







Operation and Maintenance Report January 2018 to December 2018

McCormick and Baxter Superfund Site

Portland, Oregon ECSI Site No. 74

Prepared for **Oregon Department of Environmental Quality**

March 29, 2019 150-002-005/Task 3







Operational and Maintenance Report January 2018 to December 2018

McCormick and Baxter Superfund Site Portland, Oregon

Prepared for

Oregon Department of Environmental Quality

March 29, 2019 150-002-005/Task 3

Prepared by

GSI Water Solutions, Inc.

Ein Cemall Hushes

Erin Carroll Hughes, LHG

Hydrogeologist

Hart Crowser, Inc.

Kaylan Smith

Hart Crowser, Inc.

Expires: 5/31/ 2.0/9

Richard D. Ernst, RGProgram Manager

Kaylan Smyth, EITSite Manager

Tel 503.620.7284

Contents

1.0 INTRODUCTION AND PURPOSE	1
2.0 SOIL CAP PERFORMANCE STANDARDS AND ACTIVITIES 2.1 Soil Cap Performance Standards 2.2 Soil Cap Observations 2.3 Soil Cap Maintenance Activities 2.4 Summary of Soil Cap Remedy Performance	2 2 3 5
3.0 SEDIMENT CAP PERFORMANCE STANDARDS AND ACTIVITIES	6
3.1 Sediment Cap Performance Standards	6
3.2 Sediment Cap Observations	7
3.3 Sediment Cap Maintenance Activities	9
3.4 Summary of Sediment Cap Remedy Performance	9
4.0 GROUNDWATER PERFORMANCE STANDARDS AND ACTIVITIES	;
	10
4.1 Groundwater Flow Direction and Gradient Assessment	10
4.2 NAPL Gauging and Monitoring Assessment	12
4.3 Groundwater Remedy Maintenance Activities	14
4.4 Summary of Groundwater Remedy Performance	14
5.0 VEGETATION MANAGEMENT	14
5.1 Vegetation Management Components and Goals	15
5.2 Baseline Conditions in 2010	16
5.3 Vegetation Observations in 2018	18
5.4 Vegetation Maintenance Activities	21
5.5 Vegetation Performance Summary	21
6.0 SUMMARY OF OVERALL REMEDY PERFORMANCE	22
7.0 SUMMARY OF PLANNED ACTIVITIES FOR 2019	22
8.0 REFERENCES	22



ii Contents

TABLES

- 2-1 Soil Cap O&M Activities in 2018
- 3-1 Sediment Cap O&M Activities in 2018
- 4-1 Groundwater and NAPL Elevations: June 20, 2018
- 4-2 Groundwater and NAPL Elevations: September 21, 2018
- 4-3 Groundwater O&M Activities in 2018
- 7-1 Soil Cap O&M Activities Planned through 2023
- 7-2 Sediment Cap O&M Activities Planned through 2023
- 7-3 Groundwater O&M Activities Planned through 2023

FIGURES

- 1-1 Site Location Map
- 1-2 Current Site Layout and Features
- 1-3 Site Capping Components
- 1-4 Current Site Layout with Surface Elevations
- 1-5 Historical Contaminant Source Areas
- 1-6 Historical NAPL Distribution Cross Section
- 2-1 Site Observation Summary 2018
- 4-1 Groundwater Monitoring Well Location Map
- 4-2 Groundwater Contour Map for June 20, 2018 Sampling Event
- 4-3 Groundwater Contour Map for September 21, 2018 Sampling Event
- 4-4 Groundwater Elevations in Monitoring Wells MW-52s and MW-53s
- 4-5 2018 Shallow Groundwater Elevations within the Barrier Wall
- 4-6 2018 Groundwater Elevations in Monitoring Wells MW-36 and MW-37
- 4-7 2018 Groundwater Elevations in Monitoring Wells MW-44 and MW-45
- 4-8 2018 Vertical Gradients for Monitoring Well Cluster MW-36 and MW-37
- 4-9 LNAPL and DNAPL Distribution Map for June 20, 2018 Sampling Event
- 4-10 LNAPL and DNAPL Distribution Map for September 21, 2018 Sampling Event
- 4-11 1999 to 2018 NAPL Thickness Plot for Well EW-10s
- 4-12 2001 to 2018 NAPL Thickness Plot for Well MW-20i
- 4-13 2001 to 2018 NAPL Thickness Plot for Well MW-Ds
- 4-14 2001 to 2018 NAPL Thickness Plot for Well MW-Gs
- 4-15 1999 to 2018 NAPL Thickness Plot for Well EW-15s
- 4-16 1999 to 2018 NAPL Thickness Plot for Well EW-23s
- 4-17 2003 to 2018 NAPL Thickness Plot for Well MW-56s
- 4-18 2009 to 2018 NAPL Thickness Plot for Well EW-1s
- 4-19 2006 to 2018 NAPL Thickness Plot for Well MW-22i
- 4-20 2001 to 2018 NAPL Thickness Plot for Well EW-8s
- 4-21 2001 to 2018 NAPL Thickness Plot for Well EW-18s
- 5-1 Site Plan



APPENDIX A

Photograph Log – Site Activities and Observations

APPENDIX B

Site Activity Documentation

APPENDIX C

Photograph Log – Vegetation Observations



iv | Contents

Acronyms and Abbreviations

ACB articulated concrete block
AWQC ambient water quality criteria
bgs below the ground surface

BES City of Portland, Bureau of Environmental Services
DEQ Oregon Department of Environmental Quality

DNAPL dense non-aqueous phase liquid
EPA U.S. Environmental Protection Agency

ft/ft foot per foot

FWDA Former Waste Disposal Area

HC/GSI Hart Crowser, Inc./GSI Water Solutions, Inc.

ICs institutional controls

IGA Intergovernmental Agreement
LNAPL light non-aqueous phase liquid
MCLs maximum contaminant levels
mg/kg milligrams per kilogram
NAPL non-aqueous phase liquid

NAVD88 North American Vertical Datum of 1988

NOAA National Oceanic and Atmospheric Administration

ng/L nanograms per liter

O&M Operation and Maintenance
PAHs polycyclic aromatic hydrocarbons

PCP pentachlorophenol PVC polyvinyl chloride

RCRA Resource Conservation and Recovery Act

RM River Mile

ROD Record of Decision

site McCormick and Baxter Superfund site

TFA Tank Farm Area

TRM turf-reinforced matting $\mu g/L$ micrograms per liter USGS U.S. Geological Survey



Operation and Maintenance Report January 2018 to December 2018

McCormick and Baxter Superfund Site Portland, Oregon

1.0 INTRODUCTION AND PURPOSE

This Operation and Maintenance (O&M) Report has been prepared for the Oregon Department of Environmental Quality (DEQ) to document the O&M activities implemented at the McCormick and Baxter Superfund Site (site) located in Portland, Multnomah County, Oregon, between January 1, 2018, and December 31, 2018.

O&M activities are identified in the Final O&M Plan prepared by the DEQ and the U.S. Environmental Protection Agency (EPA) (DEQ/EPA 2014). The Final O&M Plan defines the administrative, financial, and technical details and requirements for inspecting, operating, and maintaining the remedial actions at the site. The DEQ and EPA reduced the scope and frequency of O&M activities conducted at the site in 2010, from the frequency conducted at the site from 2005 through 2010. The Final O&M Plan reflects that reduction. The O&M Manual 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. Hart Crowser, Inc., and GSI Water Solutions, Inc. (HC/GSI) recently updated the O&M Manual in June 2017 (HC/GSI 2017).

The purpose of this O&M Report is to document the operation, monitoring, and maintenance activities that occurred in calendar year 2018. Figure 1-1 shows the location of the site; Figure 1-2 presents the site layout and features; Figure 1-3 presents the site capping components; Figure 1-4 presents the site layout with surface elevations; Figure 1-5 presents the historical contaminant areas; and Figure 1-6 presents historical non-aqueous phase liquid (NAPL) distribution. This report has been prepared by DEQ's contractor team, Hart Crowser and GSI.

The O&M performance standards and activities for the soil cap and sediment cap are discussed in Sections 2 and 3, respectively. The groundwater performance standards and activities are summarized in Section 4. Vegetation management is presented in Section 5. Section 6 discusses the remedy performance, and Section 7 presents recommendations for 2019. Section 8 provides references. Appendix A provides a photograph 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. Appendix C provides the photograph log for vegetation observations.

Routine operation, monitoring, and maintenance activities in 2018 were implemented primarily by the DEQ's contractor, Hart Crowser, and its teaming partner GSI (under subcontract to Hart Crowser).



2 McCormick and Baxter Superfund Site

O&M activities were also performed by American Backflow Services and McDermott Fence and Construction, Incorporated.

Key personnel for implementation of O&M activities include:

- Sarah Miller: Oregon DEQ Project Officer
- Danielle Johnson: Oregon DEQ Contract Officer
- Steve Campbell: Oregon DEQ Former Contract Officer
- Rick Ernst: Hart Crowser Program Manager
- Kaylan Smyth: Hart Crowser Site Manager
- Phil Cordell: Hart Crowser Former Site Manager
- Erin Carroll Hughes: GSI Hydrogeology Manager
- Heidi Blischke: GSI Former Technical Manager

2.0 SOIL CAP PERFORMANCE STANDARDS AND ACTIVITIES

This section presents a summary of soil cap performance standards, observations, and maintenance activities at the site for the reporting period January 1, 2018, through December 31, 2018, and a summary of remedy performance as related to the performance standards. The Final O&M Plan provides a description of the remedial action objectives and the soil operable unit remedy. Table 2-1 provides the soil cap activities conducted in 2018.

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 require long-term monitoring and maintenance. The performance standards for the soil cap are as follows:

- Maintain contaminant concentrations in surface soil below the following risk-based cleanup goals, as specified in the Record of Decision (ROD) (EPA 1996):
 - Arsenic: 8 milligrams per kilogram (mg/kg)
 - PCP: 50 mg/kg
 - Total carcinogenic PAHs: 1 mg/kg
 - Dioxins/furans: 0.00004 mg/kg
- Maintain the topsoil layer to within 50 percent of its design specification as follows:
 - Maintain a topsoil thickness of at least 6 inches for the area over the impermeable geomembrane cap; and
 - Maintain a topsoil thickness of at least 12 inches for all areas except over the impermeable geomembrane cap.



- Minimize infiltration of rainwater within the subsurface barrier wall by maintaining the subsurface stormwater conveyance system.
- Minimize stormwater erosion and ponding outside the barrier wall by maintaining site grading, surface stormwater conveyance, and native vegetation.
- Maintain native vegetation within the 6-acre riparian zone for compliance with the National Marine Fisheries Service Biological Opinion (National Oceanic and Atmospheric Administration [NOAA] 2004).

2.2 Soil Cap Observations

Soil cap observations were conducted according to the Final O&M Plan. Routine quarterly site inspections were conducted on February 8, May 23, August 2, and October 19, 2018, by DEQ, Hart Crowser, and GSI. These inspections are documented on observation forms developed for the site. Supporting documentation and pertinent details are included in Appendix B. Observations of interest from the routine inspections are summarized on Figure 2-1 and described below. Representative site photographs taken in 2018 are presented in Appendix A. As required for the site administrative record, a log of all site visitors in 2018 was kept and is also included in Appendix B.

2.2.1 Visual Inspection

The upland soil cap provides habitat for rabbits, ground squirrels, Canada geese, several other species of birds, and coyotes. Despite placing gravel to fill gaps under the fence around the upland portion of the site, periodic burrowing continues to be observed under the fence and along the perimeter road. These burrows are filled as necessary and are not of major concern.

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

Canada geese were also observed on the upland soil cap during a maintenance site inspection on April 11, 2018 (Photograph 2, Appendix A). Approximately 100 Canada geese were foraging on the upland soil cap.

On September 24, 2018, a fire burned approximately one acre of grass at the northeast side of the site on the earthen soil cap. The northwest edge of the burned area was approximately 200 feet southeast of the site shop building and burned grass in between the fence and gravel road around monitoring wells PW-2d and MW-Os and the backflow assembly above ground vault (Photograph 3, Appendix A). The fire burned the grass groundcover leaving several bare areas of the soil exposed, but it did not





4 McCormick and Baxter Superfund Site

damage monitoring wells or "no trespassing" signs. During the October 2018 site inspection, there was evidence of grass sprouting and re-growing in the burned area (Photograph 4, Appendix A).

The gate at the top of North Edgewater Road marks the entrance to the site and Willamette Cove property. This gate, which is locked with a series of locks and a chain, provides access for two railroads, Northwest Natural Gas, Metro Regional Government, DEQ, and other agencies that require access to the area. The Union Pacific Railroad tracks, which runs parallel northwest to the site and neighboring properties, are often used by the public to access the area. Access to the area generally does not affect security because of the surrounding fence and lighting at the site. However, on September 21, 2018, a 2-foot by 2-foot hole in the chain-linked fence was discovered at the second-most northwestern riverside gate (Photograph 5, Appendix A) and the lock at the northern most riverside gate was missing. The chain link fence on the gate had been clearly cut and several sleeping bags were found on the site. The chain link fence was repaired in October 2018 (Photograph 6, Appendix A).

2.2.2 Soil Cap Subsidence

In June 2008, subsidence of the soil cap was observed near groundwater monitoring wells EW-1s and MW-23d. An upland site survey confirmed that the ground surface had subsided approximately 1 foot in a limited area around the wells between the time that the soil cap was installed in 2005 and 2008. A Subsidence in Upland Cap Memorandum (HC/GSI 2008) and an Additional Subsidence Monitoring Memorandum (HC/GSI 2009) present the results of the survey and additional investigation to determine the cause of the subsidence.

