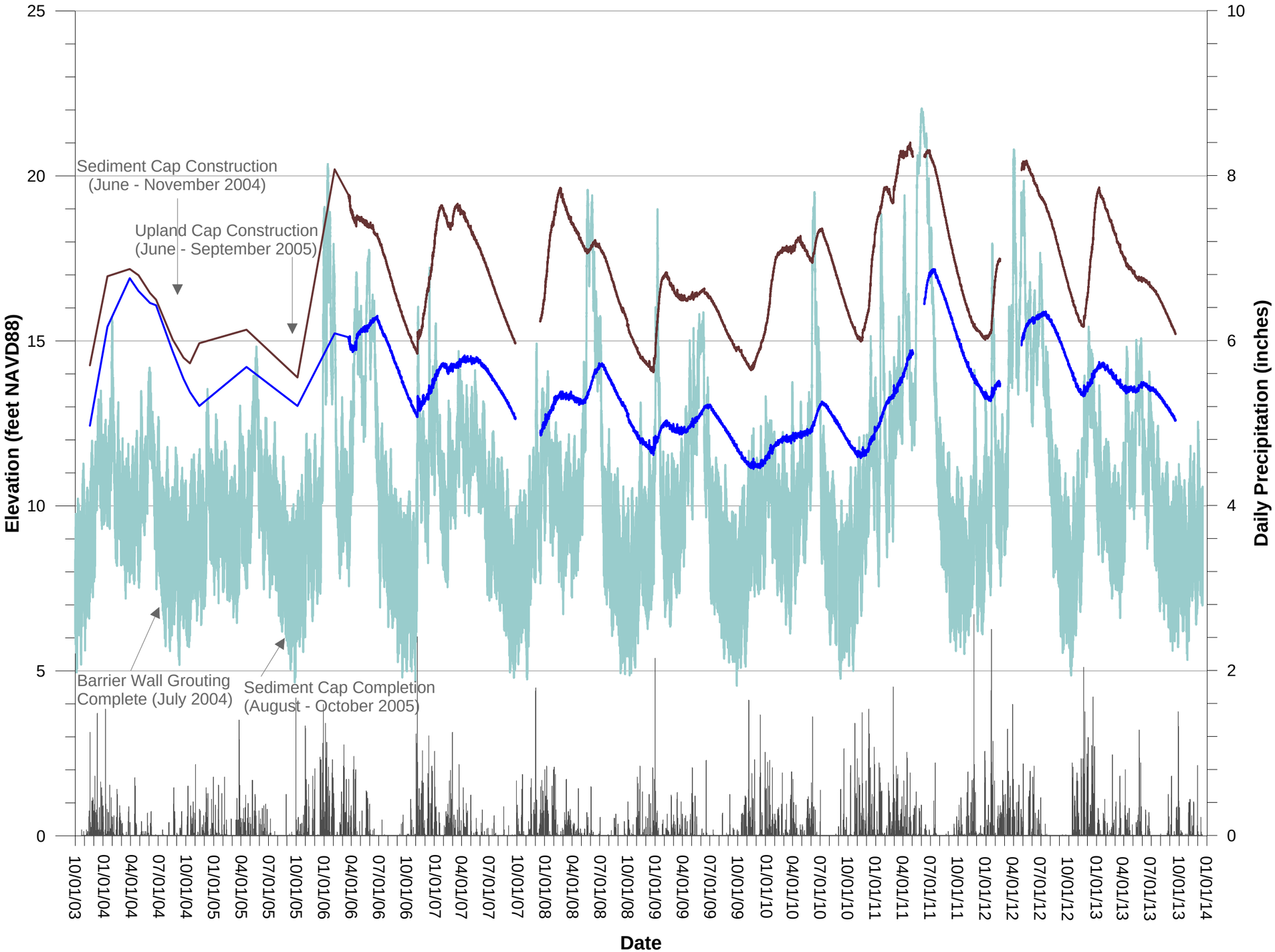
HARTCROWSER GSI Water Solutions, Inc.

Figure **4-3**

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project GIS\Project mxds\2013 Annual Report\Figure4-3 GW Elevations Sept19 2013.mxd

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

McCormick and Baxter Superfund Site
Portland, OR



LEGEND

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

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 NAVD88.

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.

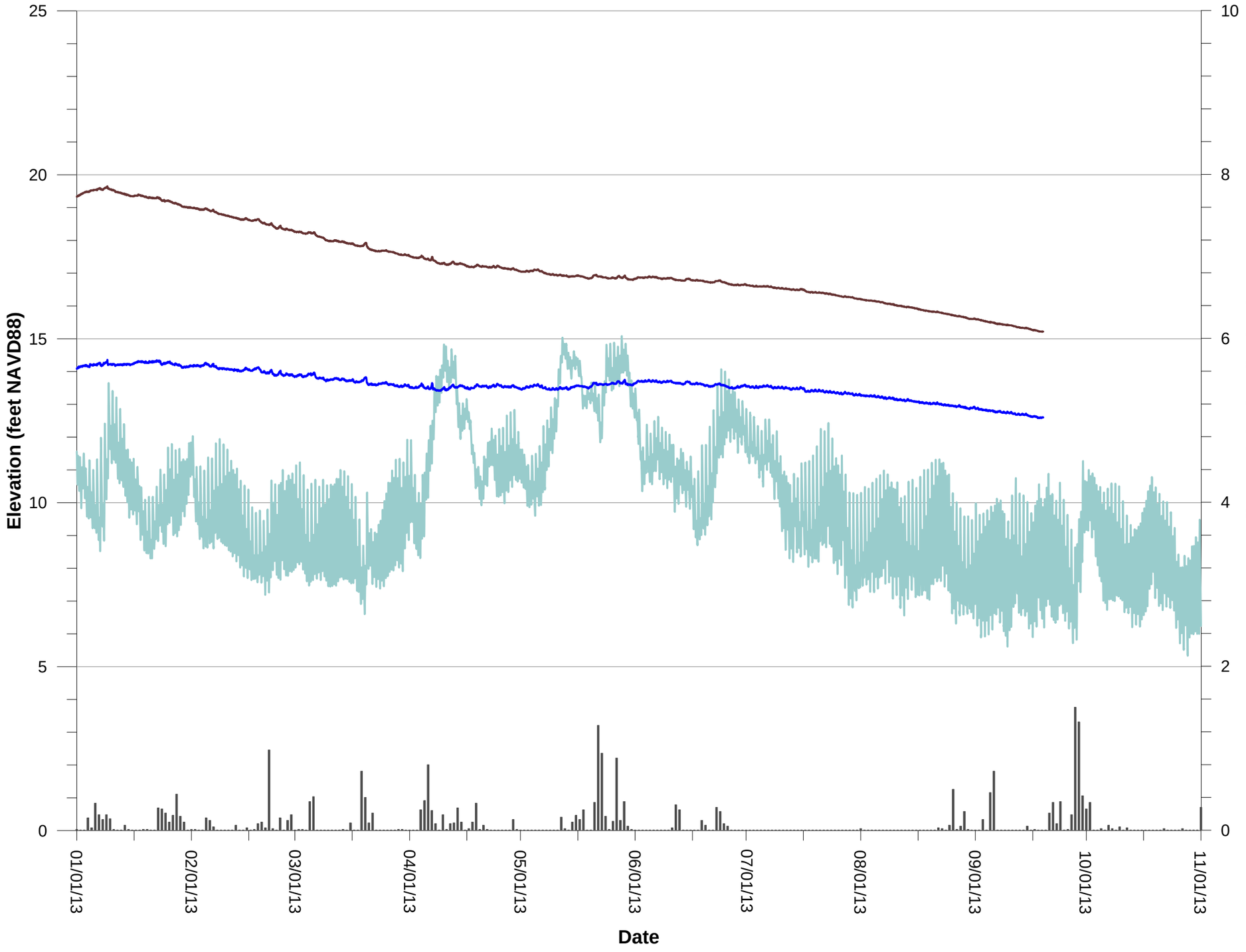


Figure 4-5:
2013 Groundwater Elevations in Monitoring Wells MW-52s and MW-53s

McCormick and Baxter Superfund Site
Portland, OR

LEGEND

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

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 NAVD88.

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.

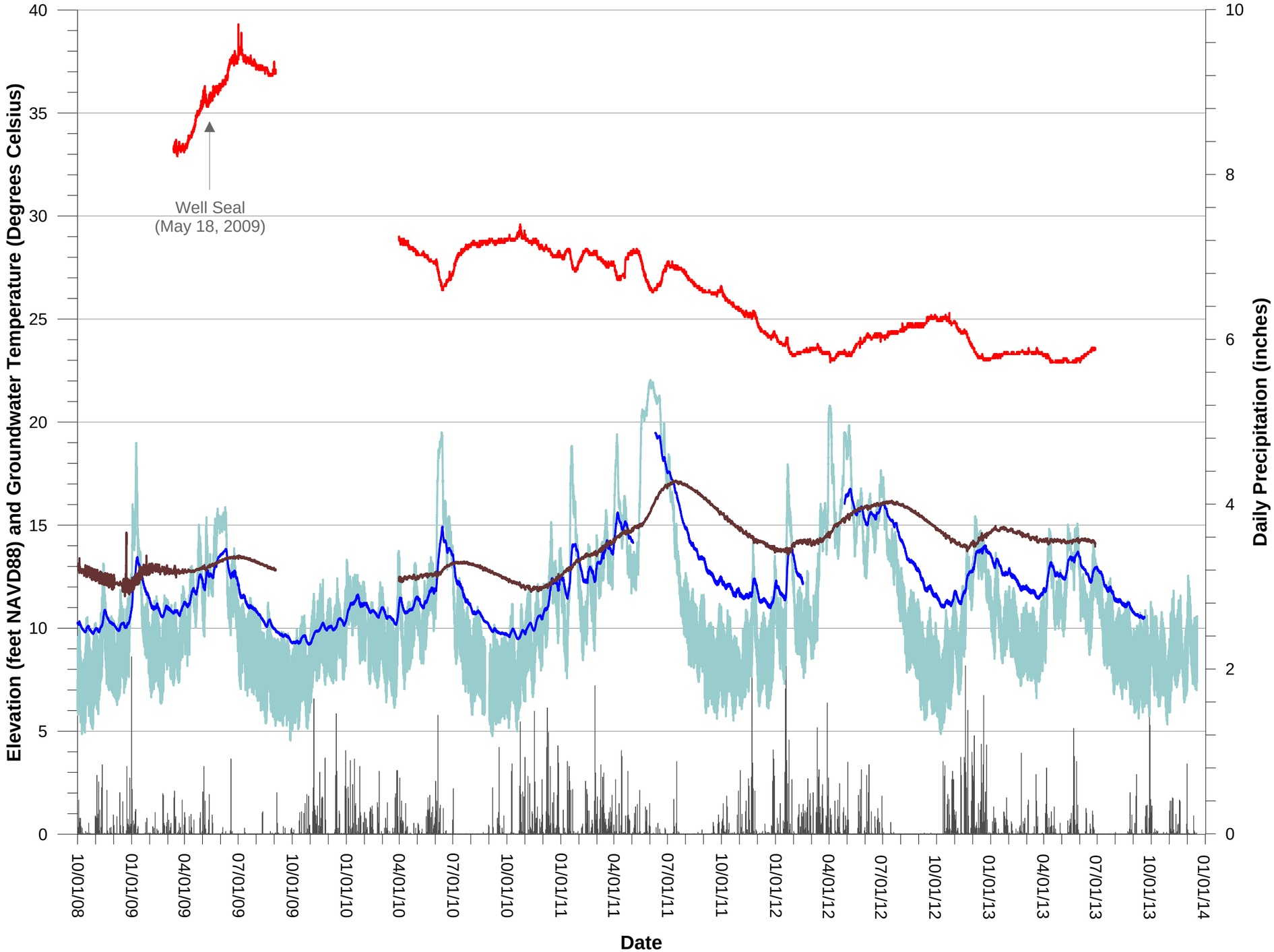


Figure 4-6:
2008 to 2013 Groundwater Tmperature in Montoring Well EW-1s and Groundwater Elevations in Monitoring Wells MW-36s and EW-1s

McCormick and Baxter Superfund Site
Portland, OR

LEGEND

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

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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HARTCROWSER
GSI Water Solutions, Inc.