Based on elevated groundwater temperatures in well EW-1s (40 °C) and the large amount of buried woody debris in the area, it was suspected that aerobic degradation of woody debris was occurring and causing the ground surface subsidence. Decreasing groundwater levels within the barrier wall also may have contributed by opening a larger unsaturated zone that allows compaction. In 2009, the shallow well EW-1s was sealed to reduce the amount of oxygen reaching the unsaturated zone. After the well was sealed, subsidence slowed with no additional subsidence being observed over the past 9 years. The groundwater temperature dropped to approximately 21 to 23°C and has remained stable for the past 9 years. This temperature is still higher than groundwater from surrounding wells (approximately 13°C) indicating that some heat is still being produced in the subsurface near well EW-1s; this may be caused by anaerobic degradation, which generates less heat than aerobic degradation.

Ground surface subsidence is monitored by measuring the inner polyvinyl chloride (PVC) casing at well MW-23d relative to the steel outer casing of the well. The inner casing extends to 182 feet bgs and is considered to be stable. The outer casing is representative of the ground surface and if the casing (or ground surface) subsides, then the distance between the inner and outer casing decreases. Since 2012, the distance has been measured at approximately 2.75 inches. Slight differences in the distance measured (within 0.10 inch for all events) are likely due to variability in measuring equipment and field personnel. Previously, the total decrease in distance between the inner and outer casing from December 2008 (first periodic measurement conducted) to 2012 was approximately 1.35 inches, with most of the decrease occurring in 2009. Thus, approximately 1.35 inches of subsidence of the ground surface in this area has occurred since 2008.



While not anticipated, significant additional settling in this area could affect performance of the stormwater conveyance system. The stormwater conveyance system is inspected quarterly and continues to perform as designed with steady flow from the outfall during and immediately after rainfall events. During 2018, Hart Crowser and GSI continued 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

Maintenance in 2018 included recycling empty, rusting 55-gallon steel drums; filling animal burrows along the fence line; repairing a "no trespassing" sign; patching a hole in the chain-link fence gate; replacing gate locks with combination locks; and monitoring re-vegetation on the burned area at the northeast side of the site.

On February 22, 2018, Hart Crowser removed approximately 12 empty, rusting 55-gallon steel drums stored under the outdoor canopy, adjacent to the site building, and recycled them at Rivergate Scrap Metals in Portland, Oregon (Photographs 7 and 8, Appendix A). A fallen over "no trespassing" sign along the southeastern side of the site was also repaired. On February 27, 2018, animal burrows along the fence were filled in with gravel (Photograph 9, Appendix A) and automotive maintenance (e.g., check oil and fuel filter) was performed on the Kubota site vehicle.

On July 18, 2018, the Portland Fire Department (Station 22) responded to a fire in the riparian area along the Willamette River shoreline and had to cut several gate locks. After discussions with the fire department on July 24, 2018, combination locks were set on all the site gates and combination number provided to the fire department. Riparian fire observations are discussed in Section 3.2.1.

On September 21, 2018, American Backflow Services of Portland, Oregon tested the site's water supply line backflow prevention valve. The backflow prevention valve met state regulation standards.

On October 23, 2018, McDonald Fence and Construction, Inc., patch-repaired the hole in the chain linked fence at the second-most northwestern riverside gate.

2.4 Summary of Soil Cap Remedy Performance

Overall, upland soil cap observations and inspections revealed no significant change in remedy performance or areas of concern. The soil cap continues to have a consistent layer of vegetation groundcover across the site (Photographs 10 and 11, Appendix A). Future O&M activities will primarily consist of quarterly inspections and routine maintenance, which will monitor the natural re-vegetation of grass in the burned area at the northeast side of the site. Decommissioning of non-essential and obsolete equipment began with removal of the irrigation system in December 2015, job trailers removal in February 2017, and continued with removal of 55-gallon drums in February 2018.

The upland soil cap subsidence near wells EW-1s and MW-23d is currently stable. This area will continue to be monitored in 2019 by taking inner and outer casing measurements at well MW-23d; by monitoring stormwater flow at the outfall during quarterly inspections; and by collecting and





reviewing transducer data from EW-1s that measures groundwater temperature and elevation. There was one instance of vandalism with a hole being cut into the site perimeter fence and indications of trespassing onto the site.

3.0 SEDIMENT CAP PERFORMANCE STANDARDS AND ACTIVITIES

This section summarizes sediment cap observation and maintenance activities for the reporting period January 1, 2018, through December 31, 2018. Site observations and maintenance activities were conducted according to the Final O&M Plan. Sediment cap inspections were conducted in February, May, August, and October 2018 by DEQ, Hart Crowser, and GSI in conjunction with inspections for the entire site. Observations of interest from the routine inspections and site meetings are presented on Figure 2-1. Routine inspections are documented in observation forms developed and recorded for the site and are presented in Appendix B. Table 3-1 provides a summary of sediment cap activities conducted in 2018.

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 as follows:
 - 6-inch rock armoring: maintain at least 6 inches thick
 - 12-inch rock armoring: maintain at least 7.5 inches thick
 - 24-inch rock armoring: maintain at least 12 inches thick
- Maintain uniformity and continuity of ACB armoring.
- Assess performance of organophilic clay to ensure it is preventing the release of mobile NAPL to the Willamette River (potential assessment parameters include sorption capacity, measure of NAPL currently sorbed, and permeability).

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

- Two AWQCs in effect at the time the ROD was issued:
 - 1996 criteria for chronic effects to aquatic life
 - 1996 criteria for human health based on fish consumption
- Two 2007 National Recommended Water Quality Criteria:
 - 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 updated in 2015 for human health and other applicable AWQCs at the time of sediment cap water sampling. These criteria were used as comparison criteria for the Fall 2015 passive surface water and sediment cap porewater sampling event. The next scheduled cap water sampling event is in 2020.

3.2 Sediment Cap Observations

Routine sediment cap inspections were conducted on February 8, May 23, August 2, and October 19, 2018, in conjunction with the four quarterly site inspections. Observations were made regarding habitat enhancement features, wildlife, vandalism, and/or trespassing. Representative site photographs of the Willamette Cove and Willamette River shorelines taken in 2018 are presented in Appendix A. Sediment cap inspection documentation is included in Appendix B. In general, the sediment cap remains in good condition.





3.2.1 Shoreline Conditions

During the October 2018 site inspection, multiple 2- to 6-inch-wide voids were observed in the ACB along the shoreline in Willamette Cove (Photograph 12, Appendix A). The gaps were visible due to the low Willamette River water surface elevation conditions at the end of summer and during low tide.

On July 18, 2018, a fire burned approximately 1 acre at the northwestern end of the riparian area between monitoring wells MW-39s and MW-43s (Photographs 13 through 16, Appendix A). The fire primarily burned undergrowth brush and grass vegetation impacting the riparian area closer to the river. It appears many of the trees survived the fire. Hart Crowser inspected PVC well casings and did not see any signs of damage to the monitoring wells. The fire burned several holes approximately 3 inches in diameter in the turf-reinforced matting (TRM) in the riparian area. During the October 2018 site inspection, we observed grass sprouting in the burned areas.

We did not observe Shoreline sheen during the 2018 inspections. Limited ebullition was observed primarily within the two areas of the sediment cap where granular organophilic clay is present.

3.2.2 Habitat Enhancement Features and Wildlife

Habitat enhancement features, such as boulder clusters and sand cover as a biotic layer, are design elements of the sediment cap. Driftwood also provides habitat enhancement along the shoreline and in the riparian area above the shoreline. The distribution of sand cover over the ACB is similar to previous years. Originally, sand was placed over a large portion of the shoreline and Willamette Cove ACB armoring, but high river flow conditions (Photograph 17, Appendix A) and wakes from passing boats have washed sand from the ACB where the bank slopes are steeper. Rounded 1 1/2-inch-minus gravel 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 2018 (Photograph 18, Appendix A); however, some has washed down steeper shorelines and has settled onto lower ACB surfaces.

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

- The south end of the shoreline near the City of Portland outfall;
- Along the shoreline near the former Tank Farm Area (TFA); and
- The north end of the site near the Burlington Northern Railroad bridge.

Boulder clusters placed during the sediment cap construction remained in place during 2018.

Numerous wildlife species continue to be observed site-wide; birds seen most frequently include Canada geese, gulls, cormorants, pigeons, blue herons, ospreys, and hawks.



3.2.3 Vandalism and Trespassing

The shoreline along the site and in the Willamette Cove is accessible and is used by the public for various forms of recreation. Throughout 2018, shoreline trash and graffiti were observed, including scattered car parts, garbage cans, bicycle parts, clothes, and numerous dumpsites (Photograph 19, Appendix A). One active camp was observed at the northwestern end of the riparian area in September 2018. Follow up quarterly inspections found the camp abandoned. In October 2018, a representative from Metro Regional Government's RID Program accompanied the quarterly site inspection to assist in evaluating options to remove trash from dumpsites.

Numerous dilapidated boats (used as dwellings) were also seen anchored in the Willamette Cove during every site visit (Photograph 20, Appendix A). We did not observe any damage to the sediment cap from moorage or physical contact by boats in the Willamette Cove. The U.S. Coast Guard and Oregon State Marine Board rules prohibit anchoring on the sediment cap.

3.2.4 Buoys

Five permanent buoys were installed in August 2011, along the perimeter of the sediment cap warning boaters of navigational hazards. Buoys were observed to be in place throughout 2018.

3.3 Sediment Cap Maintenance Activities

The sediment cap was designed to be generally maintenance free. The riparian vegetation at the upper portion and in the burned areas of the sediment cap were watered in August 2018 (see Section 5.3 for further discussion).

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. Several voids in the ACB along the Willamette Cove were observed when the water level was at a seasonal and tidal low. Sediment cap porewater and surface water sampling was conducted in 2015 with results reported in the 2015 Annual Report and the Fourth Five-Year Review (DEQ/EPA 2016). Results indicated that the sediment cap is performing as designed. The next round of porewater and surface water sampling is scheduled to be conducted in 2020, before the Fifth Five-Year Review Report in 2021.

Sand covers the shoreline at lower, less steep elevations, and significant amounts of large driftwood have accumulated to help create wildlife habitat. Numerous wildlife species continue to be observed; various birds including Canada geese, gulls, cormorants, pigeons, blue herons, ospreys, and hawks were observed in 2018.

The public frequents the shoreline for recreation, most commonly for walking dogs. Rounded gravel used to fill voids within the ACB has created a more stable substrate for wildlife and a consistent, safer walking surface for public use, although much of the gravel has been eroded from the upper potions of the ACB. The frequency of littering and dumpsites increased in 2018.





4.0 GROUNDWATER PERFORMANCE STANDARDS AND **ACTIVITIES**

This section summarizes groundwater performance standards and activities for the reporting period January 1, 2018, through December 31, 2018. Groundwater remedy observations and maintenance activities were conducted according to the O&M Plan (HC/GSI 2017). Manual NAPL and groundwater level data were collected during the site-wide semiannual monitoring events conducted on June 20, 2018, and September 21, 2018.

4.1 Groundwater Flow Direction and Gradient Assessment

The current monitoring well network is shown on Figure 4-1. On-going groundwater monitoring consists of (1) semiannual site-wide manual measurements of NAPL and groundwater levels; and (2) continuous water level measurements in 11 site wells that contain transducers. This section summarizes groundwater flow based on the 2018 water level measurements.

4.1.1 Horizontal Flow Direction and Gradients

Manual groundwater measurements were collected during or immediately following low tide in the Willamette River. The semiannual groundwater elevation data are included in Table 4-1 (June 20, 2018) and Table 4-2 (September 21, 2018).

Shallow groundwater elevation contour maps were developed for each semiannual event during what is typically the seasonal high (June) and low (September) river stage. As shown on Figures 4-2 and 4-3, the shallow horizontal groundwater gradient within the barrier wall is independent of the gradient outside the barrier wall. The groundwater gradient inside the barrier wall remains relatively flat (ranging from 0.001 to 0.005 foot per foot [ft/ft]) compared to the slightly steeper groundwater gradients (ranging from 0.003 ft/ft to 0.03 ft/ft) outside the barrier wall that are directed westerly toward the river and Willamette Cove. 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. The hydraulic separation is further illustrated by the hydrograph on Figure 4-4 from the paired monitoring well cluster MW-53s and MW-52s, located upgradient of and just inside the eastern edge of the barrier wall; this hydrograph shows groundwater levels outside of the barrier wall (MW-53s) are approximately 4 to 5 feet higher than inside the wall (MW-52s).

¹ The hydrographs on Figures 4-4 through 4-7 compare groundwater level elevations for selected well pairs to river stage elevation and precipitation data. River stage data were recorded every 30 minutes from U.S. Geological Survey (USGS) station number 14211720 (USGS 2018a). 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 North American Vertical Datum of 1988 (NAVD88) at the site (approximately RM 7) by adding 5.001 feet to the USGS reading. Precipitation data were obtained from the Astor Elementary School rain gauge located approximately 0.5 mile from the site. Daily totals were obtained from the City of Portland Hydra Network available on the USGS web site (USGS 2018b).



Comparison of the groundwater levels for interior monitoring wells EW-1s, MW-44s, MW-52s, and MW-36s (Figure 4-5) illustrate that groundwater gradients within the barrier wall are typically southwesterly (i.e., the water level in EW-1s is typically higher than MW-36s). However, during periods of peak flow in the Willamette River (e.g., May 2018), groundwater levels within the northwest corner of the barrier wall increase and cause a partial gradient reversal (i.e., the water level in MW-36s becomes higher than other interior wells; Figure 4-5). This partial reversal is caused by a deep hydraulic connection through sand at the base of the western edge of the barrier wall; when the river level exceeds the groundwater level within the barrier wall area and an upward vertical gradient results. Vertical gradients are further discussed in Section 4.1.2.

4.1.2 Vertical Flow Direction and Gradients

The Willamette River stage directly influences groundwater elevations in the nearshore areas. Daily tidal fluctuations in river stage also occur and typically range from 3 to 5 feet during the late summer and fall months when stage/discharge is lowest, and less than 2 feet during the late winter and spring months when stage/discharge is highest.

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 (Figure 4-1). The hydrographs for these wells (Figure 4-6 and 4-7) 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 small vertical gradient changes that occur in response to the daily tidal changes and seasonal river stage trends. The exterior shallow wells, also in hydraulic connection with the river, show approximately a quarter cycle delay from river fluctuations and have dampened amplitude in comparison with the deeper wells.

Shallow groundwater levels within the barrier wall responds to seasonal and diurnal tidal effects observed in the river but are muted in amplitude compared to the variations observed in the river stage. The muted amplitude or non-existent response of interior shallow wells compared with the deep zone wells suggests a clear hydraulic disconnect between the shallow aquifer within the barrier wall and the deeper water-bearing zones. This disconnect is due to 1) the presence of the barrier wall, which prevents horizontal flow across it; and 2) the presence of a confining silt layer between the shallow and intermediate zones throughout the majority of the barrier wall area, including near the MW-44/MW-45 well cluster. The location where the shallow interior response is greatest, but still significantly muted, is in well MW-36s (Figure 4-6), where a hydraulic connection exists at the base of the barrier wall (which is completed in a sandy unit at depth). While the timing of the groundwater oscillations in MW-37s and MW-36s (interior shallow wells) are closely linked, the amplitude of the changes is muted inside the wall.

Figure 4-8 illustrates the net vertical gradient between the shallow and deep water-bearing zones for the MW-36/MW-37 well cluster, which ranges from -0.214 to +0.095. On average, the net gradient continues to be slightly downward inside the barrier wall (MW-36s to MW-36d). The net downward gradient is greater inside the barrier wall because the net shallow groundwater elevation inside the barrier wall continues to be slightly elevated compared to the net river stage. The net vertical gradient





outside the barrier wall on the river side (MW-37s to MW-37d) is small and varies upward and downward according to the trends of the Willamette River. Neutral or upward vertical gradients occurred when the river stage was at a higher elevation for a prolonged period, which occurred several times between April and July 2018.

Although precipitation in the Willamette River watershed ultimately affects the stage of the river, direct precipitation near the site appears to play a minor role in determining the water levels of wells within the barrier wall and along the river. The Resource Conservation and Recovery Act (RCRA)-style soil cap was designed to divert precipitation so that little infiltration occurs within the barrier wall. Although some infiltration occurs along the fringes of the soil cap and within the riparian zone, the volume of infiltration is minimal. Between the barrier wall and the river, precipitation inputs are vastly overshadowed by the response of groundwater to variations in the 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 present seasonally.

4.2 NAPL Gauging and Monitoring Assessment

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

Measurable quantities of NAPL were present in 11 site wells (EW-1s, EW-8s, EW-10s, EW-15s, EW-18s, EW-23s, MW-20i, MW-22i, MW-56s, MW-Ds, and MW-Gs) gauged semiannually in 2018. Figures 4-9 and 4-10 show the locations of wells that contained measurable quantities of light NAPL (LNAPL) and/or DNAPL for the June and September 2018 monitoring events, respectively. Tables 4-1 and 4-2 provide semiannual NAPL gauging measurements. Figures 4-11 through 4-21 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.

4.2.1 Outside the Barrier Wall

NAPL is primarily observed outside the barrier wall next to the northwest corner of the enclosure that corresponds to the FWDA (Figure 1-5). In 2018, measurable quantities of DNAPL were observed in four wells (EW-10s, MW-20i, MW-Ds, and MW-Gs) in this area. As shown on Figures 4-11 through 4-14, the DNAPL thicknesses measured in wells EW-10s, MW-20i, MW-Ds, and MW-Gs in 2018 are generally stable since NAPL recovery was discontinued in April 2011. This is consistent with historical observations and supports the conclusion that NAPL observed in the FWDA is localized and stable. There is no evidence of NAPL mobility either across the barrier wall or to the Willamette River.

4.2.2 Inside the Barrier Wall

During semiannual monitoring, measurable LNAPL was present in three wells (EW-15s, EW-23s, and MW-56s) within the barrier wall. Figures 4-15 through 4-17 show the elevation of LNAPL and shallow groundwater versus time in wells EW-15s, EW-23s, and MW-56s, respectively. As shown on these figures, the LNAPL thickness is generally greater when the groundwater elevation is low. This is the result of gravity drainage of LNAPL through the unsaturated zone when the water table drops. This pattern has been consistent since mid-2006 when LNAPL ceased being recovered inside of the barrier wall (i.e., LNAPL thickness was not disturbed by recovery). Although the LNAPL thickness varies cyclically with changes in the groundwater elevation, the overall LNAPL thickness in these wells has remained relatively stable, with slight increases in monitoring wells EW-15s and EW-23s during low groundwater levels.

DNAPL was detected during the 2018 semiannual monitoring events within the barrier wall near the former TFA (Figure 1-5) in wells EW-1s, MW-22i, EW-8s, and EW-18s, as shown on Figures 4-18 through 4-21, respectively. The DNAPL thickness in well EW-1s (Figure 4-18) has increased to a thickness of approximately 8 feet since mid-2011, after termination of a temporary recovery period in April 2011. The DNAPL thickness in well MW-22i is approximately 6 feet thick (Figure 4-19). Approximately 2 feet of DNAPL is consistently present within the sump of well EW-8s, with occasional spikes in the DNAPL thickness up to approximately 10 feet, as observed during the June 2018 monitoring event (Figure 4-20). The DNAPL thickness in EW-18s has been generally stable around 2 feet since 2012 (Figure 4-21).

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.





4.3 Groundwater Remedy Maintenance Activities

Table 4-3 provides the groundwater O&M activities conducted in 2018. Transducer data loggers were inspected in July 2018 and during the semiannual monitoring events in 2018. Batteries were changed on select transducers on July 26, 2018. Currently, all transducers at the site are functional and installed in the wells shown on Figure 4-1.

4.4 Summary of Groundwater Remedy Performance

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

There was no measurable LNAPL in wells outside the barrier wall. DNAPL was measured in four wells outside the barrier wall. The DNAPL in these wells has remained stable with some variation due to temperature and pressure (i.e., water level variation). 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 and Fourth Five-Year Review Report [DEQ/EPA 2011; DEQ/EPA 2016]) 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 2018, 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. 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 from January 2018 through December 2018. Vegetation management activities on the upland cap were conducted in accordance with the McCormick and Baxter Vegetation Management Plan (HC/GSI 2011b).

The upland cap was constructed during a 2-year period beginning in 2004 with the re-grading of the Willamette River bank. The 6-acre riparian area cap was installed and tied into the in-water sediment cap. In 2005, a 34-acre multiple-component designed soil cap was constructed to complete the upland cap. The City of Portland, Bureau of Environmental Services (BES) entered into an Intergovernmental Agreement (IGA) with the DEQ to provide vegetation planning and vegetation management services for the upland cap from 2005 through 2010. In February 2006, the soil cap was planted with native grasses, plants, and trees, and an irrigation system was installed. After the fifth growing season, BES determined that the vegetation was fully established, and the irrigation system was no longer needed. The irrigation system was inactivated in 2009 and was decommissioned in 2015. Overall, the planting and vegetation management goals have been met.



Semiannual noxious weed control activities, including herbicide application, were conducted from spring 2006 through spring 2013. Herbicide application was temporarily discontinued in June 2013 when nearby desirable native vegetation was observed to be stressed and dying. No herbicide was applied in 2014 and 2015, but was resumed in 2016 after noxious weeds appeared to be spreading. One herbicide application was completed in May 2017. No herbicide was applied in 2018.

Rodents that inhabit the cap have damaged vegetation in the past; however, with the exception of some earlier targeted damage to the grand fir (Abies grandis) seedlings (BES 2010), there has been insignificant damage to other plantings. Rodent activities are monitored during quarterly site inspections and were not observed to be causing significant damage during site visits in 2018.

On July 19, 2018, a fire burned approximately 1 acre at the north end of the riparian area as shown in Figure 2-1. On September 24, 2018, another fire burned approximately 1 acre along the northeast side of the site, approximately 200 feet southeast of the site maintenance building and along the inside of the fence line.

5.1 Vegetation Management Components and Goals

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

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

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

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





■ A continuous corridor of shrubs and trees provide shade for the entire stream bank.

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

5.2 Baseline Conditions in 2010

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. Photographs were taken to establish a baseline to evaluate the progress of the vegetation re-establishment and the qualitative observations at select site locations. These locations or "Photo Stations" are shown on Figure 5-1 and the photographs are provided in Appendix C, Vegetation Photograph 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. 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 (Crataequs suksdorfii), cascara (Rhamnus purshiana), hardhack (Spiraea douglasii), red-osier dogwood (Cornus sericea), Pacific ninebark (Physocarpus capitatus), swamp rose (Rosa pisocarpa), river willow (Salix fluviatilis), Sitka willow (Salix sitchensis), rigid willow (Salix rigida), Piper's willow (Salix piperi), and black twinberry (Lonicera involucrata). Groundcover species planted in the lower component included: California brome (Bromus carinatus), blue wildrye (Elymus glaucus), meadow barley (Hordeum brachyantherum), slender hairgrass (Deschampsia elongata), spike bentgrass (Agrostis exerata), globe gilia (Gilia capitata), lupine (Lupinus albicaulis), and Canada goldenrod (Solidago canadensis). Tree plantings were not installed at lower elevations in the lower component of the riparian area because of the potential for late season inundation from high river levels. Instead, appropriate shrubs, primarily willows, were installed along the lower edge of this component to provide food and shade. A significant quantity of large woody debris was observed along the entire length of the lower edge. Trees and shrubs within the lower component were observed to be well established and growing both vertically and laterally. No indications of stress were noted. Localized areas of exposed TRM were observed along the length of the lower edge of the TRM, likely because of river fluctuations and movement of large woody debris along the shoreline. Thistle (Cirsium arvense) was the most common noxious weed with lesser quantities of knapweed (Centaurea Sp.) and butterfly bush (Buddleia davidii) present.



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

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

5.2.2 Upland Area

The upland area is divided into three components: the earthen cap; the stormwater retention pond/drainage swale; and the impermeable cap (Figure 5-1). A variety of native trees, shrubs, and herbaceous species are present on the earthen cap as shown in photographs captured at 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 Station 6, Appendix C).

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

Stormwater Retention Pond/Drainage Swale Component. This component was planted with a native shrub overstory consisting of hardhack, Sitka willow, and Piper's willow (Photograph 4, 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 (*Schoenoplectus tabernaemontanii*), small-fruited bulrush (*Scirpus microcarpus*), Western sloughgrass (*Beckmania syzigachne*), Western mannagrass (*Glyeria occidentalis*), tufted hairgrass (*Deschapsia cespitosa*), slender hairgrass, meadow barley, spike bentgrass, meadow foxtail (*Alopecuris geniculatus*), self heal (*Prunella vulgaris*), Spanish clover, and gumweed (*Grindelia integrifolia*). The shrub plantings in the pond and swale area were well established and appeared healthy. Many of the grasses and herbs in the pond area did not survive because the infiltration of surface runoff limits moisture and the understory is dominated by sand and bare ground. Given that the shrubs were well established, the area is flat, and erosion generally was not occurring, replanting grasses and herbs was not recommended. No noxious weeds were observed in this component.

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

Summary. In general, the upland area appeared to be performing well in 2011 (baseline conditions) 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. Vegetation inspections will monitor how the vegetation responds to fire damage at the northern end of the site.

5.3 Vegetation Observations in 2018

On May 15 and June 27, 2018, Hart Crowser inspected the upland cap to assess the current conditions as compared to the baseline conditions observed in June 2011. Qualitative data were recorded on species composition, cover and density of vegetation, growth and vigor, and effectiveness of previous noxious weed treatments. The Photograph Log (Appendix C) shows select Photo Stations during the June 2018 inspection that are paired with photographs from the June 2011 baseline inspection for a qualitative assessment of the site. Photo Stations are shown on Figure 5-1. 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 an approximate height of 9 to 20 feet. The area has good grass coverage and no barren areas were visible. As the tree species continue to develop, they will increase shading along the shoreline of the river. Most of the shrubs planted during the TRM repairs in December 2015 have perished as a result of high winter river levels and summer drought; however, groundcover is returning to the area following placement of the mulch and soil beneath the TRM. Sediment and debris accumulation above the ACB are also helping to re-establish groundcover in the area.

The spring 2017 herbicide application was successful at treating the black mustard (Brassica nigra), scotch broom (Cytisus scoparius), knapweed and Canada thistle (Cirsium arvense); however, some thistle was still observed in the lower portion of the riparian area. No herbicide treatment was performed in 2018. The vegetation will be again inspected in June 2019 and the need for noxious plant control will be assessed.

Localized areas of exposed TRM are still visible along the length of the lower edge of the TRM, but adventive vegetation is continuing to cover the areas after the December 2015 repairs. A significant quantity of large driftwood was observed along the entire length of the lower component of the riparian area in June and October 2018.

Upper Component. Ponderosa pine, madrone, Nootka rose, snowberry, Oregon-grape, Douglas Hawthorne, and elderberry appeared well established and performing best within this component. Grand Fir have not recovered following the drought in 2015.