Figure 4-7:
2013 Groundwater Tmperature in Montoring Well EW-1s and Groundwater Elevations in 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 Data

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.

HARTCROWSER

GSI Water Solutions, Inc.

Current Top of Wall Elevation at 22.15 ft NAVD88

Upland Cap Construction (June - September 2005)

Sediment Cap Construction (June - November 2004)

Barrier Wall Grouting Complete (July 2004)

Sediment Cap Completion (August - October 2005)

Elevation (feet NAVD88)

Daily Precipitation (inches)

Date

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 Data

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.

HARTCROWSER

GSI Water Solutions, Inc.

Current Top of Wall Elevation at 22.15 ft NAVD88

Elevation (feet NAVD88)

Daily Precipitation (inches)

25
20
15
10
5
0

10
8
6
4
2
0

1/1/13
2/1/13
3/1/13
4/1/13
5/1/13
6/1/13
7/1/13
8/1/13
9/1/13
10/1/13
11/1/13

Date

Figure 4-9:
2013 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 Data

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.

HARTCROWSER

GSI Water Solutions, Inc.

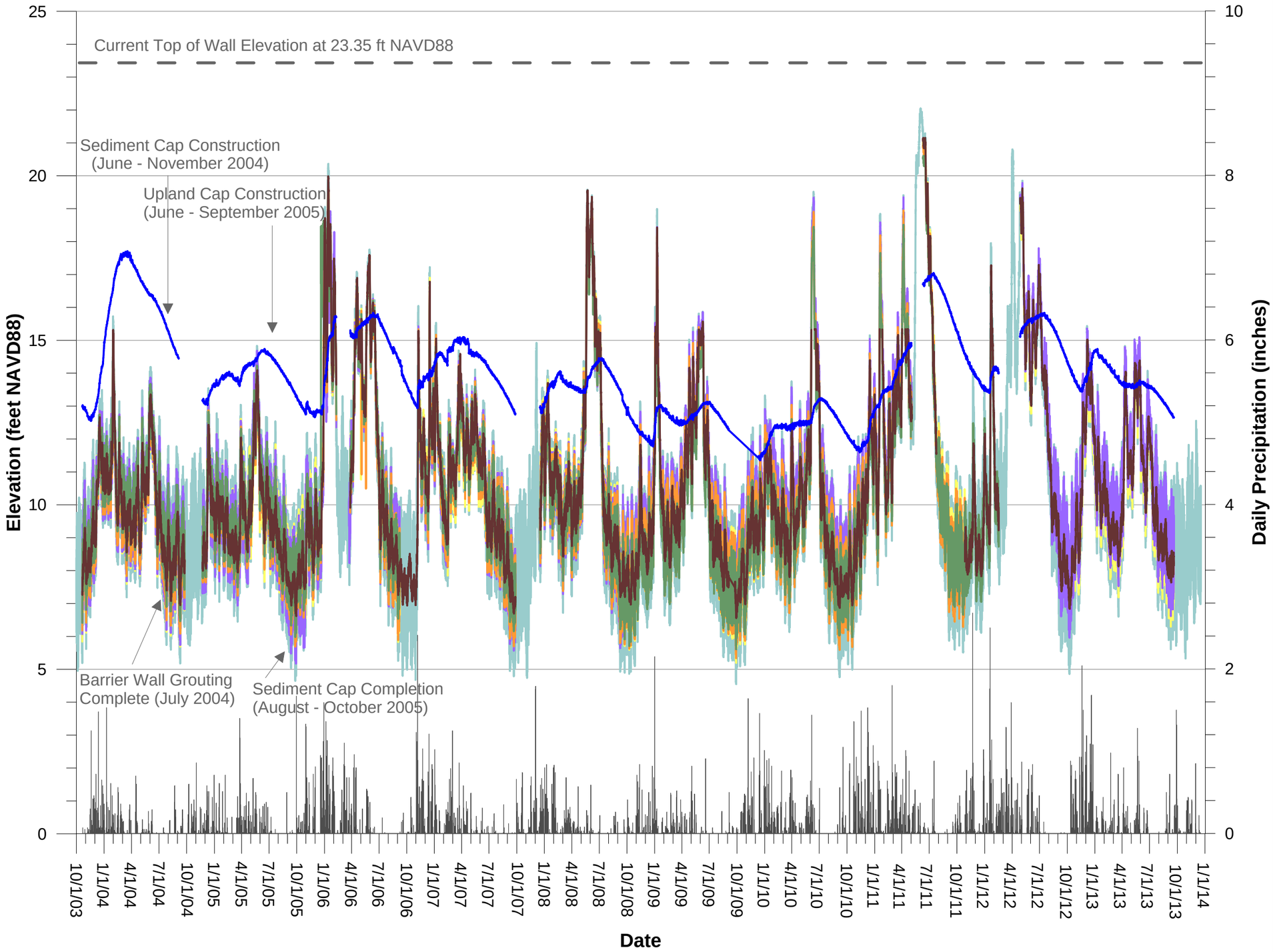


Figure 4-10:
Post-Barrier Wall Groundwater Elevations in Monitoring Wells MW-44 and MW-45

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 Data

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.

HARTCROWSER

GSI Water Solutions, Inc.

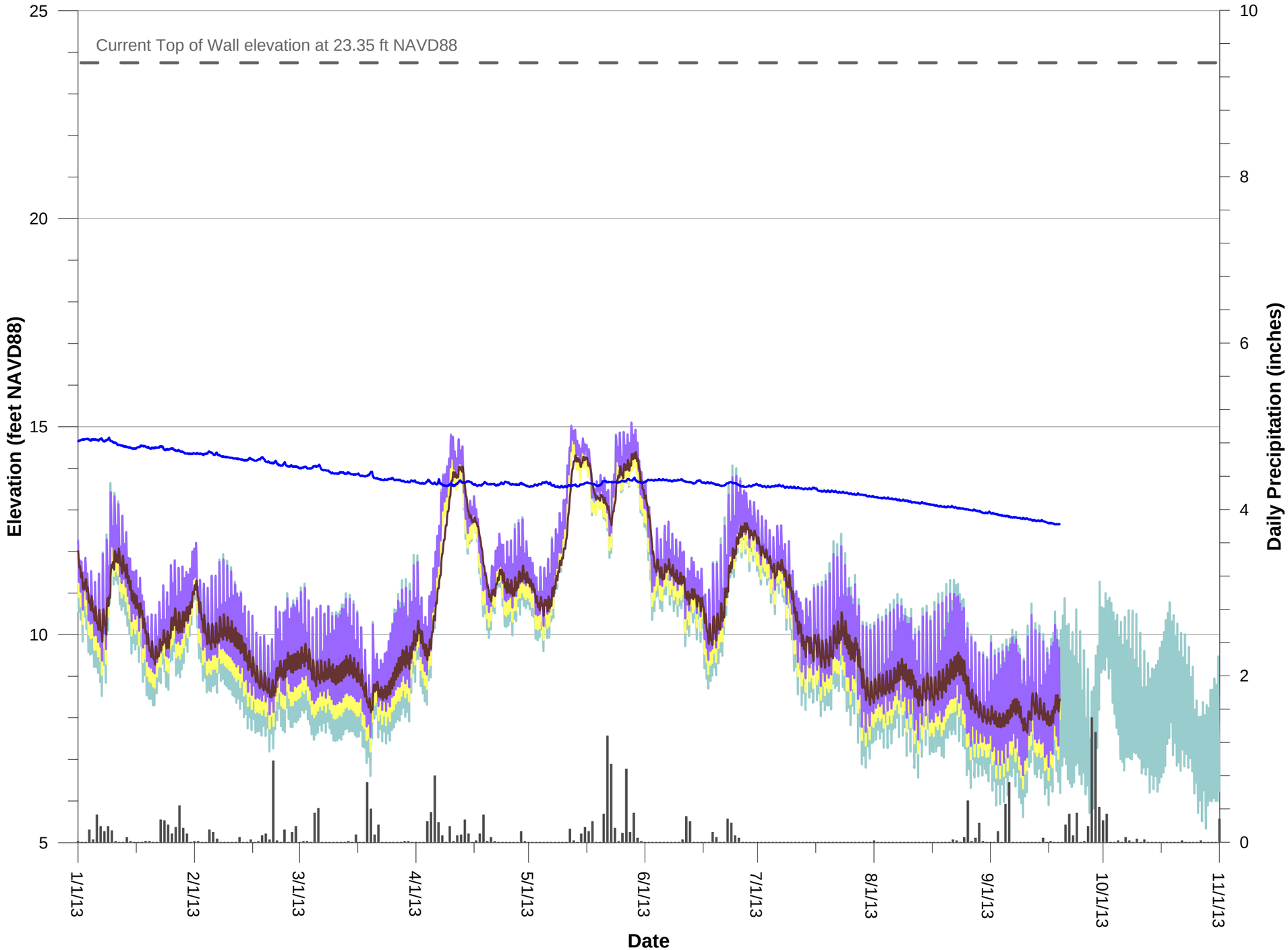


Figure 4-11:
2013 Groundwater Elevations in Monitoring Wells MW-44 and MW-45

McCormick and Baxter Superfund Site
Portland, OR

LEGEND

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

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:

1) Aerial photo taken on September 22, 2006
2) Due to an erroneous DNAPL measurement in MW-Gs on June 27, 2013, the well was re-measured on July 12, 2013 and that DNAPL thickness is show.

0 200 400

Scale in feet

McCormick and Baxter Superfund Site
Portland, Oregon

LNAPL and DNAPL Distribution Map for June 27, 2013 Monitoring Event

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure
4-12

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project GIS\Project mxds\2013 Annual Report\Figure4-12 LNAPL and DNAPL Map June27 2013.mxd

LEGEND

Groundwater Monitoring Wells (Thickness of LNAPL or DNAPL)

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

NOTES:

1) Aerial photo taken on September 22, 2006

0 200 400

Scale in feet

McCormick and Baxter Superfund Site
Portland, Oregon

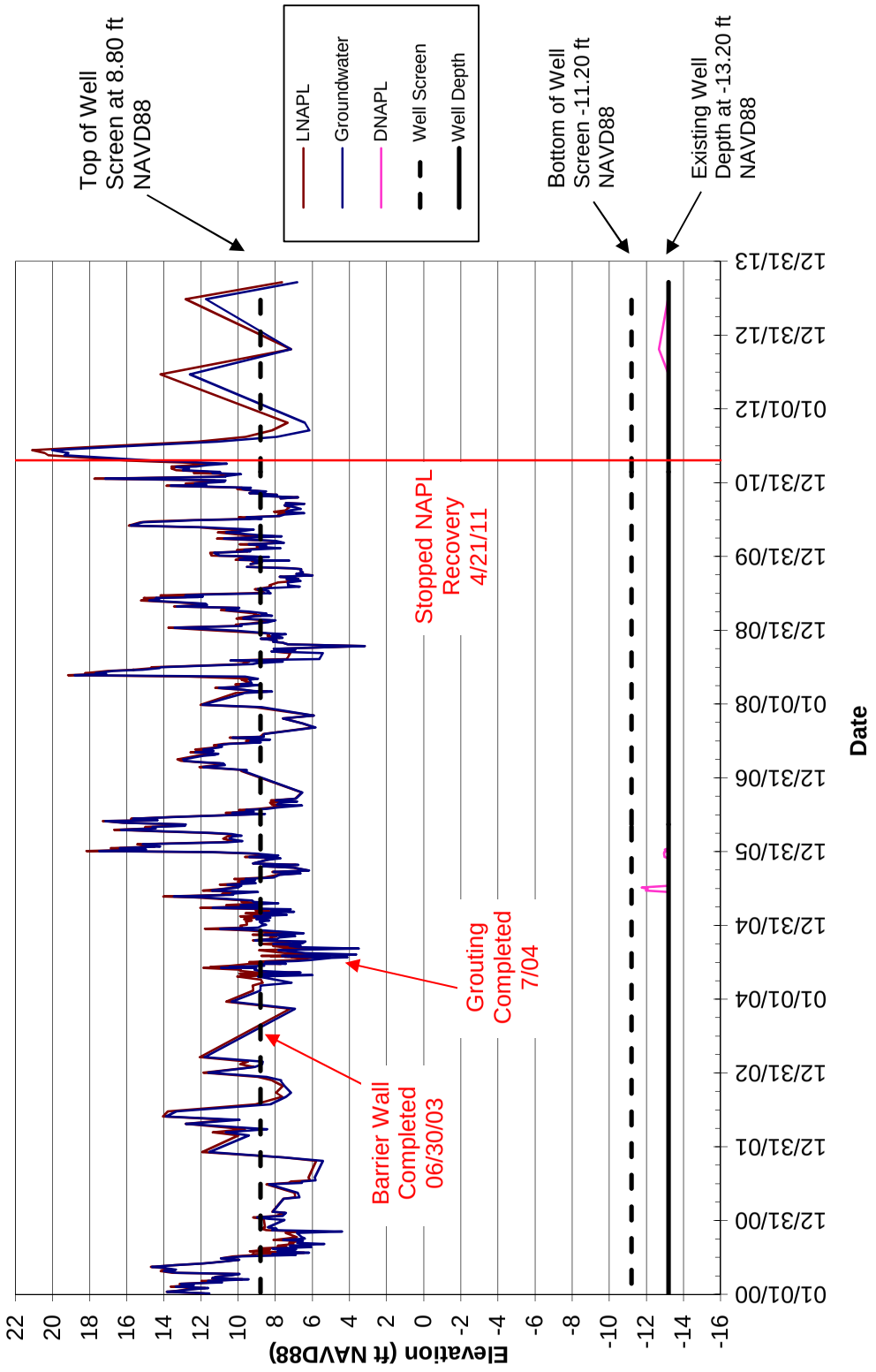
LNAPL and DNAPL Distribution Map for September 19, 2013 Monitoring Event