Following a period of dry weather and the July 2018 fire in the riparian area, approximately 2,500 gallons of water were applied to the riparian area on August 8, 2018. The water was applied to avoid excessive late season drought stress previously experienced in 2015 and to a lesser degree in 2016.

Volunteer madrone and oak were present along the fence and appeared to be thriving. Individual plants, including oceanspray, cascara, twinberry, and Pacific ninebark, continue to grow well. Groundcover plantings also appeared healthy and fewer weeds were observed; however, thistle and St. John's-wort (*Hypericum* sp.) were still present.

Summary. In general, the upper and lower components appeared to be performing well with the trees and shrubs generally recovering from somewhat drier than normal summers. Only the Grand Fir seem to have been significantly impacted by the repeated dry summers. Groundcover species are providing good coverage of the site soils; no areas of bare ground were observed. In general, the canopy in the north portion of the riparian area is much denser when compared to the south.

The July 2018 fire burned approximately 1 acre at the north end of the riparian area appears to have only burned groundcover and underbrush species. During the October 2018 site inspection, we





observed grass spouting in the burned area. The 2019 vegetation and site inspections will continue to monitor the area and to determine if maintenance is required to supplement ground cover.

Large driftwood continues to accumulate along the shoreline to the middle of the bank near the break between the upper and lower components (Photographs 7 and 9, Appendix C). This large driftwood provides habitat for birds, small mammals, and other wildlife using this portion of the site.

Scattered noxious weeds continue to grow in the riparian area, but their abundance was significantly reduced by the spring 2017 herbicide application. These populations will be evaluated following the June 2019 vegetation inspection and additional herbicide applications may be recommended.

5.3.2 Upland Area

Earthen Cap Component. Tree and shrub plantings on the earthen cap were healthy and growing well (Photographs 2, 3, and 5, Appendix C). Ponderosa pine, Oregon grape, elderberry, lupine, and serviceberry continue to perform the best. Nootka rose dominated the northwest portion of the earthen cap. Trees and shrubs ranged in height from approximately 6 to 15 feet. Herbaceous species provided full coverage of the ground. During our June 2018 site visit, gumweed, mullein, and goldenrod and various grasses were frequently observed throughout the earthen cap. No indications of significant stress were observed, and oak tress appeared to have recovered following recent dry summers. Localized areas of moss were observed in the herbaceous layer. Scattered areas of noxious weeds still persist and are being monitored. Future herbicide applications may be recommended.

Stormwater Retention Pond/Drainage Swale Component. Vegetation in the drainage swale area are fairly well established and appeared healthy in 2018 (Photograph 4, Appendix C). Various grasses make up nearly all of the groundcover in the retention pond; however, a few bare areas were observed. 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. Alder and willow were present and expanding around the periphery of the stormwater retention pond. In the past, during water stressed years like 2017, dead shrubs were observed.

Impermeable Cap Component. The grassland species on the impermeable cap provided excellent coverage of the ground (Photograph 6, Appendix C). Gumweed was observed along the southwestern edge of the impermeable cap and provides increased diversity in this area. The remaining grasses and forbs were thriving, and no issues were noted in 2018.

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. Noxious weed density decreased following the spring 2017 herbicide application. The necessity of additional treatments will be evaluated following the June 2019 vegetation inspection. Vegetation and quarterly inspections in 2019 will monitor the area burned in September 2018, along the northeast side of the site to evaluate



if the groundcover species successfully returns after the fire damage. During the October 2018 site inspection, we observed grass re-spouting in the burned area.

5.4 Vegetation Maintenance Activities

This section describes activities conducted to maintain vegetation in 2018. The general planting goals continue to be met.

5.4.1 Noxious Weed Control

A preventive control approach continues to be implemented as part of an ongoing effort to control the spread of noxious weed species. Spot spraying was last completed over the entire site in May 2017. This followed weed suppression efforts in spring and fall of 2016. No herbicide was applied in 2018. Various invasive weeds, like the Canada thistle (Photograph 10, Appendix C) a B-listed noxious weed, continued to be observed throughout the site, but at numbers that aren't significantly inhibiting growth of native plants. Two new species that have been known to create large monocultures were observed in 2018. These were common teasel (Dipsacus sylvestris) and tansy (Tanacetum vulgare). Neither of these are on the Oregon state noxious weed list. Their presence will also be further evaluated during the 2019 monitoring season.

Due to exceptionally dry summer conditions, irrigation water was applied in the riparian area to help alleviate stressed vegetation in 2015, 2016, and 2017. In 2018, as a precautionary measure and to encourage plant growth in areas damaged by the July 2018 fire, one watering event was completed on August 8, 2018, when 2,500 gallons of water were applied to the riparian area following a stretch of hot weather. The watering targeted all stressed trees and shrubs, although greater emphasis was placed on the vegetation that appeared to be the most stressed, which included grand fir, Oregon ash, red osier dogwood, and nootka rose.

It is anticipated that additional irrigation water may be needed in 2019, particularly if the site is subject to drought conditions. It will be particularly important to provide water for the remaining conifers, as they appear to be the most stressed. The water tank trailer and firehose worked well to apply water throughout the site and this same technique could be used again, if needed. Conditions will be monitored during the summer months and, if dry conditions are prevalent, a drought assessment survey will be conducted to determine if additional watering is needed.

5.5 Vegetation Performance Summary

Overall, the tree, shrub, and groundcover plantings are performing well throughout the site. Although alder and willow are present along the periphery, much of the stormwater retention pond remains barren. Groundcover species provide excellent coverage over much of the site. Noxious weed coverage was reduced by the 2017 spring herbicide application, but close attention will be paid to weed populations during the 2019 vegetation inspections and noxious weed control measures will be implemented, if needed. The 2019 vegetation quarterly inspections will monitor and evaluate the vegetation response, growth, and adaptation in the 2018 burned areas along the northeast side of the





site and in the riparian area. The June 2019 vegetation inspection will document which species are thriving and provide maintenance recommendations if necessary.

Vegetation appeared to recover from several years of drought between 2015 and 2017, although several conifers in the upper riparian area did not survive. As the surviving woody plants become more established, they will have better means for withstanding drought conditions in the future. Vegetation monitoring will continue to be performed during summer 2019 and additional watering will be provided as needed for the survival of the vegetation.

6.0 SUMMARY OF OVERALL REMEDY PERFORMANCE

Overall, the 2018 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 2019

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

Table 7-1 presents the soil cap O&M activities planned through 2023. Soil cap O&M activities in 2019 will consist primarily of quarterly inspections and routine maintenance. Semiannual inspections should be continued in 2019 to assess and monitor vegetation planting areas, species identification (native, non-native, and invasive), growth, density, and general coverage throughout the site. The need for noxious weed control activities will be evaluated based on site and vegetation inspections.

Table 7-2 presents the sediment cap O&M activities planned through 2023. In 2019, activities are expected to include quarterly inspections and routine maintenance, and a riparian litter and dumpsite cleanup. Planning for the 2020 cap monitoring event will also be conducted.

The frequency of the groundwater monitoring activities through September 2023 are summarized in Table 7-3. The next groundwater quality sampling event will occur in 2020. Routine maintenance of the data logger transducers are also included as elements of groundwater O&M.

8.0 REFERENCES

BES 2010. Vegetation Management Report (January 2009 through December 2009), McCormick & Baxter Creosoting Company, Portland, Oregon. City of Portland, Bureau of Environmental Services. January 2010.

DEQ/EPA 2011. Draft Final Operation Third Five-Year Review Report, McCormick & Baxter Creosoting Company Superfund site. September 2011.

DEQ/EPA 2014. Final Operation and Maintenance Plan for the McCormick and Baxter Creosoting Company Superfund site, Portland, Oregon. March 2014.



DEQ/EPA 2016. Fourth Five-Year Review Report, McCormick & Baxter Creosoting Company Superfund site. September 2016.

EPA 1996. Record of Decision, McCormick & Baxter Creosoting Company site, Portland, Oregon. March 1996.

HC/GSI 2008. Subsidence in Upland Cap Memorandum, McCormick & Baxter Superfund site, Portland, Oregon. December 15, 2008.

HC/GSI 2009. Additional Subsidence Monitoring Memorandum, McCormick & Baxter Superfund site, Portland, Oregon. February 22, 2009.

HC/GSI 2011a. DNAPL Data Gap Investigation Report, McCormick & Baxter Creosoting Company site, Portland, Oregon. Prepared for Oregon Department of Environmental Quality. July 2011.

HC/GSI 2011b. Vegetation Management Plan, McCormick and Baxter Creosoting Company Superfund site, Portland, Oregon. August 2011.

HC/GSI 2017. Operation and Maintenance Manual, McCormick & Baxter Creosoting Company site, Portland, Oregon. Prepared for Oregon Department of Environmental Quality. June 2017.

NOAA 2004. Endangered Species Act - Section 7 Consultation. Biological Opinion & Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation. McCormick and Baxter Creosoting Company site, Willamette River Remediation Sediment Cap, Multnomah County, Oregon. National Marine Fisheries Service, Northwest Region. March 15, 2004.

USGS 2018a. USGS 14211720 Willamette River at Portland, OR. Provisional gage height data. 2003 to Present. Accessed at:

http://waterdata.usgs.gov/nwis/uv?cb_00060=on&cb_00065=on&cb_00055=on&format=gif_default &period=60&site no=14211720.

USGS 2018b. Astor Elementary School Rain Gage. Provisional, uncorrected raw data from the City of Portland Hydra Network. 2005 to Present. http://or.water.usgs.gov/non-usgs/bes/astor.rain.





Table 2-1: Soil Cap O&M Activities in 2018 2018 O&M Annual Report McCormick and Baxter Superfund Site

O&M Activity	Frequency in 2018
Visual Inspections:	
Cap surface	February, May, August, October
Subsidence near EW-1s	February, May, August, October
Stormwater conveyance system	February, May, August, October
Security fencing	February, May, August, October
Warning signs	February, May, August, October
Abundance and survival of vegetation	February, April, May, June, August, October
Routine Maintenance and Monitoring:	
Manual removal of invasive plants	None
Targeted application of herbicides	None
Non-Routine Maintenance:	
Removal of empty 55-Gallon drums and debris	February, April
Filling of potential animal burrow into the earthen cap	February
Fire damage inspections	July, September
Riparian area water events	August
Utilities Service:	
Water	September (Backflow Testing)

Table 3-1: Sediment Cap O&M Activities in 2018 2018 O&M Annual Report McCormick and Baxter Superfund Site

O&M Activity	Frequency in 2018
Visual Inspections (from shore):	
Warning buoys	February, May, August, October
Cap surface	February, May, August, October
Habitat quality	February, May, August, October
Routine Monitoring:	
Water column and inter-armoring water sampling	None
Organoclay core sampling	None
Non-Routine Monitoring:	
Multibeam bathymetric surveys, side-scan sonar survey	None
Non-Routine Maintenance:	
Cut articulated concrete block cable loops	Periodically

Table 4-1: Groundwater and NAPL Elevations: June 20, 2018 2018 O&M Annual Report McCormick and Baxter Superfund Site

			Measuring						Groundwater
			Point				LNAPL	DNAPL	Elevation LNAPL
					5	B			
			Elevation	Depth to	Depth to	Depth to	Thickness	Thickness	Corrected
Well ID EW-1s	Date 6/20/2018	Time 10:20	(ft NAVD88) 40.1	LNAPL (ft)	water (ft)	DNAPL (ft)	(ft)	(ft) 8.0	(ft NAVD88)
EW-1S EW-2s	6/20/2018	10:20	42.4	_	24.5 nm	40.0		- 8.0	15.6
EW-8s	6/20/2018	10:45	40.5	-	25.5	52.3	-	2.4	15.0
EW-10s	6/20/2018	8:45	29.4		19.0	41.5		1.2	10.5
EW-15s	6/20/2018	9:20	43.0	29.0	33.2	41.5	4.2	1.2	13.9
EW-18s	6/20/2018	10:35	40.7	25.7	25.7	44.5	Trace	0.2	15.1
EW-19s	6/20/2018	8:55	25.9		15.2				10.8
EW-23s	6/20/2018	9:30	37.6	24.2	27.2		3.0		13.4
MW-1r	6/20/2018	11:00	37.6		22.7				14.9
MW-7 WC	6/20/2018	8:15	36.7		22.4				14.3
MW-10r	6/20/2018	9:55	41.9		26.8				15.1
MW-15s	6/20/2018	9:23	43.3		28.4				14.9
MW-17s	6/20/2018	9:41	41.3		26.5				14.7
MW-20i	6/20/2018	9:05	41.4		31.4	71.1		3.6	10.1
MW-22i	6/20/2018	10:00	42.3		31.7	52.5		6.5	10.6
MW-23d	6/20/2018	9:50	41.1		30.1				11.0
MW-32i	6/20/2018	11:27	39.3		24.5				14.8
MW-34i	6/20/2018	9:30	32.7		22.5				10.2
MW-35r	6/20/2018	8:20	32.3		21.1				11.2
MW-36d	6/20/2018	9:27	30.5		20.3				10.2
MW-36i	6/20/2018	9:30	30.2		20.0				10.2
MW-36s	6/20/2018	9:34	30.7		17.4				13.3
MW-37d MW-37i	6/20/2018 6/20/2018	9:50 9:42	26.1 25.9		15.8 15.7				10.3 10.2
MW-37s	6/20/2018	9:42	24.9		14.4				10.5
MW-38d	6/20/2018	10:45	31.8		21.2				10.7
MW-38i	6/20/2018	10:45	32.1		21.8				10.7
MW-38s	6/20/2018	10:20	32.3		18.3				14.0
MW-39d	6/20/2018	10:40	29.8		19.2				10.6
MW-39i	6/20/2018	10:35	30.1		19.6				10.5
MW-39s	6/20/2018	10:30	29.8		19.2				10.6
MW-40d	6/20/2018	10:55	28.7		18.1				10.6
MW-40i	6/20/2018	10:45	28.7		18.4				10.4
MW-40s	6/20/2018	10:50	28.3		13.7				14.6
MW-41d	6/20/2018	10:51	27.4		16.5				10.9
MW-41i	6/20/2018	10:51	27.1		16.5				10.6
MW-41s	6/20/2018	11:00	27.8		17.3				10.5
MW-42d	6/20/2018	11:02	32.2		21.5				10.7
MW-42i	6/20/2018	11:05	32.7		22.1				10.6
MW-42s	6/20/2018	11:07	32.4		17.5				14.9
MW-43d	6/20/2018	11:04	28.3		17.6				10.8
MW-43i	6/20/2018	11:01	30.3		19.4				10.9
MW-43s	6/20/2018	10:59	31.1		20.6				10.5
MW-44d	6/20/2018 6/20/2018	8:40	29.6		19.0				10.6
MW-44i MW-44s	6/20/2018	8:33 8:45	29.3 29.6		19.0 14.7				10.3 14.9
MW-45d	6/20/2018	8:52	27.9		17.6				10.3
MW-45i	6/20/2018	9:59	28.0		17.6				10.4
MW-45s	6/20/2018	8:50	28.2		17.6				10.6
MW-46s	6/20/2018	10:05	35.5		20.5				15.0
MW-47s	6/20/2018	10:06	35.5		24.5				11.1
MW-48s	6/20/2018	11:25	38.7		23.7				15.0
MW-49s	6/20/2018	11:20	37.6		18.4				19.2
MW-50s	6/20/2018	10:10	39.3		24.1				15.1