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure
4-13

Document Path: P:\Portland\205 - OR DEQ\003 - 003 McCormick and Baxter\Project GIS\Project mxds\2013 Annual Report\Figure4-13 LNAPL and DNAPL Map Sept19 2013.mxd



McCormick and Baxter Superfund Site
Portland, Oregon

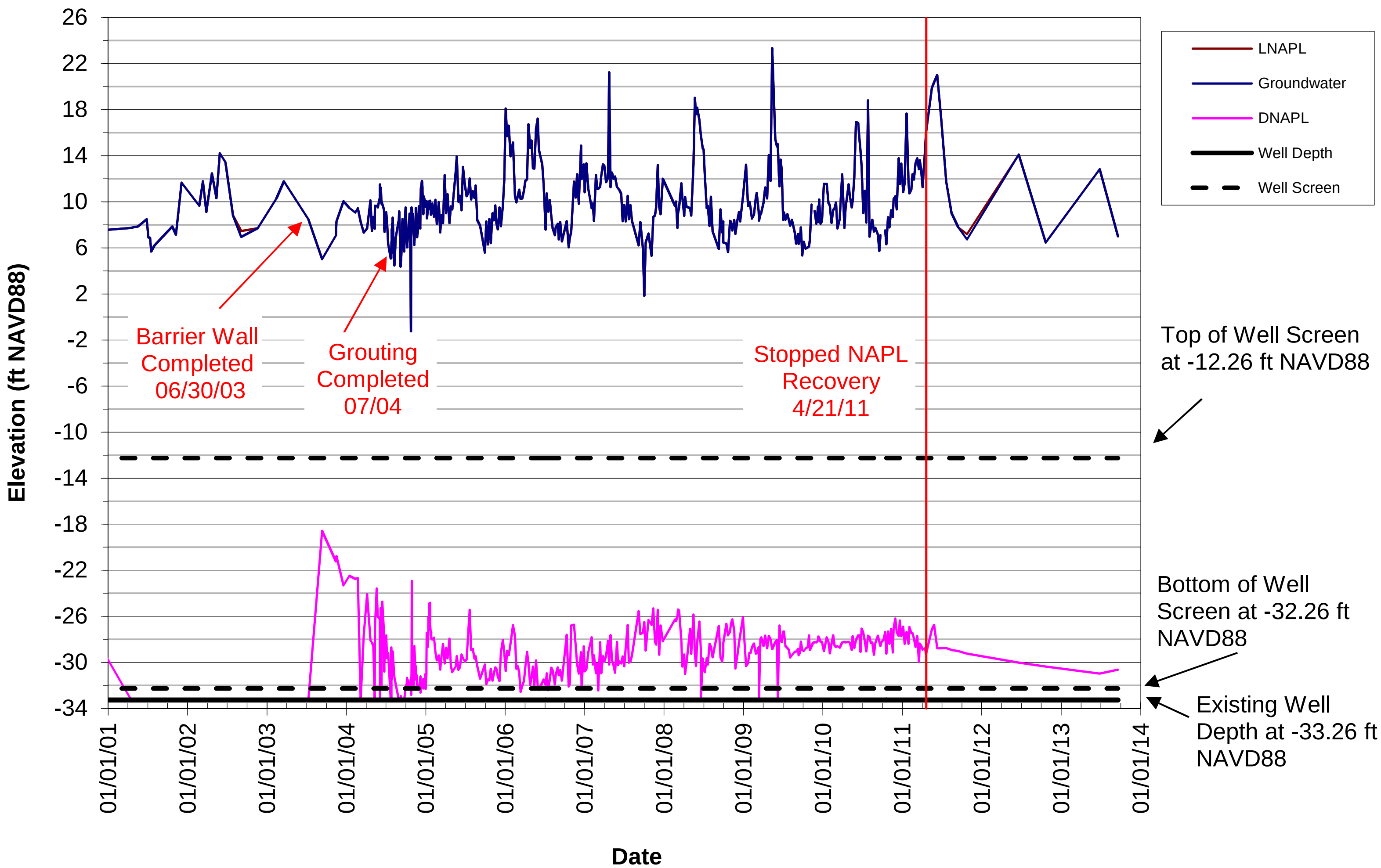
1999 to 2013 NAPL Thickness Plot for Well EW-10s

4/14

HARTCROWSER GSI Water Solutions, Inc.

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 2013 NAPL Thickness Plot for Well MW-20i

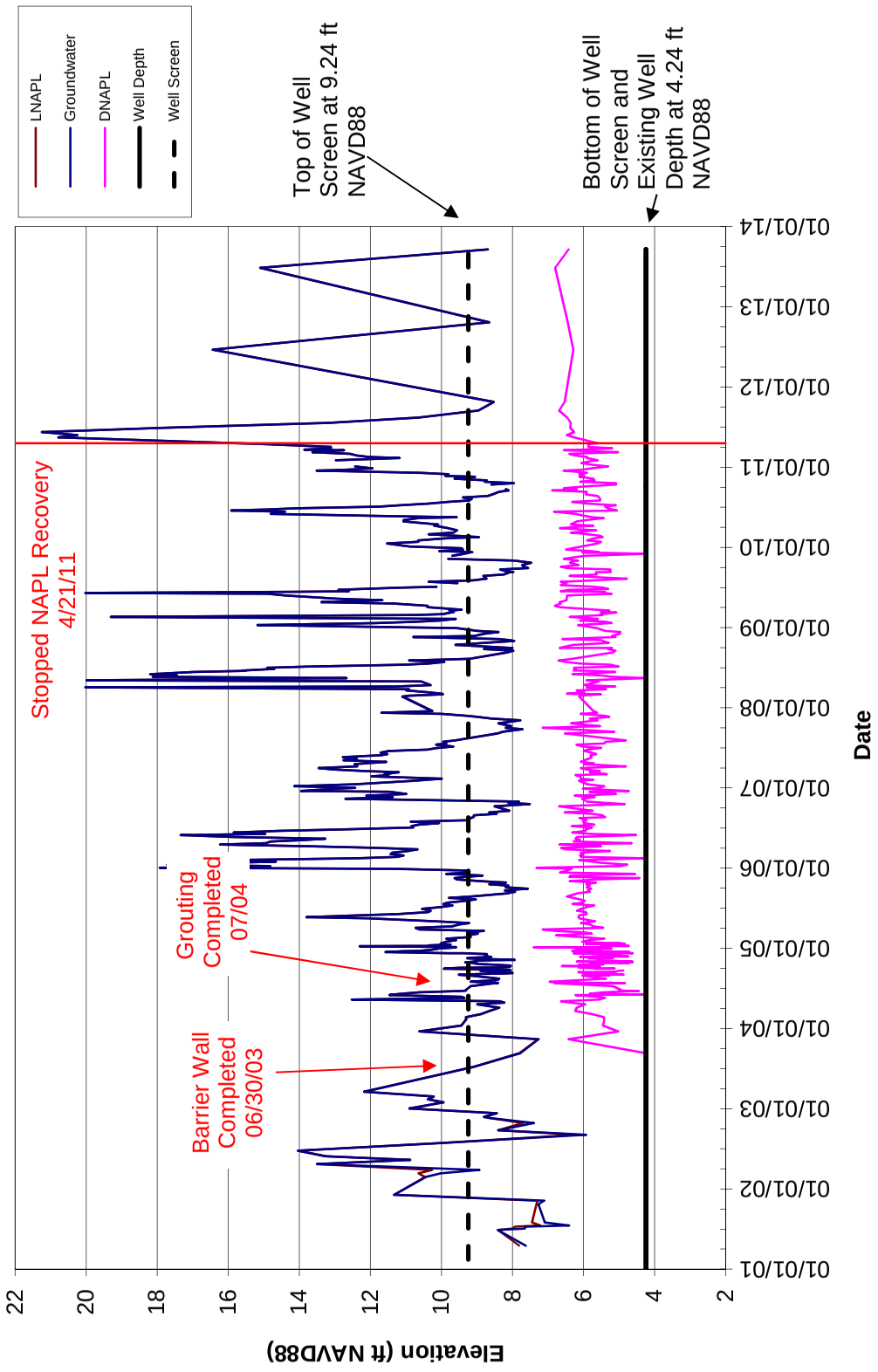
4/14

HARTCROWSER

GSI Water Solutions, Inc.

Figure

4-15



McCormick and Baxter Superfund Site
Portland, Oregon

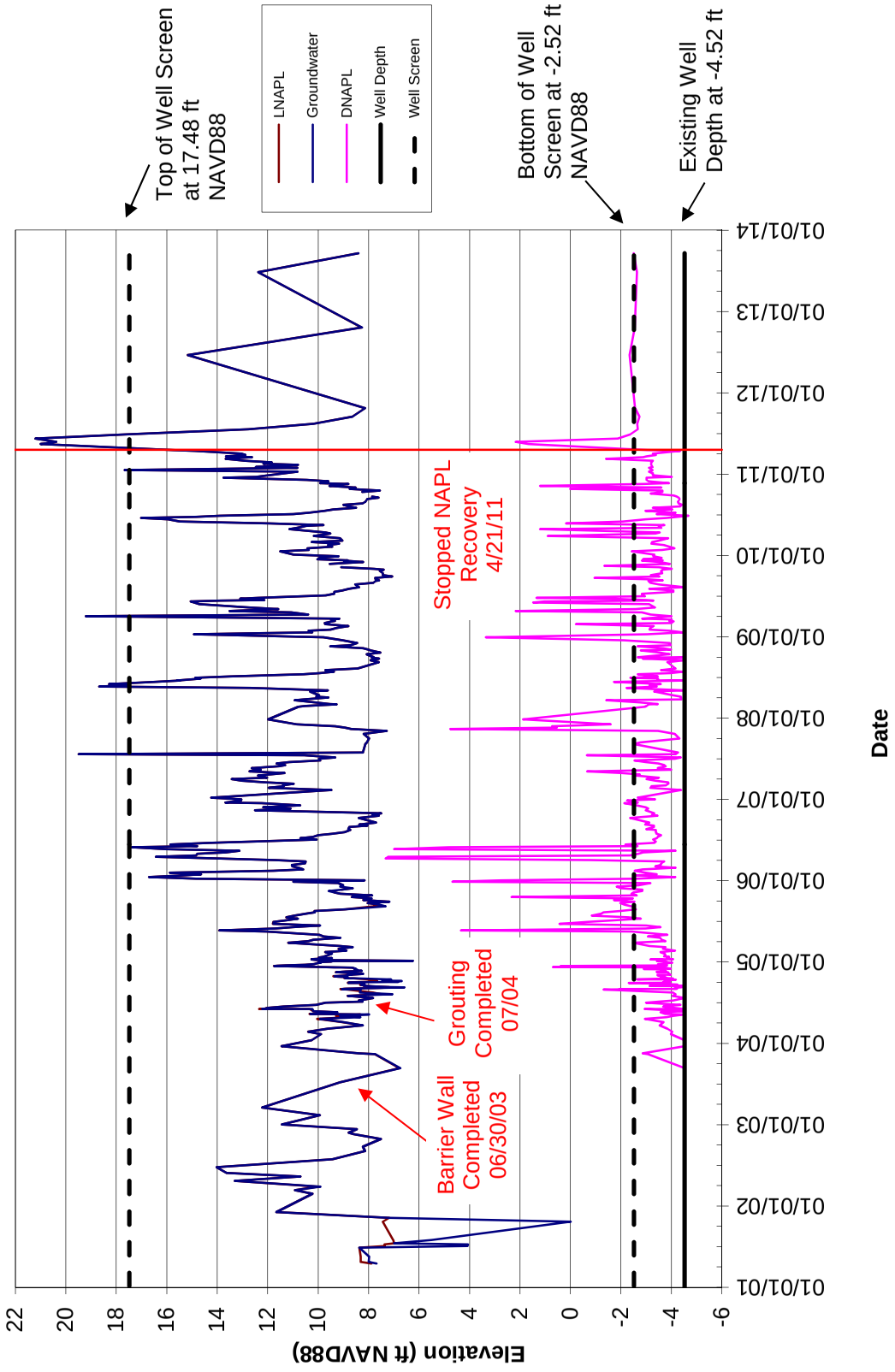
2001 to 2013 NAPL Thickness Plot for Well MW-Ds

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-16



McCormick and Baxter Superfund Site
Portland, Oregon

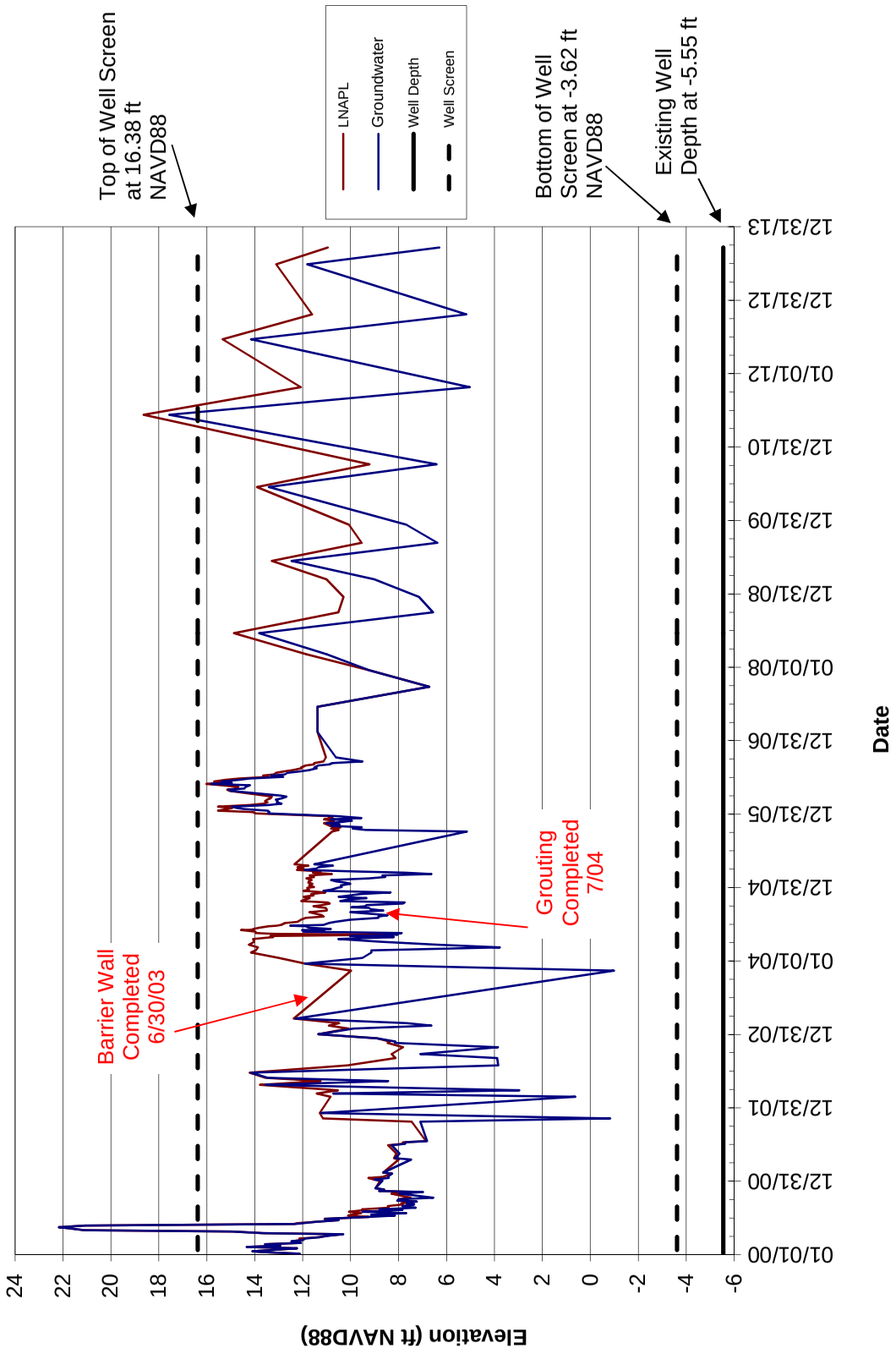
2001 to 2013 NAPL Thickness Plot for Well MW-Gs

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-17



McCormick and Baxter Superfund Site
Portland, Oregon

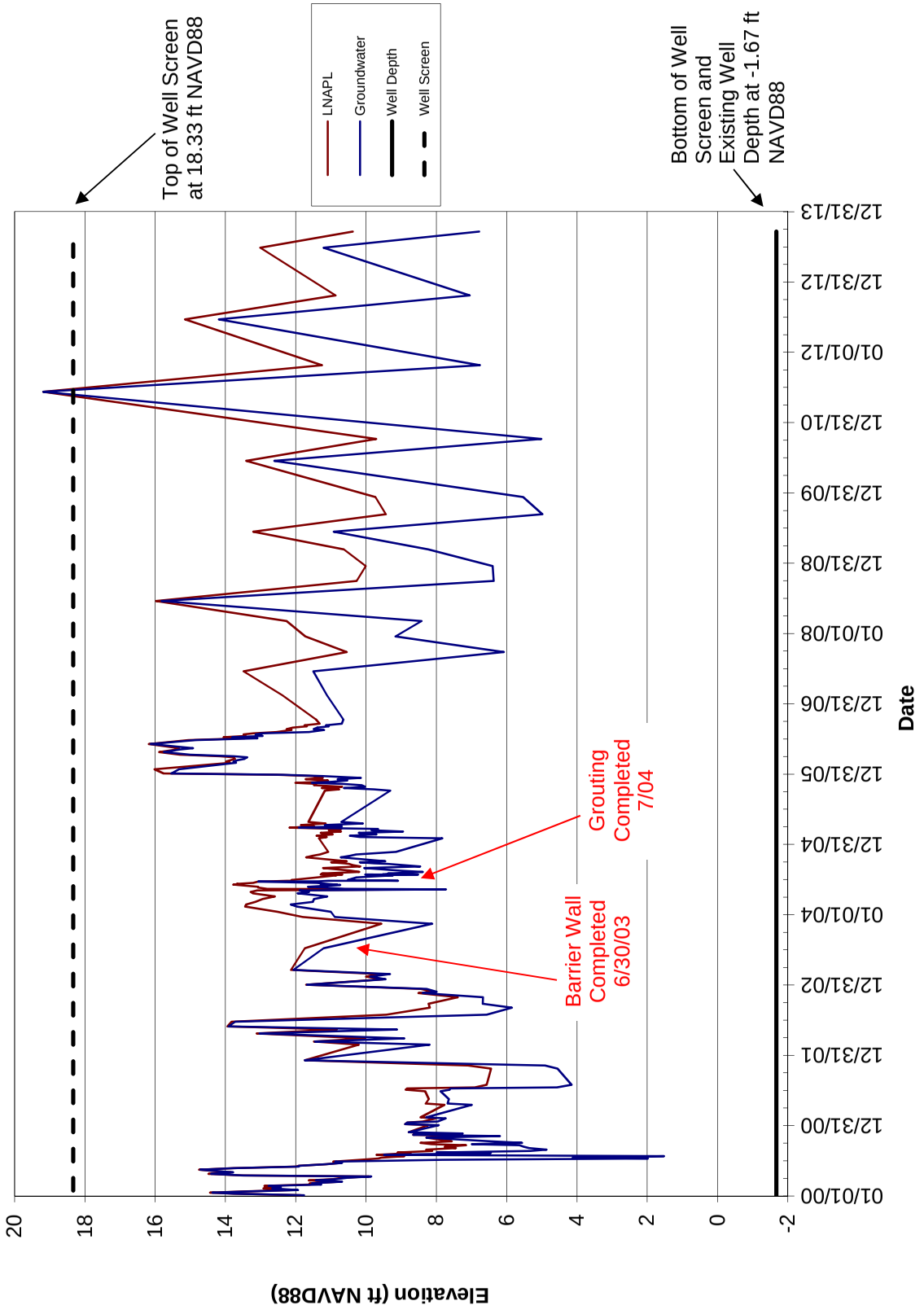
1999 to 2013 NAPL Thickness Plot for Well EW-15s

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-18



McCormick and Baxter Superfund Site
Portland, Oregon

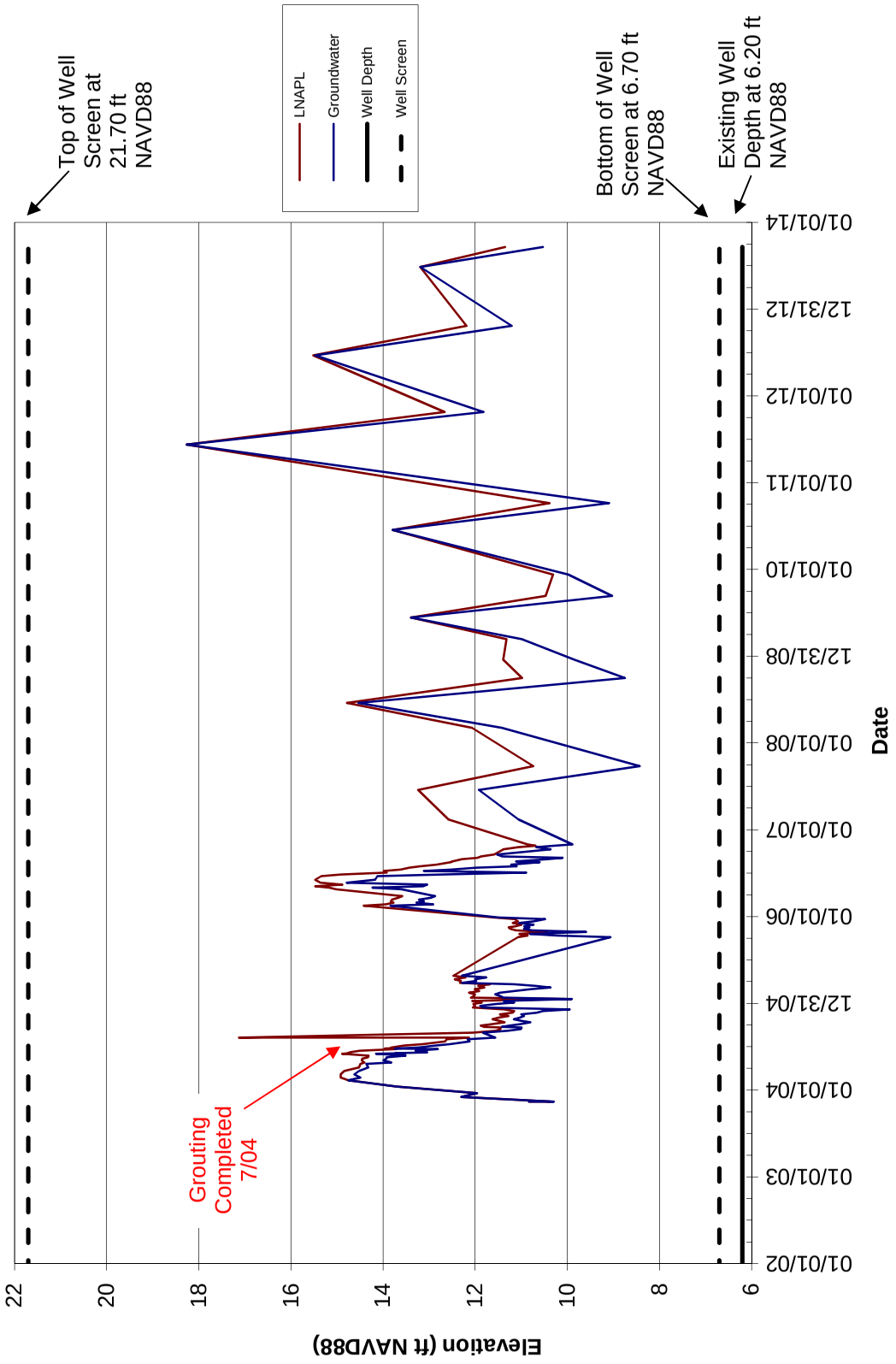
1999 to 2013 NAPL Thickness Plot for Well EW-23s