Table 4-1: Groundwater and NAPL Elevations: June 20, 2018 2018 O&M Annual Report McCormick and Baxter Superfund Site

			Measuring Point Elevation	Depth to	Depth to	Depth to	LNAPL Thickness	DNAPL Thickness	Groundwater Elevation LNAPL Corrected
Well ID	Date	Time	(ft NAVD88)	LNAPL (ft)	water (ft)	Depth to DNAPL (ft)	(ft)	(ft)	(ft NAVD88)
MW-51s	6/20/2018	10:13	39.5	LIVAL E (IC)	20.4	Diexi E (it)	(14)	(10)	19.1
MW-52s	6/20/2018	10:26	40.7		25.6				15.1
MW-53s	6/20/2018	10:28	40.4		21.8				18.6
MW-54s	6/20/2018	8:59	41.8		26.7				15.0
MW-55s	6/20/2018	9:04	41.0		24.6				16.4
MW-56s	6/20/2018	9:40	43.5	29.2	29.5		0.3		14.3
MW-57s	6/20/2018	9:09	42.0		29.6				12.4
MW-58d	6/20/2018	8:37	41.4		31.2				10.2
MW-58i	6/20/2018	8:34	41.0		30.9				10.1
MW-58s	6/20/2018	8:31	41.5		30.3				11.2
MW-59s	6/20/2018	8:12	35.9		18.5				17.4
MW-60d	6/20/2018	10:00	40.1		29.7	29.7		Trace	10.4
MW-61s	6/20/2018	8:52	43.6		26.4				17.3
MW-62i	6/20/2018	9:14	42.6		32.4				10.2
MW-As	6/20/2018	11:29	39.3		21.0				18.3
MW-Ds	6/20/2018	9:15	42.9		31.2	37.1		1.6	8.9
MW-Gs	6/20/2018	8:55	40.2		29.0	42.9		1.8	8.6
MW-Os	6/20/2018	10:20	40.9		21.8				19.1
PW-1d	6/20/2018	10:31	44.0		29.2				14.8
PW-2d	6/20/2018	11:20	41.8		27.0				14.8

LNAPL specific gravity estimated as 0.981 g/cm³

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

nm = EW-2s excluded from table since it was inadvertently not visited during the 2018 cycle. Will be revisited in 2019.

Table 4-2: Groundwater and NAPL Elevations: September 21, 2018 2018 O&M Annual Report
McCormick and Baxter Superfund Site

		1				1			
			Measuring						Groundwater
			Point	_	_	_	LNAPL	DNAPL	Elevation LNAPL
			Elevation	Depth to	Depth to	Depth to	Thickness	Thickness	Corrected
Well ID	Date	Time	(ft NAVD88)	LNAPL (ft)	water (ft)	DNAPL (ft)	(ft)	(ft)	(ft NAVD88)
EW-1s	9/21/2018	11:20	40.1		26.0	39.8		8.2	14.1
EW-2s	-	-	42.4	-	nm	-	-	-	-
EW-8s	9/21/2018	10:50	40.5	22.4	27.2	53.3		1.4	13.3
EW-10s	9/21/2018	10:00	29.4	23.1	23.1	41.7	Trace	0.9	6.4
EW-15s	9/21/2018	10:15	43.0	31.9	45.0	42.4	13.0	4.6	10.8
EW-18s	9/21/2018	11:05	40.7	27.4	27.4	43.1	Trace	1.6	13.3
EW-19s	9/21/2018	9:50	25.9	27.2	18.9		4.2		7.1
EW-23s MW-1r	9/21/2018	10:30 12:15	37.6 37.6	27.3	31.5 26.7		4.3		10.3 10.9
MW-7 WC	9/21/2018 9/21/2018	10:55	36.7		26.7				10.9
MW-10r	9/21/2018	11:45	41.9	28.5	28.7				13.1
MW-15s	9/21/2018	9:45	43.3	26.5	30.5				12.8
MW-17s	9/21/2018	9:30	41.3		28.8				12.5
MW-20i	9/21/2018	9:10	41.4		35.4	70.8		3.9	6.0
MW-22i	9/21/2018	11:55	42.3	35.9	35.4	53.2	Trace	5.8	6.4
MW-23d	9/21/2018	10:23	41.1	33.3	34.6	یی.∠	Hace	٥.٥	6.5
MW-32i	9/21/2018	10:32	39.3		28.5				10.8
MW-34i	9/21/2018	9:20	32.7		26.8				5.9
MW-35r	9/21/2018	11:05	32.7		23.8				8.5
MW-36d	9/21/2018	9:35	30.5		24.7				5.7
MW-36i	9/21/2018	9:33	30.2		24.7				6.0
MW-36s	9/21/2018	9:29	30.7		20.2				10.6
MW-37d	9/21/2018	9:43	26.1		20.3				5.7
MW-37i	9/21/2018	9:40	25.9		20.3				5.8
MW-37s	9/21/2018	9:38	24.9		18.1				6.7
MW-38d	9/21/2018	10:00	31.8		26.0				5.8
MW-38i	9/21/2018	9:58	32.1		25.7				6.3
MW-38s	9/21/2018	9:56	32.3		21.3				11.0
MW-39d	9/21/2018	10:08	29.8		24.1				5.8
MW-39i	9/21/2018	10:06	30.1		24.3				5.8
MW-39s	9/21/2018	10:04	29.8		22.9				6.8
MW-40d	9/21/2018	10:16	28.7		22.9				5.7
MW-40i	9/21/2018	10:14	28.7		22.5				6.2
MW-40s	9/21/2018	10:12	28.3		16.9				11.4
MW-41d	9/21/2018	10:24	27.4		21.7				5.7
MW-41i	9/21/2018	10:22	27.1		21.3				5.8
MW-41s	9/21/2018	10:20	27.8		20.9				6.9
MW-42d	9/21/2018	10:31	32.2		26.5				5.7
MW-42i	9/21/2018	10:29	32.7		26.7				6.0
MW-42s	9/21/2018	10:27	32.4		19.5				12.8
MW-43d	9/21/2018	10:38	28.3		22.7				5.7
MW-43i	9/21/2018	10:36	30.3		24.5				5.8
MW-43s	9/21/2018	10:34	31.1		24.4				6.6
MW-44d	9/21/2018	10:57	29.6		23.7				6.0
MW-44i	9/21/2018	10:56	29.3		23.0				6.4
MW-44s	9/21/2018	10:55	29.6		16.4				13.2
MW-45d	9/21/2018	11:10	27.9		22.6				5.3
MW-45i	9/21/2018	11:08	28.0		22.0				6.0
MW-45s	9/21/2018	11:07	28.2		21.4				6.8
MW-46s	9/21/2018	11:15	35.5		22.2				13.4
MW-47s	9/21/2018	11:18	35.5		28.2				7.3
MW-48s	9/21/2018	11:47	38.7		24.3				14.4
MW-49s	9/21/2018	12:15	37.6		20.9				16.7
MW-50s	9/21/2018	10:20	39.3		25.3				14.0

Table 4-2: Groundwater and NAPL Elevations: September 21, 2018 2018 O&M Annual Report McCormick and Baxter Superfund Site

			Measuring Point				LNAPL	DNAPL	Groundwater Elevation LNAPL
			Elevation	Depth to	Depth to	Depth to	Thickness	Thickness	Corrected
Well ID	Date	Time	(ft NAVD88)	LNAPL (ft)	water (ft)	DNAPL (ft)	(ft)	(ft)	(ft NAVD88)
MW-51s	9/21/2018	10:15	39.5		22.9				16.6
MW-52s	9/21/2018	9:57	40.7		27.5				13.3
MW-53s	9/21/2018	9:53	40.4		24.8				15.6
MW-54s	9/21/2018	9:08	41.8		28.9				12.9
MW-55s	9/21/2018	9:00	41.0		28.6				12.5
MW-56s	9/21/2018	8:30	43.5	31.8	31.8		Trace		11.7
MW-57s	9/21/2018	9:15	42.0		33.4				8.7
MW-58d	9/21/2018	11:40	41.4		36.0				5.4
MW-58i	9/21/2018	11:20	41.0		35.7				5.3
MW-58s	9/21/2018	11:15	41.5		33.9				7.6
MW-59s	9/21/2018	11:40	35.9		22.6				13.3
MW-60d	9/21/2018	9:10	40.1		33.9	33.9		Trace	6.2
MW-61s	9/21/2018	10:49	43.6		31.1				12.6
MW-62i	9/21/2018	9:25	42.6		36.7				5.9
MW-As	9/21/2018	10:35	39.3		23.0				16.3
MW-Ds	9/21/2018	9:30	42.9	34.9	34.9	36.4	Trace	2.3	8.0
MW-Gs	9/21/2018	8:50	40.2	32.7	32.7	43.9	Trace	0.8	7.5
MW-Os	9/21/2018	10:03	40.9		22.9				18.0
PW-1d	9/21/2018	10:30	44.0		33.1				10.9
PW-2d	9/21/2018	10:02	41.8		30.9	·			10.9

LNAPL specific gravity estimated as 0.981 g/cm³

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

nm = EW-2s excluded from table since it was inadvertently not visited during the 2018 cycle. Will be revisited in 2019.

Table 4-3: Groundwater O&M Activities in 2018 2018 O&M Annual Report McCormick and Baxter Superfund Site

O&M Activity	Frequency in 2018	
NAPL Monitoring:		
Manual gauging of site wells	June, October	
Groundwater Monitoring:		
Downloading continuous water level data from transducers	June, October	
Manual water level measurements from site wells	June, October	
Routine Maintenance of Equipment:		
Transducers	June, October	
Non-Routine Maintenance:		
Changed batteries in select transducers	July	

Table 7-1: Soil Cap O&M Activities Planned through 2023 2018 O&M Annual Report McCormick and Baxter Superfund Site

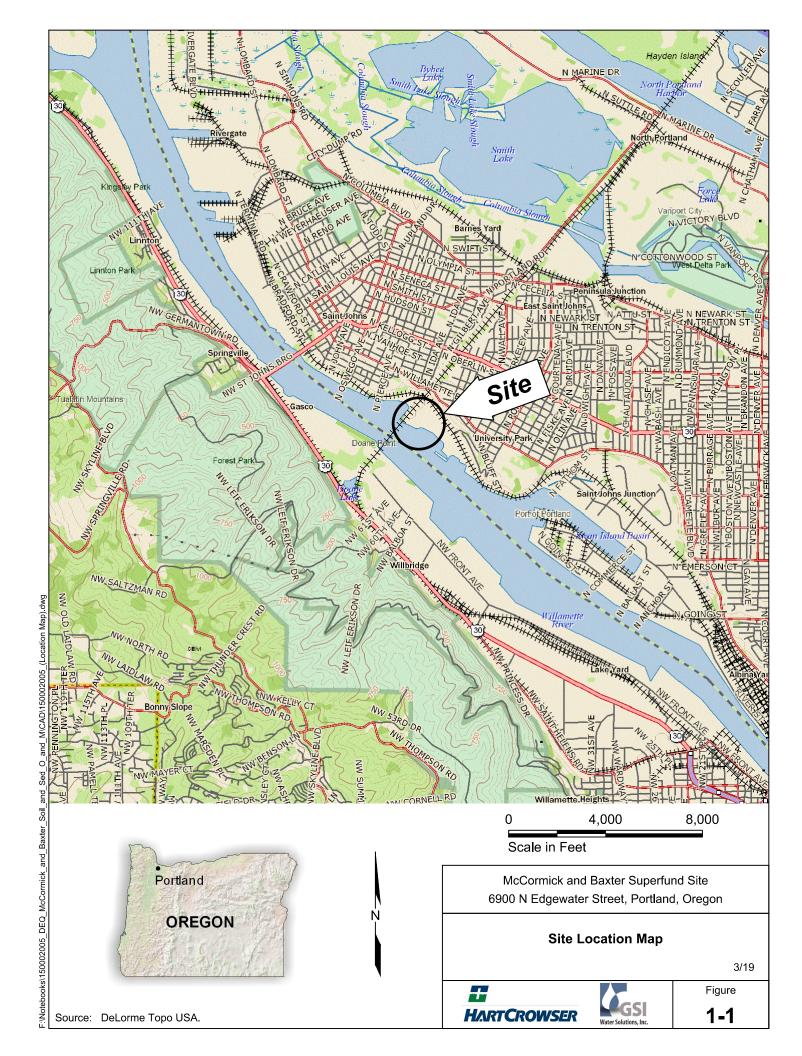
O&M Activity	Frequency
Visual Inspections:	
Cap surface	Quarterly
Subsidence near EW-1s	Quarterly
Stormwater conveyance system	Quarterly
Security fencing	Quarterly
Warning signs	Quarterly
Abundance and survival of vegetation	Quarterly
Routine Maintenance and Monitoring:	
Manual removal of invasive plants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