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-19



McCormick and Baxter Superfund Site
Portland, Oregon

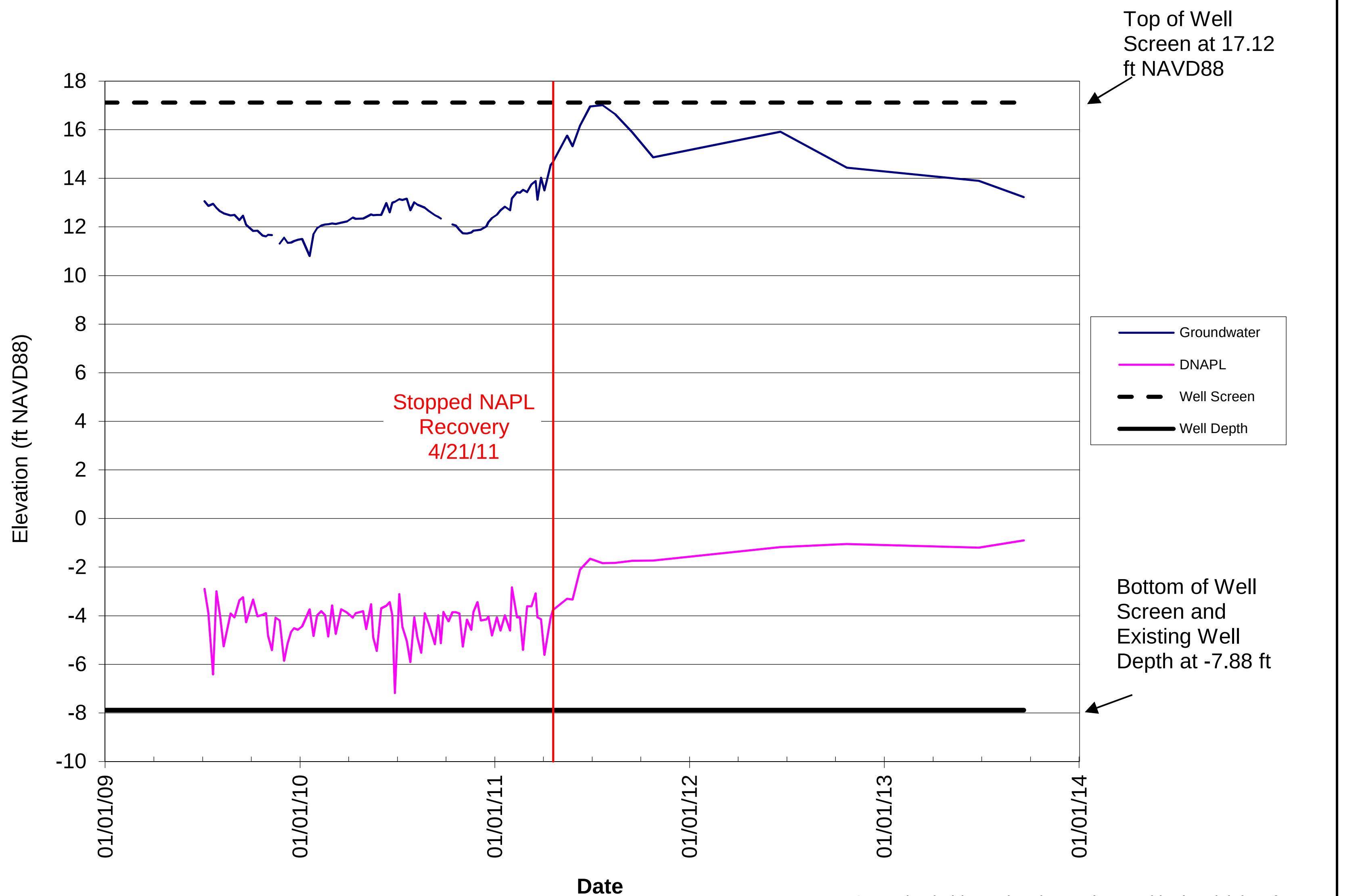
2003 to 2013 NAPL Thickness Plot for Well MW-56s

4/14

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 are changing with time, the elevations shown are approximate.

McCormick and Baxter Superfund Site
Portland, Oregon

2009 to 2013 NAPL Thickness Plot for Well EW-1s

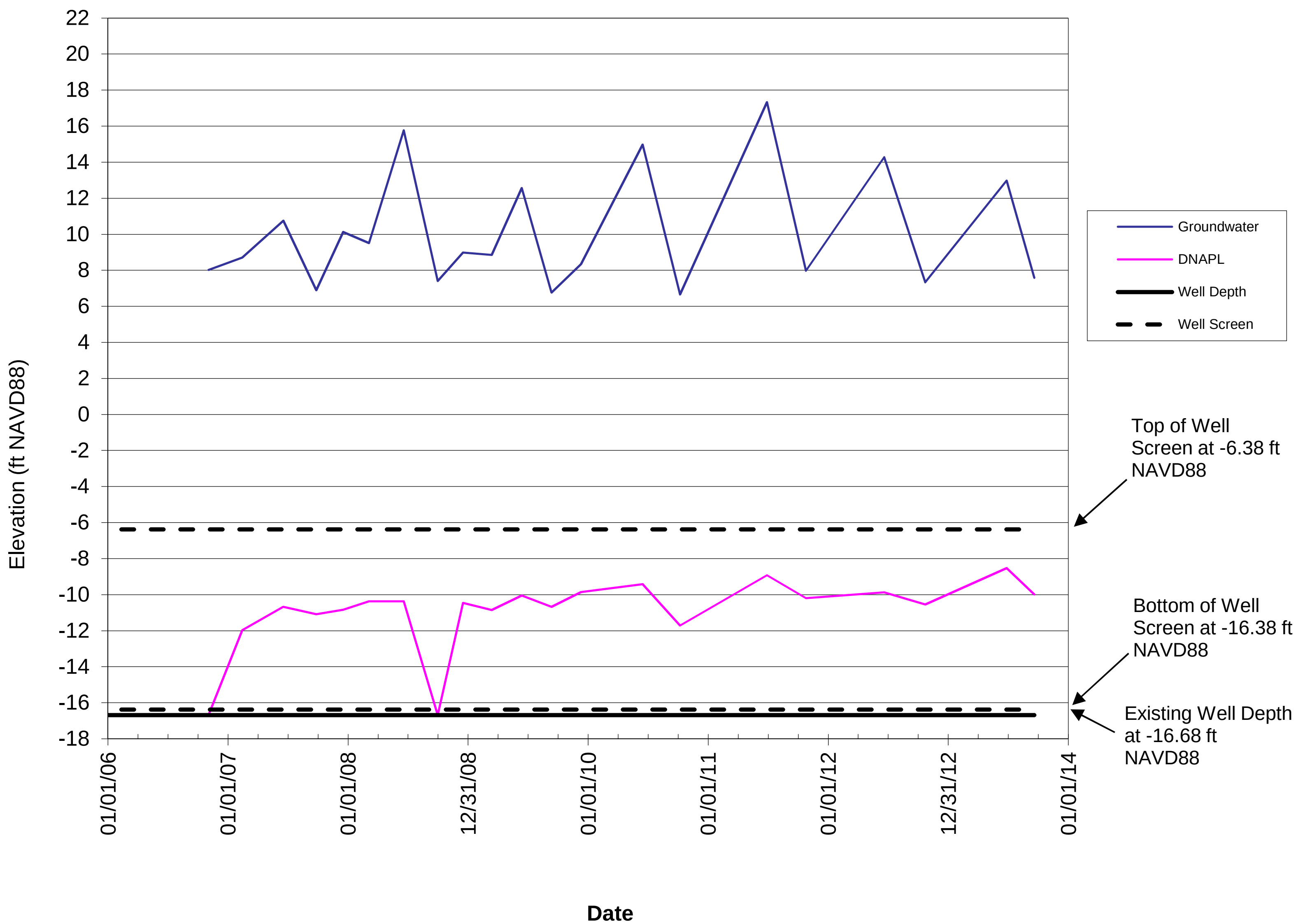
4/14

HARTCROWSER

GSI Water Solutions, Inc.

Figure

4-21



McCormick and Baxter Superfund Site
Portland, Oregon

2006 to 2013 NAPL Thickness Plot for Well MW-22i

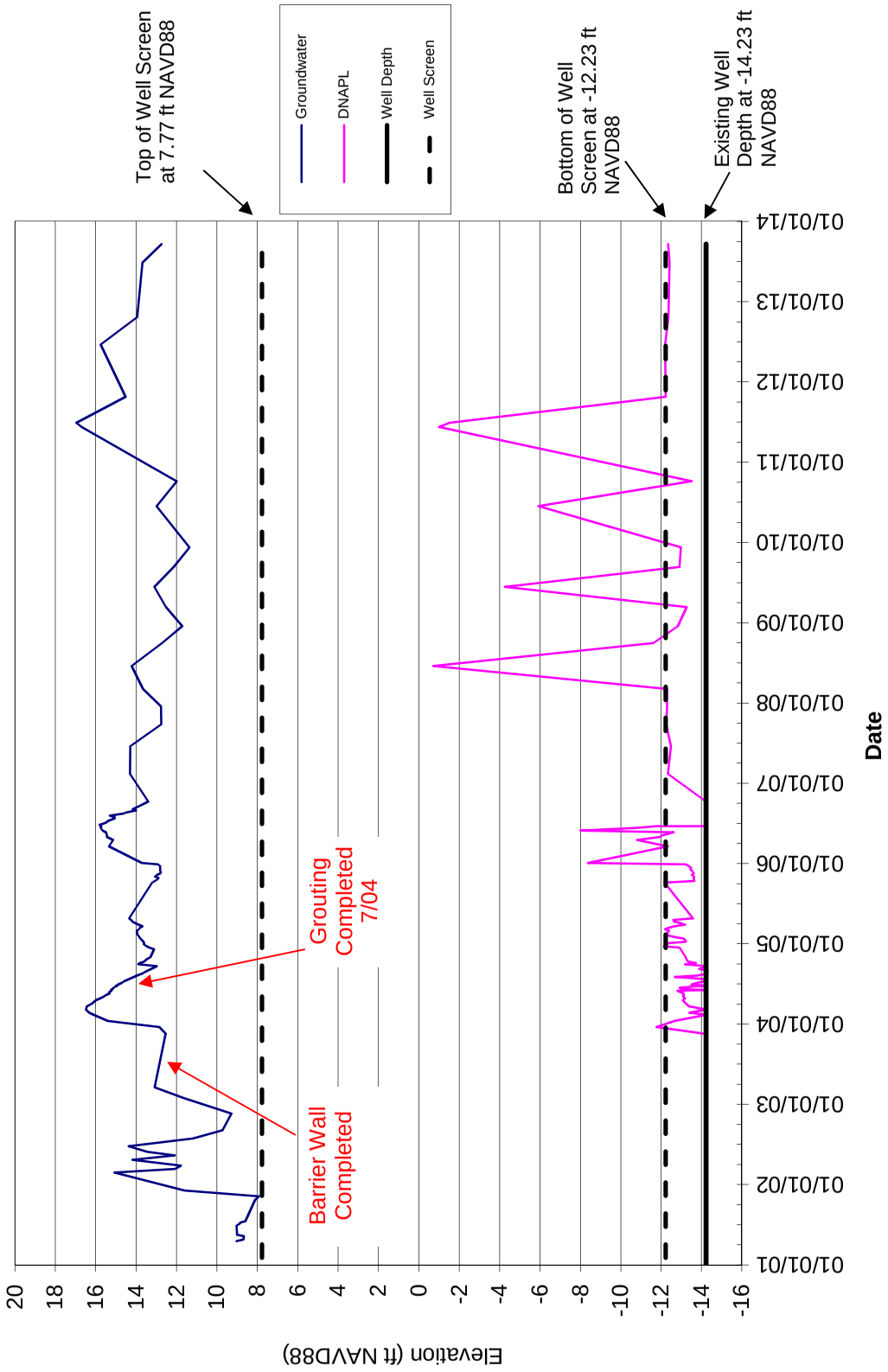
4/14

Hart Crowser

GSI Water Solutions, Inc.

Figure

4-22



McCormick and Baxter Superfund Site
Portland, Oregon

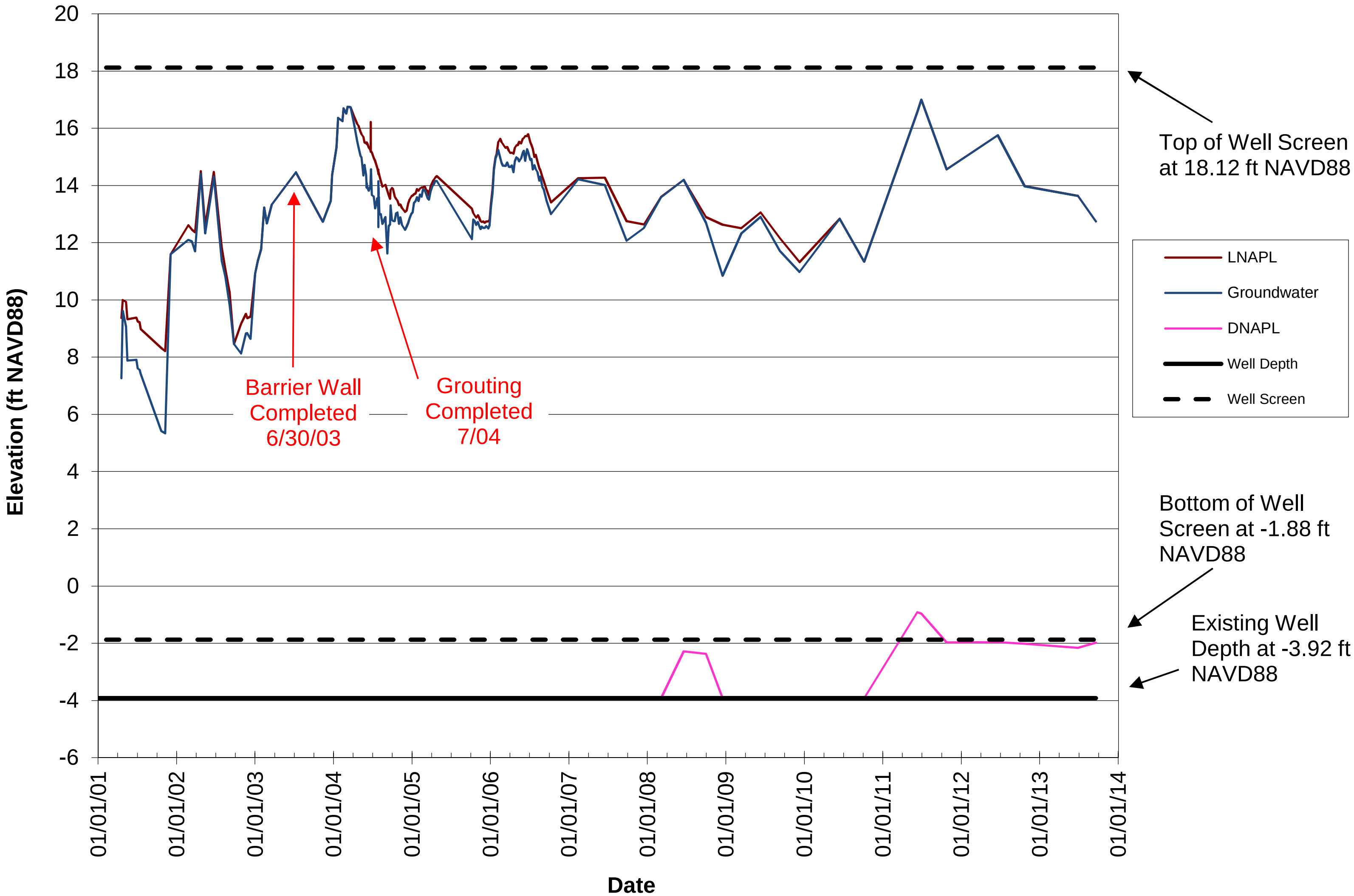
2001 to 2013 NAPL Thickness Plot for Well EW-8s

4/14

HARTCROWSER GSI Water Solutions, Inc.

Figure

4-23



McCormick and Baxter Superfund Site
Portland, Oregon

2001 to 2013 NAPL Thickness Plot for Well EW-18s

4/14

HARTCROWSER

GSI Water Solutions, Inc.

Figure

4-24

ENTRANCE AREA
Fence (Typ.)
Property Line
Gravel Road
Union Pacific Railroad
Burlington Northern Inc.
(Spokane, Portland, and Seattle Railway Co.)
DRAINAGE SWALE
EARTHEN CAP
Barrier Wall
Stormwater
Retention
Pond
Riprap
IMPERMEABLE CAP
Rock Pile
RIPARIAN AREA
Willamette Cove
Sand Pile
SEDIMENT CAP
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

2/14

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
PHOTOTGRAPHIC LOG –
SITE ACTIVITIES AND OBSERVATIONS

OPERATION AND MAINTENANCE REPORT
JANUARY 2013 TO DECEMBER 2013
MCCORMICK AND BAXTER SUPERFUND SITE
PORTLAND, OREGON

Photograph 1 – Typical animal burrow underneath perimeter fence. Photograph taken facing east with Union Pacific Railroad in the background.

Photograph 2 – Evidence of ground squirrel on upland soil cap.

Photograph 3 – One of the MW-58 monitoring wells showing localized erosion and concrete surface seal completely undermined prior to repairs.

Photograph 4 – MW-58 well under repair. Old concrete surface seal and well monument removed prior to replacement.

Photograph 5 – MW-58 well under repair. Old surface seal and monument removed. New concrete surface seal is approximately 2-feet deep.

Photograph 6 – MW-58 well cluster repairs completed without making modifications to the existing well casing heights.

Photograph 7 – Two of the three MW-58 wells in the well cluster completed.

Photograph 8 – Perimeter fence along Union Pacific Railroad under repair. Photograph taken facing southeast.

Photograph 9 – Willamette River shoreline showing distribution of woody debris and habitat gravel on ACB armoring. Photograph taken facing northwest.

Photograph 10 – Habitat gravel distribution on ACB armoring. Photograph taken facing west.

Photograph 11 – Habitat gravel settled throughout lower, flatter, shoreline. Habitat boulder cluster can also be seen in the photograph. Photograph taken facing northwest.

Photograph 12 – Habitat gravel settled on lower shoreline.

Photograph 13 – Typical habitat gravel placement throughout upper shoreline.

Photograph 14 – Crayfish seen on sediment cap rock armoring.

Photograph 15 – Transient boats throughout Willamette Cove. Photograph taken facing west.

Photograph 16 – Exposed ACB armoring cables were cut to remove the trip hazard.

Photograph 17 – Creosote pole washed up on Willamette River shoreline. This pole was removed from the shoreline. Photograph taken facing southwest.

APPENDIX B
DOCUMENTATION

Date	Time in	a.m/p.m	Time Out	a.m/p.m	Name	Name of company, Agency, or Organization	Comment (Purpose of Visit)
11/30/12	0725	a.m.	0730	am	Jason Miles	HC	Picking up sign in Sheet
01/04/13	1020	a.m	1116	a.m	Jason Miles	HC	Responding to a non response from the security system.
1/22/13	0955	am	1315	pm	Jason Miles	HC	Cut cable / check buoys / Throw trash
2/6/13	1020	am	1200	pm	Chris Martin	HC	Responded non-response alarm
2/19/13	1042	am	1300	PM	Jason Miles	HC	Alarm system Assessment
2/19/13	1042	am	1236	PM	Robin VanTine	Century Link	Alarm System Assessment
2/21/13	1318	PM	1344	PM	Jason Miles	HC	Job Shadow
2/21/13	1318	PM	1344	PM	David Sensibaugh	HC	Job Shadow
3/1/13	0857	am	1238	PM	Jason Miles	HC	Disperse Drums

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.)
3/14	1300		1615		Chris Martin	HC	Quarterly Site Meeting
3/14	1300		1600		Scott McIntyre	DEQ	
"	"		1345		John McDonald	NW Natural	discuss abandonment
"	"		1600		Sarah Miller	DEQ	
"	"		1600		Neil Buescher	GSI	
3/20	927	am	1037	a.m	Jason Miles	HC	Kubota maintenance
3/20	1135	am	1418	pm	"	"	Back from Napa with parts Thaw connector/Hookup t-valve
3/28	0930	am	1100	am	Brian Allen	Phillips Electronics	Alarm
3/28	0930	am	1440		Jason Miles	HC	Alarm Install/Kubota Service
3/28	957	am	1440		Craig Ressler	McFarland's mobile	Veh Service
4/11	0910	am	1055	AM	Chris Martin	~~Sprinkler System~~ HC	Sprinkler System
4/11	0910	am	1055	AM	Jason Miles	~~Sprinkler System~~ HC	Sprinkler System
4/11	0910	am	1015	AM	Richard Moreno	VERDE	SPRINKLER SYSTMEM
4/23	1315	PM	1440	PM	Chris Martin	HC	Site visit
4/23	1315	PM			Duane Hennessy	HC	
4/23	1315	PM			Sarah Miller	DEQ	
4/27	0945	AM	1537	PM	Jason K. Miles	HC	NAPL Removal/O&M

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

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time IN	a.m./ p.m.?	Time OUT	a.m./ p.m.?	Name	Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
6-27-13	8:15	a.m	17:30	p.m	Jason Miles	Hart Crowser	Low-tide monitoring
6-27-13	8:15	a.m.	14:00		Chris Martin	Hart Crowser	Low-tide monitoring
6/27	840				Troy Faber	HC	"
6/28	830	1130			Chris Martin	HC	Site insp. Meeting
6/28	8:30	1130			S. MAZZO	DEQ	"
6/28	830	1130			Hal Blischke	GSI	"
7/2	0843	a.m	1410	pm	Jason Miles	HC	Maintenance Items
7/2	10:05	am	13:33	pm	Dave Hennessey	HC	Veg. monitoring
7/12	07:55	a.m	11:20	a.m	Jason Miles	HC	Maintenance
7/12	07:55	am	11:20	a.m	Chris Martin	HC	Maintenance
7/22	1400	PM	1604	PM	Jason Miles	HC	Water trees
7/23	0910	AM	0940	AM	Chris Martin	HC	Fire inspection
7/23	0910	AM	0940	AM	Rob Bell	Portland Fire/Rescue	Fire inspection
8/12	0815	AM	1320		Chris Martin	HC	Backflow test
8/12	0815	AM	845		Bill Ellis	ASSE ABT	Backflow test
8/12	100	PM	120	pm	Mike Hanan	Huser	Fire Ext's inspection
8/20	10:55	AM	1250		Scott Thibert	TWF	Pick up organoclay mat