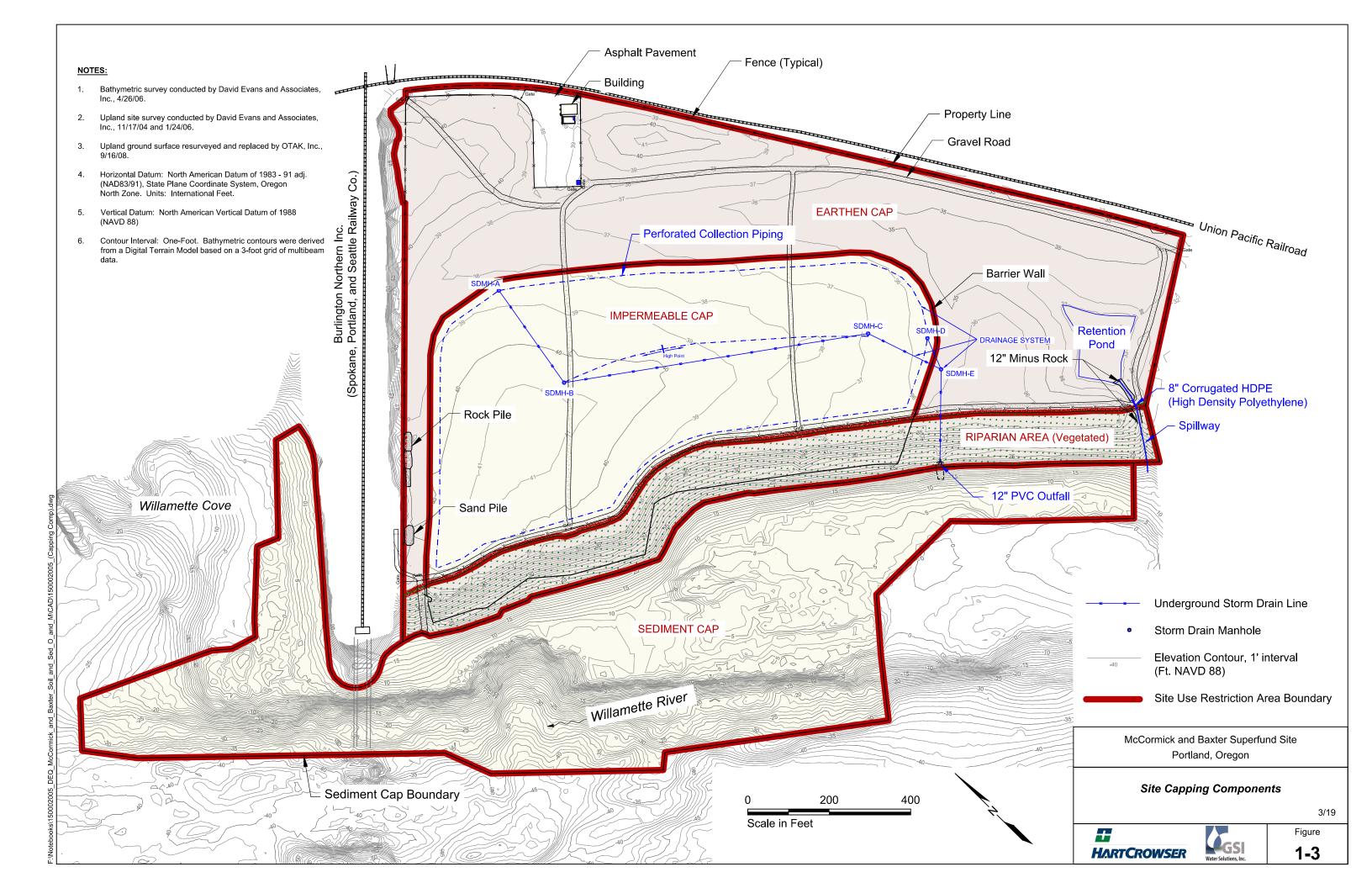
Table 7-2: Sediment Cap O&M Activities Planned through 2023 2018 O&M Annual Report McCormick and Baxter Superfund Site

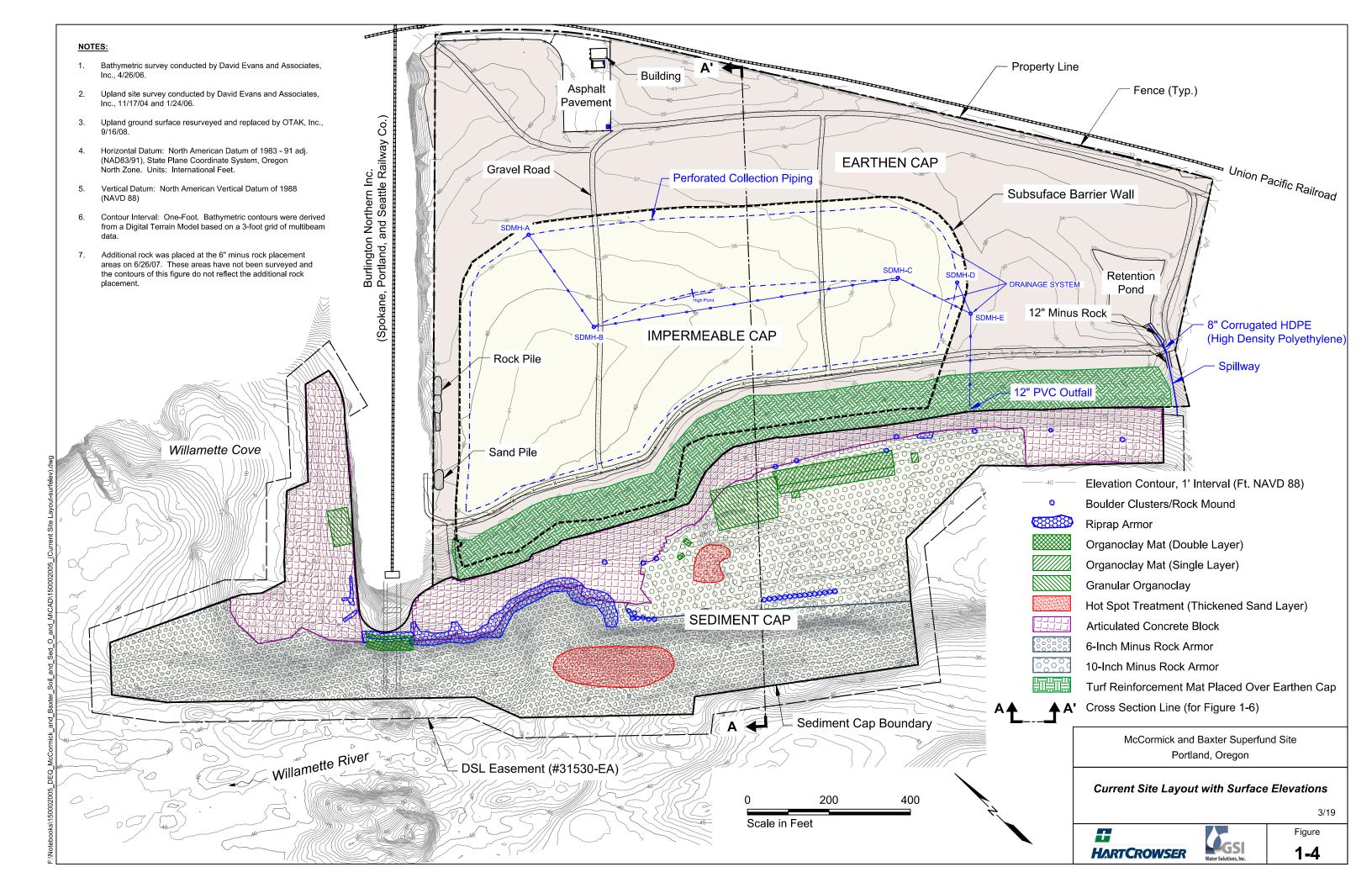
O&M Activity	Frequency		
Visual Inspections (from shore):			
Warning buoys	Quarterly		
Cap surface	Quarterly		
Habitat quality	Annually		
Routine Monitoring:			
Water column and inter-armoring water sampling	Every 5 years (next event in 2020)		
Organoclay core sampling	Not anticipated in 2020; additional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

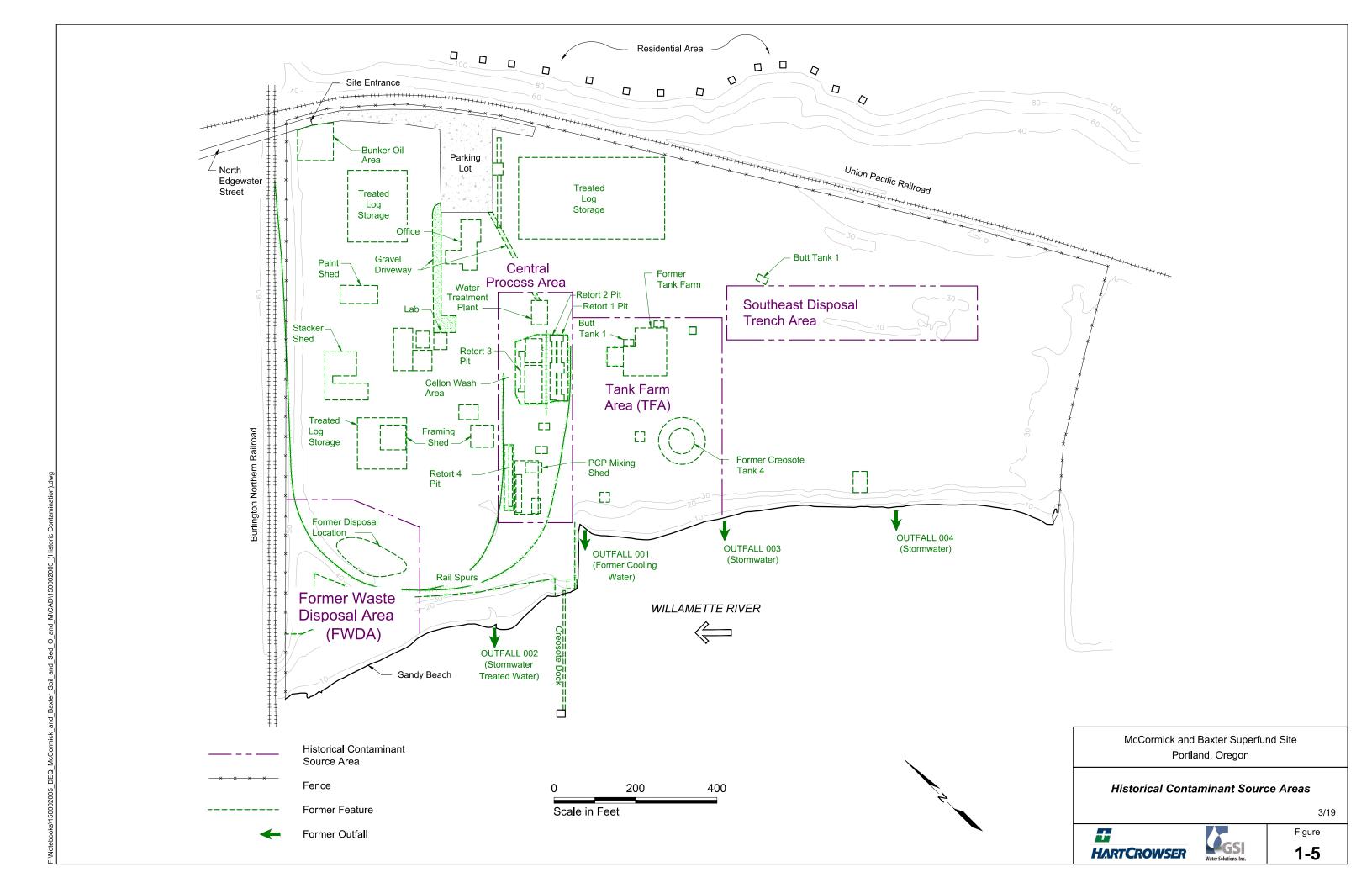
Table 7-3: Groundwater O&M Activities Planned through 2023 2018 O&M Annual Report McCormick and Baxter Superfund Site

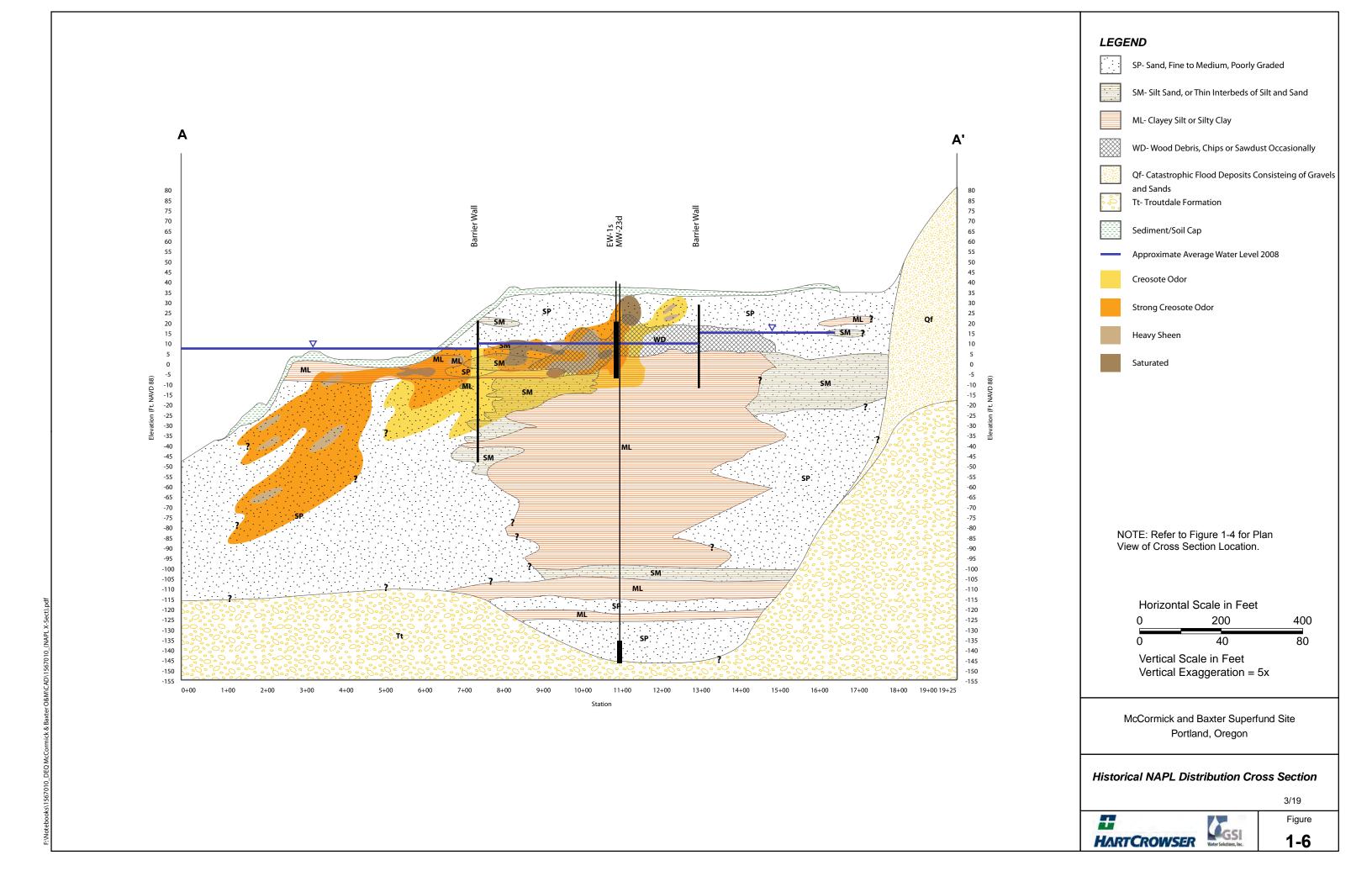
O&M Activity	Frequency
NAPL Monitoring:	
Manual gauging of site wells	Semiannually
Manual extraction from exterior wells	Not recommended
Groundwater Monitoring:	
Downloading continuous water level data from transducers	Semiannually
Manual water level measurements from site wells	Semiannually
Groundwater Sampling:	
Site-wide	2020,
	Subsequent frequency to be determined
Infiltration pond (MW-59s)	Every 5 years
Routine Maintenance of Equipment:	
Interface probes, pumps, vehicle, data loggers / transducers, etc.	As needed