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.)
8/13	4:11	PM	5:40	PM	Erin Carroll	GSI Water Solutions	
8/13	4:11	PM	5:40	PM	William Fish's Env. Sci Class	PSU	
8/20	10:55	AM	1250		Chris Martin	HC	Pick up organic clay mat
9/19	07:37	AM	1615	PM	Jason Miles	HC	Data logger maint/Low Tide Monitoring
9/19	1130	AM	330	P	Troy Fowler	HC	Low tide
9/19	1130	AM	330	P	Brooke Schmidt	HC	Low tide
9/20	0856	AM			Jason Miles	HC	Switch out Data loggers FW-15 and MW-37
9/27	8:30	AM	0945		T. Kevin Ogan	West Yost	Fence Repair Coverage
9/27	8:30	AM	0945		John Payne	West-meyer	fence repair
9/27	8:30	AM	0945		Jason Miles	HC	Fence Repair
10/3	11:30	AM	5pm	pm	Diane Hennessy	HC	Monitoring - Vegetation
10/10	0900	AM	1135 1200		Chris Martin	HC	Site inspection
10/16	0900	AM	~~1130~~ 1130		Heidi Blaschke	GSI	Site inspection
10/16	910	AM	1130	AM	Sarah Miller	DEQ	" "
10/16	910	"	1130	"	Scott Manzano	DEQ	" "

F:\Data\Jobs\DEQ\15670-xx M&B\15670-00\Task 4\2007 draft OM Manual\Tables\2.2 site visit log

McCormick & Baxter Operational & Functional Determination Period Status Meeting Report

Thursday 3/14/13
1:00 P.M.
6900 N. Edgewater Street
Portland, OR 97203

Meeting called by:	Oregon Department of Environmental Quality (DEQ)	Type of Meeting:	Monthly 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
	John McDonald	Env. Specialist	NW Natural

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 Thursday, March 14, 2013. John McDonald from NW Natural Gas attended the beginning of the site walk to describe NW Natural's plan to decommission a gas line within the railroad right of way along the northern property boundary. The next inspection is scheduled for June 2013.

Site Walk – Shoreline

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

- Willamette and Willamette Cove shoreline conditions.
- Gravel overlay on ACB.
- Riparian Area Repairs: Turf Reinforcement Mat and Plantings
- Buoy locations.
- Stormwater discharge.

Gravel from the shoreline enhancement task (completed in October 2012) has settled into the voids of the ACB. Much of the excess gravel has washed away or settled further down the bank. In general the gravel appears to be working as intended. Trees planted as part of the shoreline enhancement plan have been planted 10-15 feet upgradient from the TRM repair location where they were intended to be planted.

The Willamette River at the time of inspection (between 1:00 and 3:00 PM) was between 8 and 9 feet NAVD88. Low tide was at 5 PM with a tide of approximately 7.8 feet NAVD88. All of the 5 buoys were present and visible. Discharge from the outfall was moderate (approximately 10 gpm). The outfall was in good condition and clear of debris.

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.
- Work zone to be affected by NW Natural's plan to abandon a gas line.

The site perimeter fence was intact, no new areas of burrowing were identified, and the drainage basin was dry. The distance between the inner and outer casing at MW-23d showed no movement – still at 2.56".

Action Items:	Person Responsible	Deadline
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Martin	Quarterly
■ Discuss alarm system options with Philips Electronics	Chris Martin	June 2013
■ Contact Native Ecosystems Northwest regarding interest/cost estimate for removal of above ground sprinkler components.	Chris Martin	June 2013
■ Contact Cherokee Construction regarding trees planted away from TRM repair	Chris Martin	June 2013
■ Dispose of hazardous and non-hazardous waste accumulated from site investigations	Chris Martin	June 2013
■ Conduct a Site clean-up prior to our June quarterly site visit	Chris Martin	June 2013
■ Request Metro combination lock for backup access to upper gate	Scott Manzano	June 2013

Site Activities / Miscellaneous Field Activities

Buoy Monitoring: All five buoys were visible during the site visit.

Clean Fill Disposal (MW-2 and MW-3): Based on the Technical Memorandum dated December 3, 2012, from GSI to the DEQ regarding the Comparison of soil from decommissioning of MW-2 and MW-3 to clean fill/background levels, DEQ determined that the soil could be dispersed onto the topsoil in the soil cap area. Jason (HC) spread the well decommissioning materials lightly on the cap surface in the area of the original wells on March 4, 2013.

False Security Alarms: Hart Crowser was called by the security system provider (Philips Electronics) regarding the security systems failure to automatically call the alarm company. The alarm should automatically call Philips every 30 days to confirm proper operation of the system. Hart Crowser staff visited the site on January 6 and February 6, 2013 in response to these alarms. Philips determined the problem was with the phone line, not the alarm system. Century Link visited the site with Jason (HC) to troubleshoot the phone lines in February. Century Link noticed multiple lines within the phone box for M&B although only one is currently in use. These lines were also mis-labeled. Since Century Link's visit, we have not had a false alarm call from the system.

Deliverables

Final 2012 O&M Report: The Final 2012 O&M Report will be submitted to the DEQ in April 2013.

Action Item:	Person Responsible:	Deadline:
Final 2012 O&M Report	Chris Martin/Heidi Blischke	April 2013

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

Meeting Status:

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

McCormick & Baxter Operational & Functional Determination Period Status Meeting Report

Friday 6/28/2013
8:30 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
	Chris Martin	Field Manager	Hart Crowser
	Heidi Blischke	Technical Manager	GSI

Site Status Meeting Notes

Site Walk and Inspection

Scott Manzano, Chris Martin, and Heidi Blischke completed a thorough inspection of the entire site on Friday, June 28, 2013. The next inspection is scheduled for September 2013.

Site Walk – Shoreline

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

- Willamette and Willamette Cove shoreline conditions.
- Gravel overlay on ACB.
- Riparian Area Repairs: Turf Reinforcement Mat and Plantings
- Buoy locations.
- Stormwater discharge.

Gravel from the shoreline enhancement task (completed in October 2012) appears to be working as intended. Gravel has settled into the voids of the ACB. Much of the excess gravel has washed away or settled further down the bank. Trees planted as part of the shoreline enhancement plan appear to be in good condition. The trees were planted 10-15 feet above (into the riparian area) from the TRM repair locations where they were intended to be planted. The site ecologist (Dianne Hennessey) will assess the most efficient shrubs to be planted adjacent to the repairs, and report her findings in late summer.

The Willamette River at the time of inspection (between 8:30 and 11:30 AM) was between 12.5 and 13 feet NAVD88. Low tide was at 2 PM with a tide of approximately 12.2 feet NAVD88. All of the 5 buoys were present and visible, although the center buoy was partially submerged (~6 inches).

Discharge from the outfall was moderate (approximately 5-10 gpm). The outfall was in good condition although weeds have begun to accumulate in the discharge stream. The weeds will be removed when the team is out doing other maintenance activities.

Large creosote-impregnated log was observed sitting on the ACB. Log will be removed and disposed of at Hillsboro Landfill.

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, some new areas of burrowing were identified (rodent sized burrows), and the drainage basin was dry. The distance between the inner and outer casing at MW-23d showed no movement – still at 2.56".

Soil has eroded from the flush mount wells on the railroad property adjacent to Willamette Cove. The wells are no longer within Oregon Water Resource well construction code and must be repaired.

Action Items:	Person Responsible	Deadline
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Martin	Quarterly
■ Dispose of hazardous and non-hazardous waste accumulated from site investigations	Chris Martin	September 2013
■ Collect bid requests and implement site irrigation system removal.	Chris Martin	September 2013
■ Request Metro combination lock for backup access to upper gate	Scott Manzano	September 2013
■ Evaluate plantings along the repaired TRM	Chris Martin	July 2013
■ Weed around upland RCRA cap stormwater outfall	Chris Martin	September 2013
■ Remove creosote-impregnated log from ACB	Chris Martin	September 2013

Site Activities / Miscellaneous Field Activities

Irrigation System Removal: Hart Crowser will collect quotes from irrigation/landscape firms to estimate the cost of removing the sprinkler system from the site. Upon approval from DEQ, hart Crowser will execute the irrigation system removal.

Well Monument Replacement: The ground surface surrounding monitoring well cluster MW-58d, MW-58i, and MW-58s has eroded below the existing well monument and monument foundation. Hart Crowser will collect bids from qualified monitoring well drillers to replace the three existing flush-mounted monitoring wells with new above-ground casings.

Deliverables

Final 2012 O&M Report: The Final 2012 O&M Report was be submitted to the DEQ in May 6, 2013.

Action Item:	Person Responsible:	Deadline:
Sediment Cap Monitoring Design	Heidi Blischke	Draft 7/12/2013

Budget Status: April through June 2013 were at/or below the anticipated budget.

Meeting Status:

Date / Time	TBD – September 2013	
Location	McCormick & Baxter Facility	Site Office

McCormick & Baxter Operational & Functional Determination Period Status Meeting Report

Wednesday 10/16/2013
9:00 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, October 16, 2013. The next inspection is scheduled for January 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) appears to be working as intended. Gravel has settled into the voids of the ACB. Much of the excess gravel has washed away or settled further down the bank. Trees planted as part of the shoreline enhancement plan appear to be in good condition, although with leaves missing for the winter it is hard to be sure. The trees were planted 10-15 feet above (into the riparian area) from the TRM repair locations where they were intended to be planted. To cover the TRM repair location as originally intended, the site ecologist (Diane Hennessey) suggests planting Northwest sandbar willow (*Salix fluvialis or Salix* sessilifolia) using 10" plugs that already have the roots grown instead of willow stakes.

The Willamette River at the time of inspection (between 9:30 and 11:30 AM) was between 7.6 and 6.9 feet NAVD88. Low tide was at 1 PM with a tide of approximately 6.7 feet NAVD88. All of the 5 buoys were present and visible.

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

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.

The site perimeter fence was intact, with some areas of burrowing identified (rodent sized burrows), and the drainage basin was dry.

The distance between the inner and outer casing at MW-23d is approximately 1/16 of an inch less than previously (2.50" versus 2.56"). This movement will be monitored during subsequent site visits.

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.

Action Items:	**Person Responsible**	**Deadline**
■ Continue to Monitor MW-23d inner/outer casing relationship for movement.	Chris Martin	Quarterly
■ Dispose of hazardous and non-hazardous waste accumulated from site investigations	Chris Martin	December 2013
■ Collect bid requests and implement site irrigation system removal.	Jason Miles	March 2014
■ Request Metro combination lock for backup access to upper gate.	Scott Manzano	December 2013
■ Request additional plantings along the repaired TRM.	Chris Martin	March 2014

Site Activities / Miscellaneous Field Activities

Irrigation System Removal: In spring 2014, Hart Crowser will collect quotes from irrigation/landscape firms to estimate the cost of removing the sprinkler system from the site. Upon approval from DEQ, Hart Crowser will execute the irrigation system removal.

Deliverables

Draft Final O&M Plan: The Draft Final 2012 O&M Plan for continued maintenance and monitoring was submitted to site stakeholders in October 2013.

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

Budget Status: June through October 2013 were at/or below the anticipated budget.

Meeting Status:

Date / Time	January 29, 2014 9:30AM	
Location	McCormick & Baxter Facility	Site Office

Table 3.1
Example Soil Inspection Form
McCormick and Baxter Creosoting Company
Portland, Oregon

3/14/2013

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)	48°F
Wind Speed (day of observation)	Light wind 8 to 18 mph
Total Precipitation (week of observation)	0.05 inches
Erosion	None Observed
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, significant flow, greater than 30 gpm
Flow in Collection Piping	Moderate flow, approximately 10 gpm
Outfall and Spillway	
Note Approx. Flow Volume	Significant flow, greater than 30 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:**

Table 3.1
Example Soil Inspection Form
McCormick and Baxter Creosoting Company
Portland, Oregon

6/28/2013

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)	78°F
Avg. Low temp (week of observation)	60°F
Wind Speed (day of observation)	Light wind 3 to 9 mph
Total Precipitation (week of observation)	0.48 inches
Erosion	None Observed
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	Birds, Geese
Daily Activities	Site Inspection and Low Tide Monitoring
Obsevations or Notes	
Follow Up Inspection	☐ Yes ☒ No Date:

Table 3.1
Example Soil Inspection Form
McCormick and Baxter Creosoting Company
Portland, Oregon

10/16/2013

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)	67°F
Avg. Low temp (week of observation)	42°F
Wind Speed (day of observation)	Light wind 3 to 7 mph
Total Precipitation (week of observation)	0.00 inches
Erosion	None Observed
Around Manholes	None Observed
Headway Retention Pond	None Observed
Eastern Edge of Property	None Observed
Spillway Area	None Observed
Outfall Area	Fair, needs more rock placement
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	Good
Wildlife	Birds, Geese, Crawdad
Daily Activities	Site Inspection and Low Tide Monitoring
Obsevations or Notes	
Follow Up Inspection	☐ Yes ☒ No Date:

Table 3.2
Example Sediment Inspection Form
McCormick and Baxter Creosoting Company
Portland, Oregon

3/14/2013

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)	48°F
Wind Speed (day of observation)	Light wind 8 to 18 mph
Total Precipitation (week of observation)	0.05 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 (8 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	All five buoys visible
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)

Table 3.2
Example Sediment Inspection Form
McCormick and Baxter Creosoting Company
Portland, Oregon

6/28/2013

Site Observations Form - Sediment Cap
Quarterly

tbl_site_observations

Category	Observation
Gate Conditions (quarterly)	All locked and secure
Avg. High Temp (week of observation)	78°F
Avg. Low Temp (week of observation)	60°F
Wind Speed (day of observation)	Light wind 3 to 9 mph
Total Precipitation (week of observation)	0.48 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	12 to 30 plus feet (13 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	All five buoys visible
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)

Table 3.2
Example Sediment Inspection Form
McCormick and Baxter Creosoting Company
Portland, Oregon

10/16/2013

Site Observations Form - Sediment Cap
Quarterly

tbl_site_observations

Category	Observation
Gate Conditions (quarterly)	All locked and secure
Avg. High Temp (week of observation)	67°F
Avg. Low Temp (week of observation)	42°F
Wind Speed (day of observation)	Light wind 3 to 7 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.)	None Observed
ACB and Riprap Armoring	Good
Changes in Location	Good
Displaced blocks	Good
Vandalism	None Observed
River relative to top of ACB	40 to 80 plus feet. (7 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	All five buoys in place and in good condition
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)

REQUEST FOR BIDS
ENVIRONMENTAL WELL MONUMENT REPLACEMENT

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
MCCORMICK AND BAXTER SITE
PORTLAND, OREGON

QUESTIONS BY: AUGUST 30, 2013, 12:00 Noon.

BID SUBMITTAL DATE: SEPTEMBER 4, 2013, 12:00 Noon.

INTRODUCTION

Hart Crowser, Inc., is currently performing environmental services for the Oregon Department of Environmental Quality (DEQ). Hart Crowser intends to subcontract with an environmental drilling subcontractor (Subcontractor) to repair three monitoring well monuments at the McCormick and Baxter Site (Site) in Portland, Oregon (Figure1).

The scope of work generally includes removing three existing damaged flush-mounted monitoring well monuments and replacing them on or between September 16 and 20, 2013 (anticipated conditions and other requirements are described in detail below).

Provided mandatory requirements are met, selection will be based on the total estimated cost. The selected drilling firm must be licensed and bonded in the State of Oregon, and the driller must be licensed in Oregon to construct/alter monitoring wells. The Subcontractor will be responsible for performing the work in accordance with Oregon Water Resources Department (OWRD) regulations and procedures, and preparing and submitting all documentation required by the OWRD (e.g., start cards, well reports). The selected firm will be required to execute a standard Hart Crowser contract and/or task order for these services.

SITE LOCATION AND DESCRIPTION

Location. The Site address is 6900 North Edgewater Street, Portland, Oregon, just off North Willamette Boulevard (Figure 1). The Site is located on the Willamette River at approximately River Mile 7, and encompasses approximately 41 acres of land and an additional 23 acres of capped contaminated river sediments.

8910 Gemini Drive
Beaverton, Oregon 97008-7123
Fax 503.620.6918
Tel 503.620.7284

Description. Figure 2 shows the layout of the project site. The McCormick and Baxter Creosoting Company operated at the Site between 1944 and 1991, treating wood products with creosote, pentachlorophenol, and inorganic (arsenic, copper, chromium, and zinc) preservative solutions. Significant concentrations of wood-treating compounds have been found in soil and groundwater at the Site and in river sediments adjacent to the Site. Currently, the Site is vacant except for a paved parking area, a small shop building, two field office trailers, and associated utilities used to support ongoing remedial action operations and maintenance.

As part of site characterization activities, wells MW-58s, MW-58i, and MW-58d were installed northwest of the site. A gravel maintenance road leads up to the wells. The ground surface surrounding the three wells has eroded away causing the 2-inch diameter PVC well casings to become exposed underneath the monuments.

SCOPE OF WORK

This purpose of this task is to replace the damaged flush-mounted monuments to restore the protectiveness of monitoring wells surface seal. Subcontractor's work shall conform to all applicable regulations pertaining to the monitoring well alterations, including obtaining the necessary variances and filing the required documentation with the OWRD. If our scope below differs from OWRD regulations, the OWRD regulations will prevail. A Hart Crowser representative will be present to observe the repair activities. We anticipate that all work will be completed in one day. Well logs for the three wells and photographs showing current conditions are included in Attachment A. The locations of MW-58s, MW-58i, and MW-58d are highlighted on Figure 2.

Monument Replacement. A licensed driller under subcontract to Hart Crowser will remove the existing flush-mounted monuments and concrete surface seals and replace them. The existing concrete surface seal extends approximately 8 inches below ground surface. When replacing the monuments, the new concrete surface seal shall extend approximately 2 feet below ground surface to protect against future erosion. It is not anticipated that the monitoring well casing will need to be extended or shortened as a result of these repairs.

Investigation-Derived Waste. Repair activities are not anticipated to generate any soil or water investigation-derived waste. Materials generated by the well repairs, such as well monuments, concrete, empty bentonite bags, and other waste materials shall be removed from the Site and properly disposed of by the Subcontractor.

HEALTH AND SAFETY

The Subcontractor shall be responsible for all matters relating to the health and safety of their personnel and equipment in performance of the work. This includes recognition of the potential health and safety hazards associated with the work and compliance with the minimum requirements of the Health and Safety Plan in force for the work. The Subcontractor has the option to exercise more conservative health and safety practices provided Hart Crowser is given a minimum of one day's notice.

BID INFORMATION AND SUBMITTAL

Required Bid Submittal Information

The following information is required in the bid submittal, using the attached Bid Request Form:

A) Company bonding/licensing information;

B) Company address, phone numbers, and contact person;

C) Lump sum cost to complete the above scope of work; and

D) Indication that project schedule can be met (i.e., perform work on or between September 16 through 20, 2013.

Definition of Bid Items

The following defines the bid items listed on the attached Bid Request Form.

Item 1 – Monitoring Well Repairs. Costs for this line item shall include all labor, per diem, travel, equipment, and materials (e.g., monuments and concrete) associated with repairing wells MW-58s, MW-58i, and MW-58d. The lump sum cost shall include mobilization to the site, demobilization following completion of work, and disposal. Cost associated with obtaining and/or filing the OWRD start cards and reports are also included in this line item.

Proposed Bidding and Project Schedule

If you wish to bid on this project, please respond by returning a completed Bid Request Form to Chris Martin by hard copy, e-mail (chris.martin@hartcrowser.com), or facsimile (503-620-6918). All submittals must be received no later than **12:00 p.m., September 4, 2013**. Telephone quotes will not be accepted. Only those firms solicited by Hart Crowser may provide a bid. Late or

incomplete submittals are grounds for rejection of the bid, but Hart Crowser reserves the right to waive minor informalities.

Please contact Chris Martin at (503) 432-5979 or chris.martin@hartcrowser.com, if you have any questions regarding this bid request (all questions must be received by August 30, 2013, at noon). We anticipate selection the week of September 4, 2013. It is intended that a contract with the selected firm will be executed the week of September 9, 2013. The activities shall be scheduled with Hart Crowser to be completed on or by September 20, 2013.

Basis for Selection

Selection will be based on the total lump sum cost as indicated on the submitted Bid Request Form. Additionally, the following mandatory requirements must be met: proper bonding/licensing and ability to meet the project schedule.

Protest Provisions

Those solicited by Hart Crowser for this request for bids may submit a protest in writing to Chris Martin by hard copy, e-mail (chris.martin@hartcrowser.com), or facsimile (503-620-6918). Protests relating to the bid solicitation process may be submitted up to one day (24-hours) prior to the bid submittal due date mentioned above. Protest to the award selection will be allowed up to 3 days after the protester knows, or reasonably should have known, of the award of the contract. Written protests shall clearly state all of the grounds of the protest and must include all arguments and evidence in support of the protest. Hart Crowser will investigate and issue a written response to the protest within 5 business days.

CONTRACT AND PAYMENT

Terms and Conditions

The selected firm will be required to execute Hart Crowser's agreement for subcontracting services, if not currently under a Continuing Services Agreement with Hart Crowser (Attachment B). If selected, proof of insurance will be required. Additionally, there are flow-down provisions in our prime agreement with the DEQ that pertain to subcontracts (Attachment C) and minimum insurance requirements that must be met (Attachment D). Subcontractor shall comply with the relevant aspects of these flow-down provisions.

Payment

We will require copies of submitted OWRD reports (e.g., start cards and well forms) prior to payment. Payment to the Subcontractor will then be based on lump sum cost stipulated in the contract (which will include the completed Bid Request Form); will constitute complete compensation for furnishing all supervision, labor, equipment, overhead, profit, material, and services; and will be paid after accomplishing and completing all required work, notwithstanding that minor tasks may not be mentioned herein. Unless explicitly identified elsewhere, all lump sum items shall be considered 100 percent complete when approved by Hart Crowser.

Attachments:
Figure 1 – Site Location Map
Figure 2 – Site and Monitoring Well Locations
Environmental Well Replacement Bid Request Form
Attachment A – Site Information
Attachment B – Example Hart Crowser Agreement for Subcontracting Services
Attachment C – Referenced Sections of Prime Agreement
Attachment D – Insurance Requirements from Prime Agreement

APPENDIX C
PHOTOGRAPHIC LOG – VEGETATION OBSERVATIONS

OPERATION AND MAINTENANCE REPORT
JANUARY 2013 TO DECEMBER 2013
MCCORMICK AND BAXTER SUPERFUND SITE
PORTLAND, OREGON

Photograph 1 – Typical rodent holes, these were observed in the stormwater swale area. (October 2013)

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 - October 2013)

Photograph 3 - Tree and shrub plantings on the earthen cap are spreading. Taken looking southeast from Photograph Location 2. (October 2013)

Photograph 4 – Eastern edge of the earthen cap with perimeter road in foreground. Taken looking west from Photograph Location 3. (October 2013)

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 - October 2013)

Photograph 6 – Tree plantings on the earthen cap. Taken looking northwest from Photograph Location 5. (October 2013).

Photograph 7 – Impermeable cap dominated by grasses and herbaceous vegetation. Taken looking east from Photograph Location 6 comparing baseline and current conditions. (Left - June 2011, Right - October 2013)

Photograph 8 – Impermeable cap dominated by grasses and herbaceous vegetation. Taken looking southeast from Photograph Location 7 comparing baseline and current conditions. (Left - June 2011, Right - October 2013)

Photograph 9 – Vegetation growth and wood debris within the lower riparian component. Taken looking southeast from Photograph Location 8. (October 2013)

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 - October 2013)