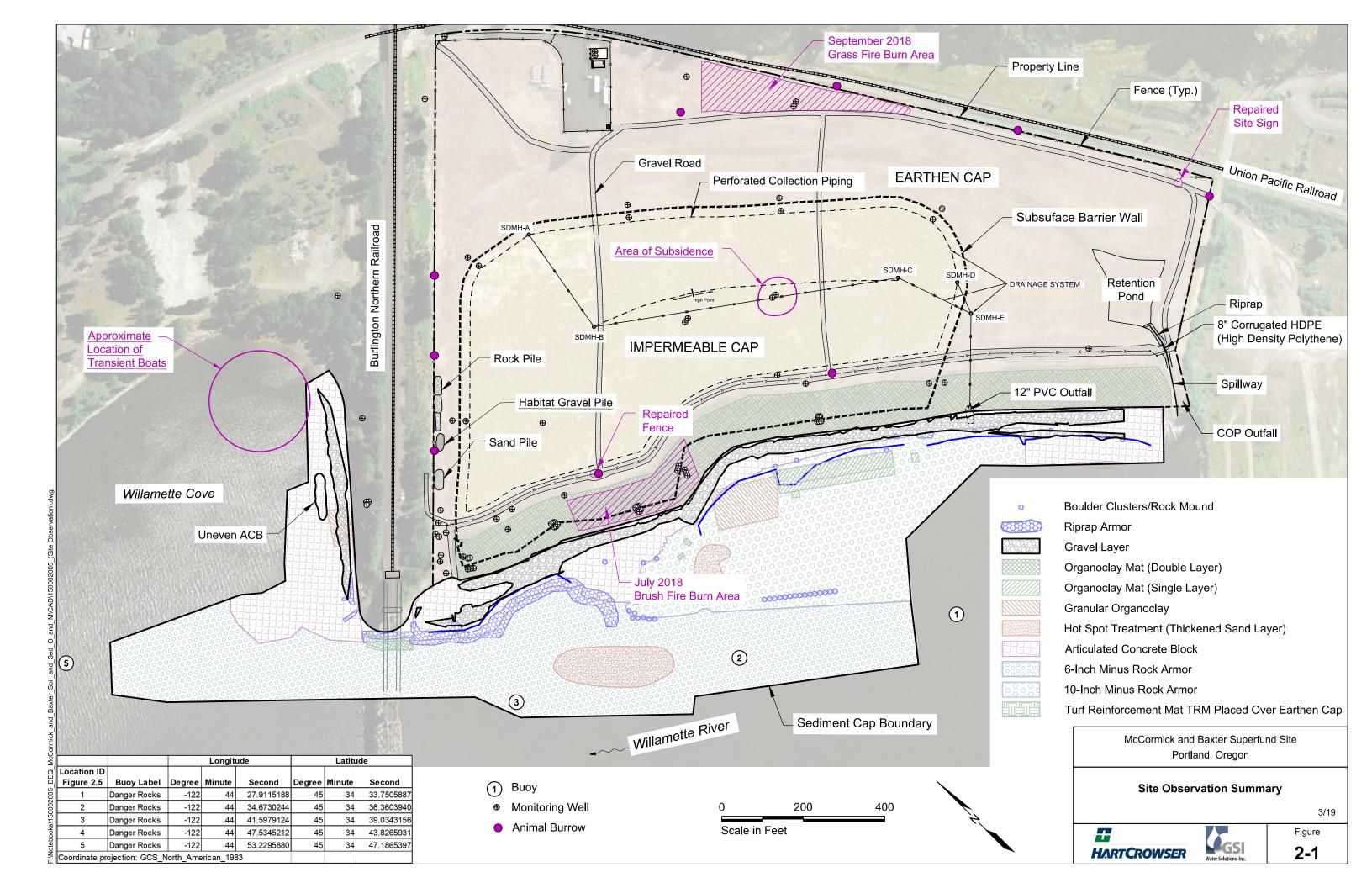




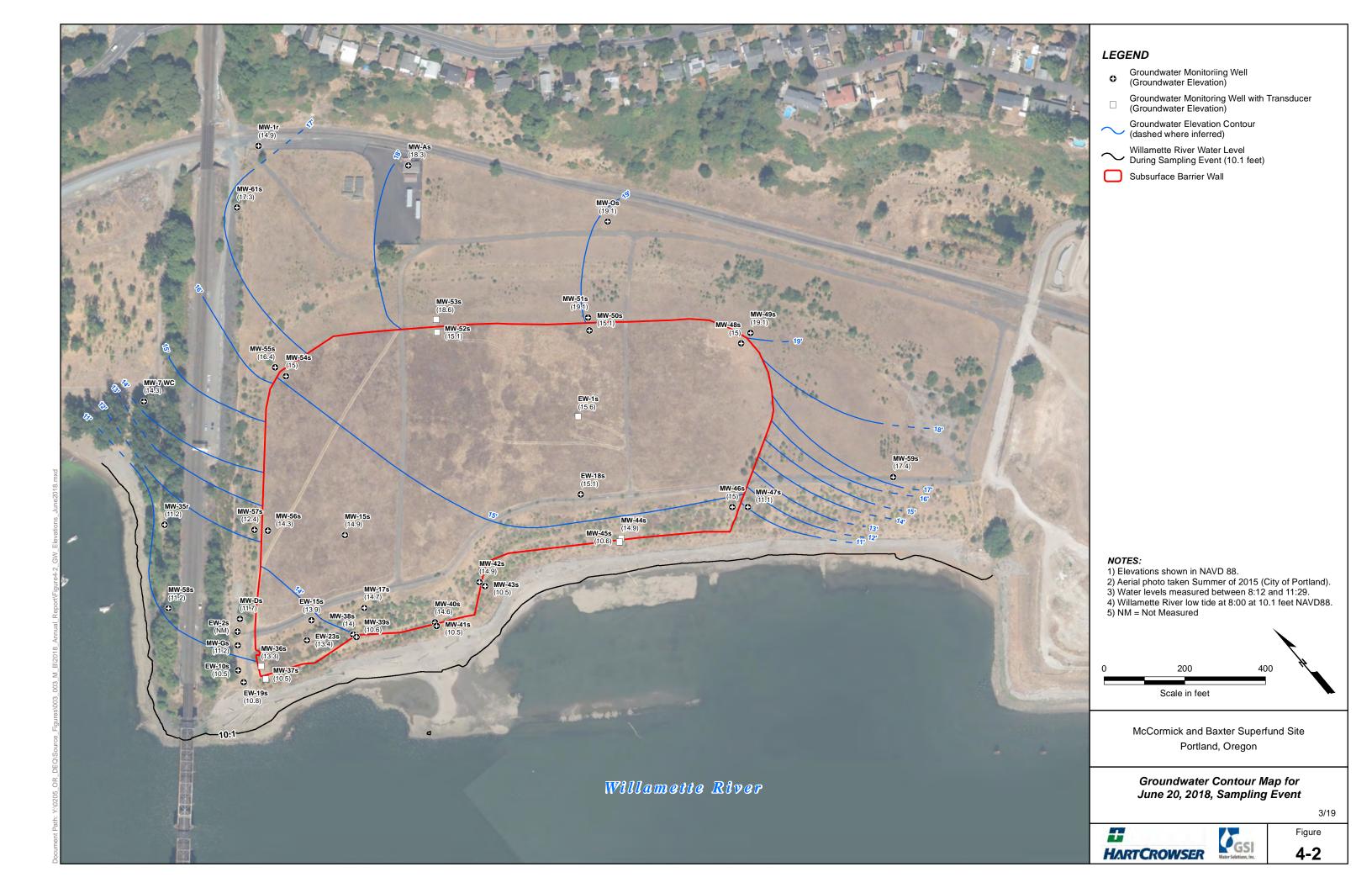


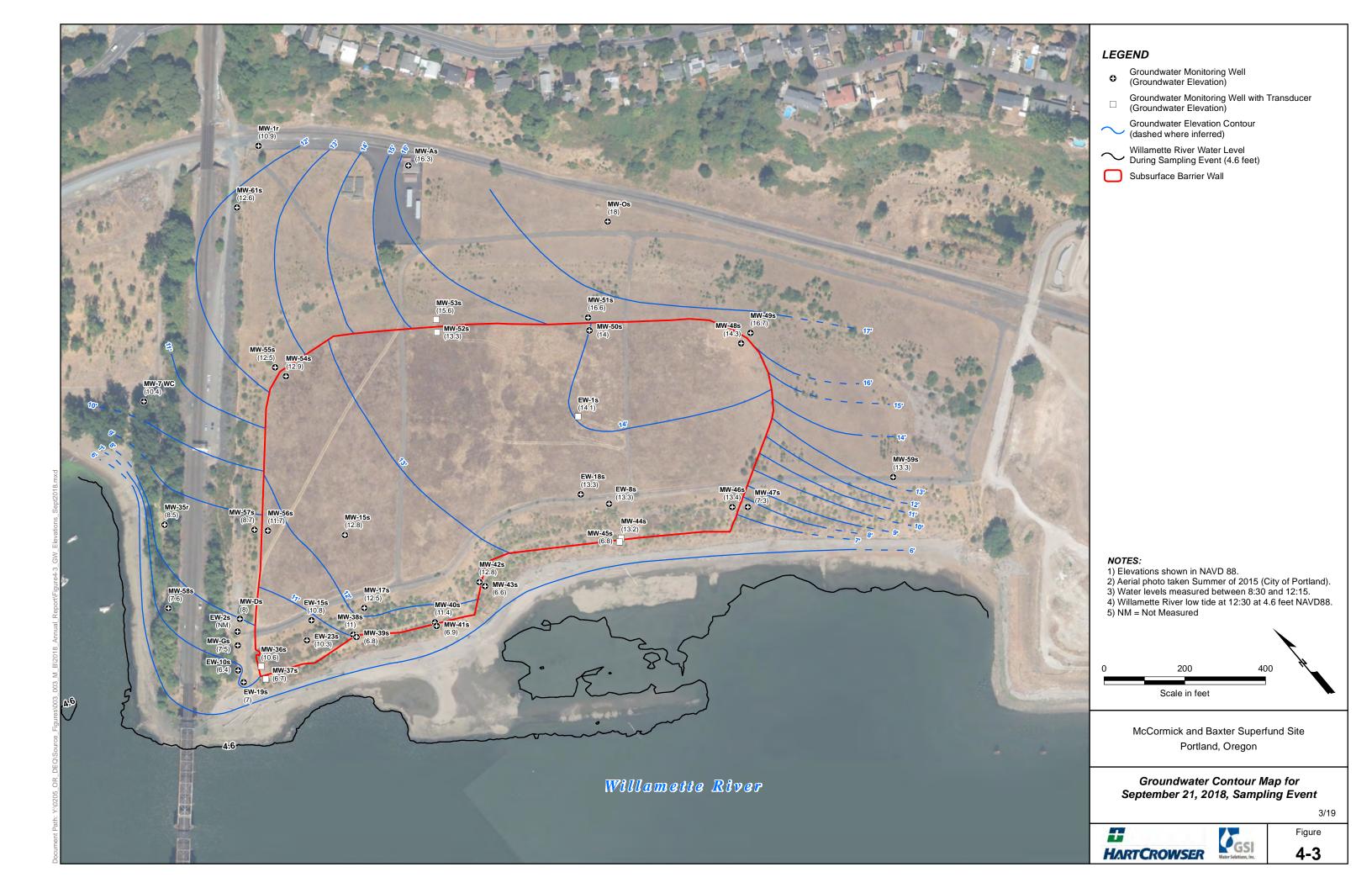


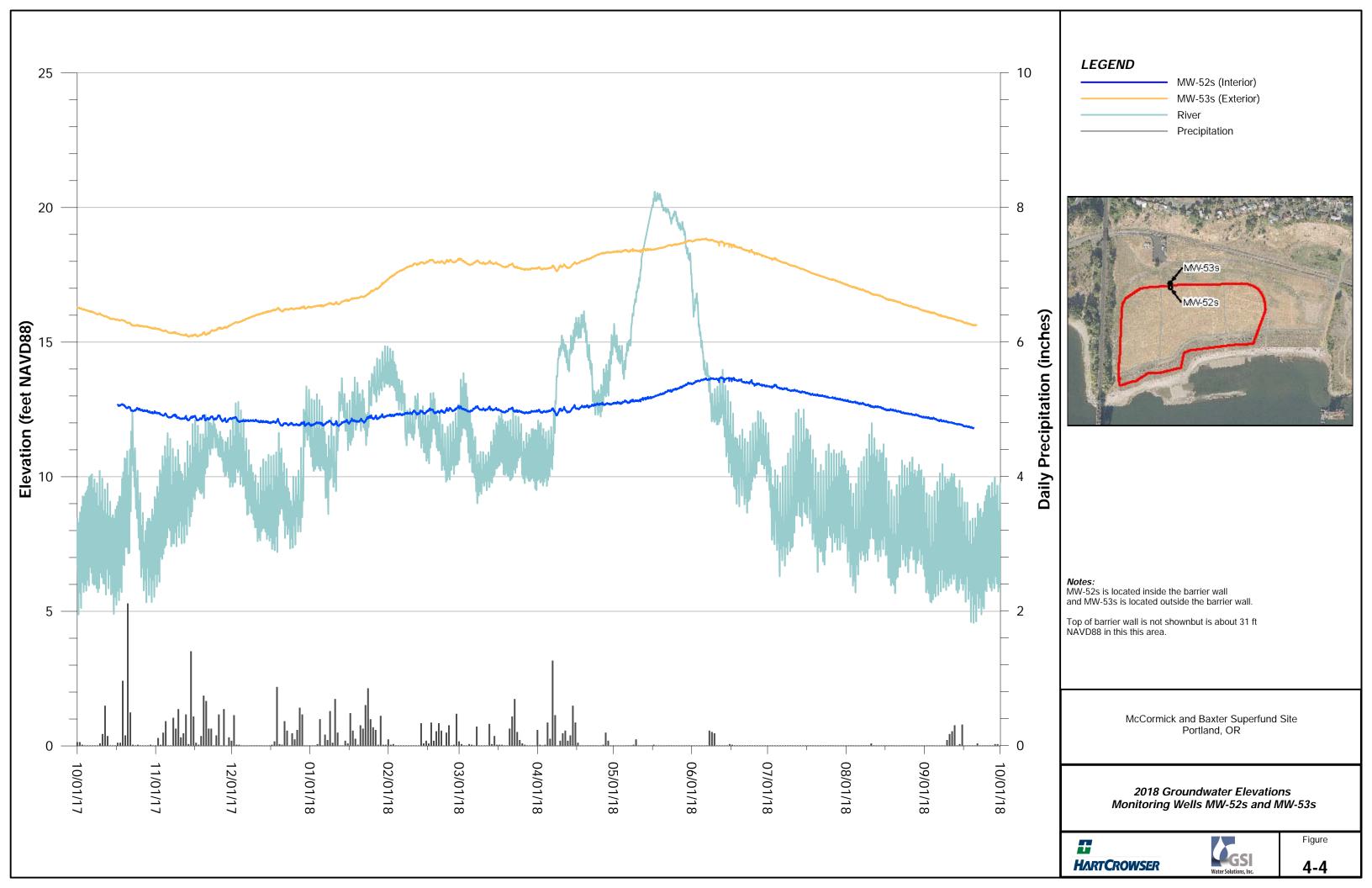


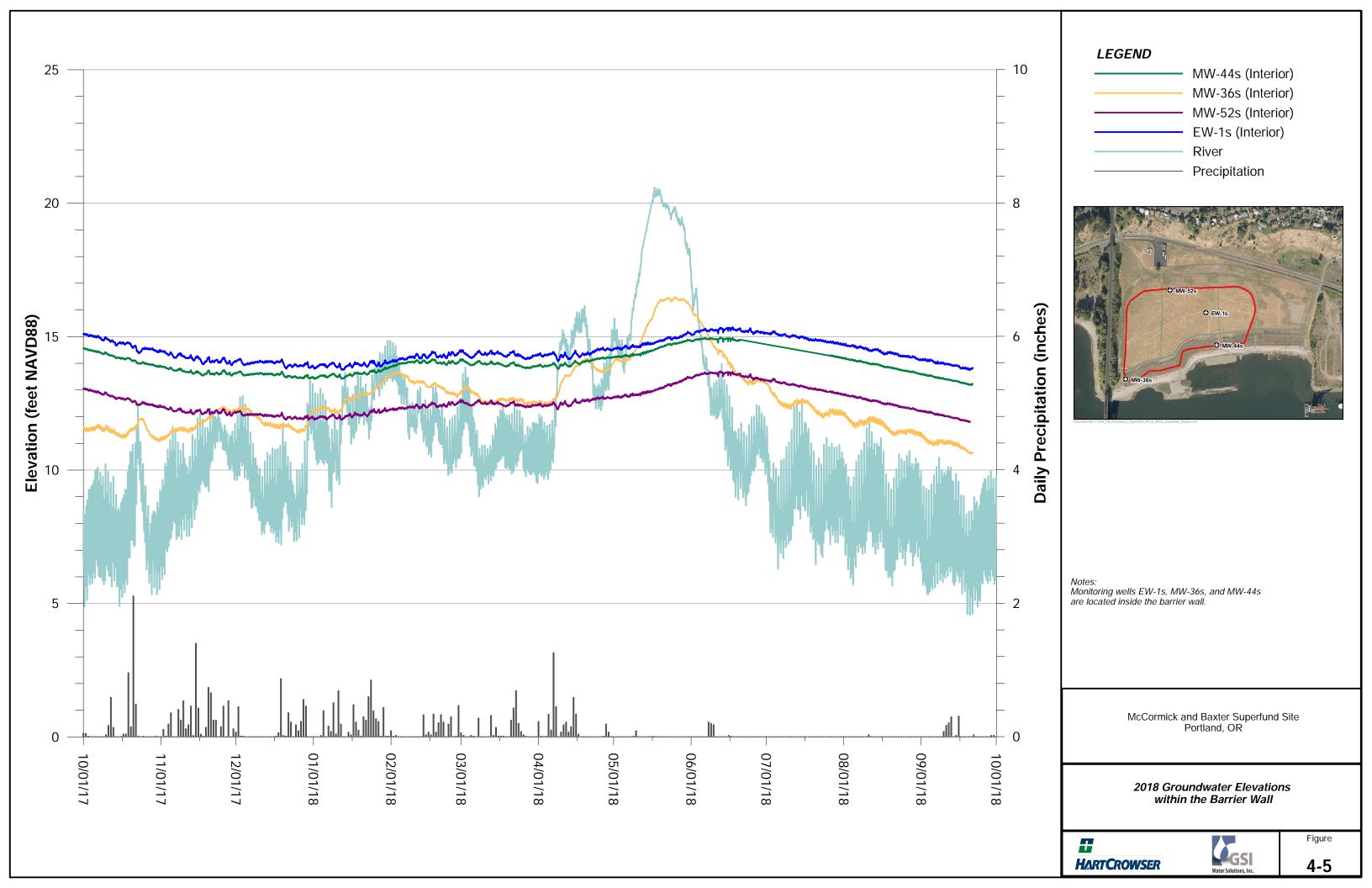


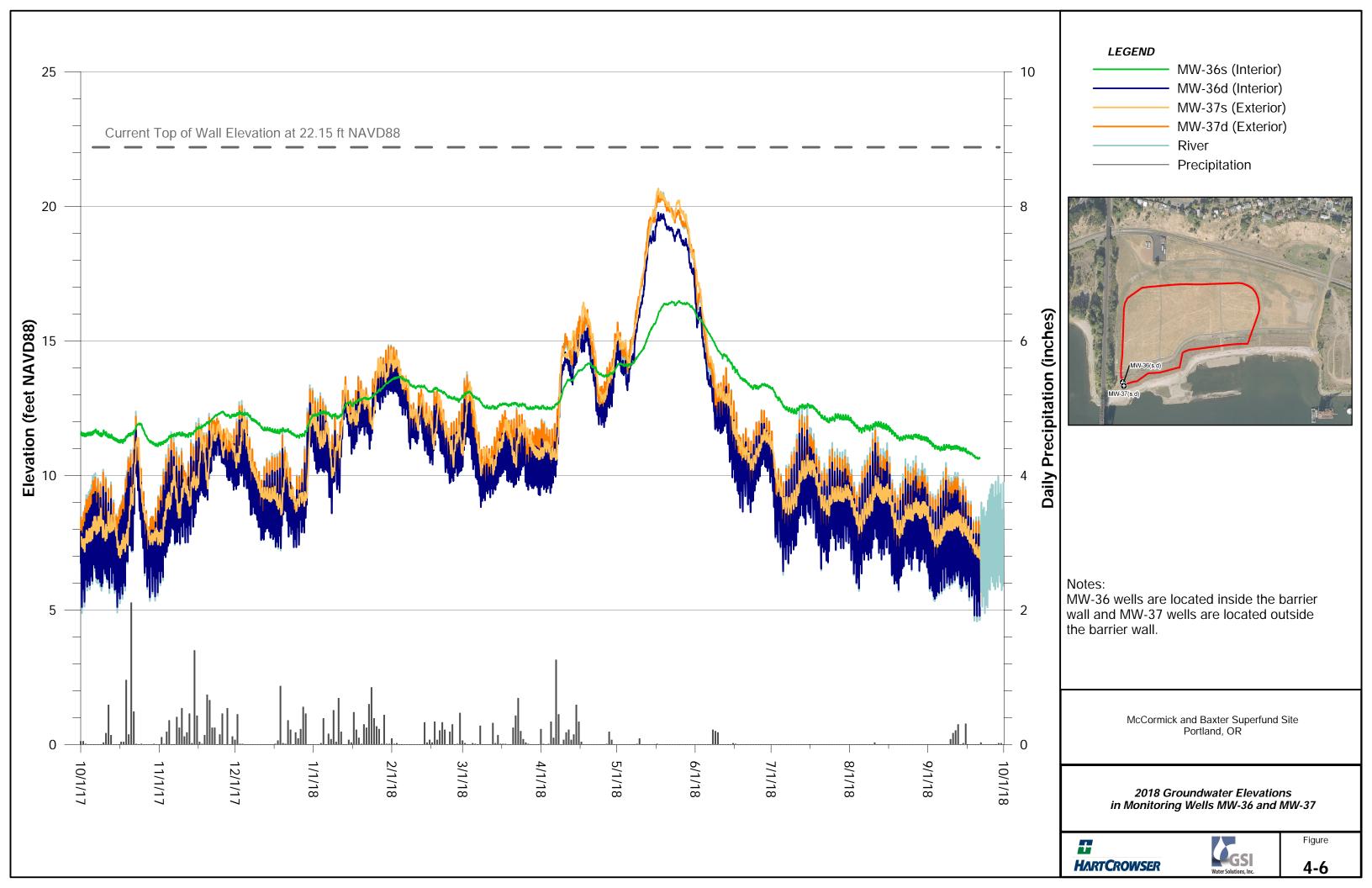


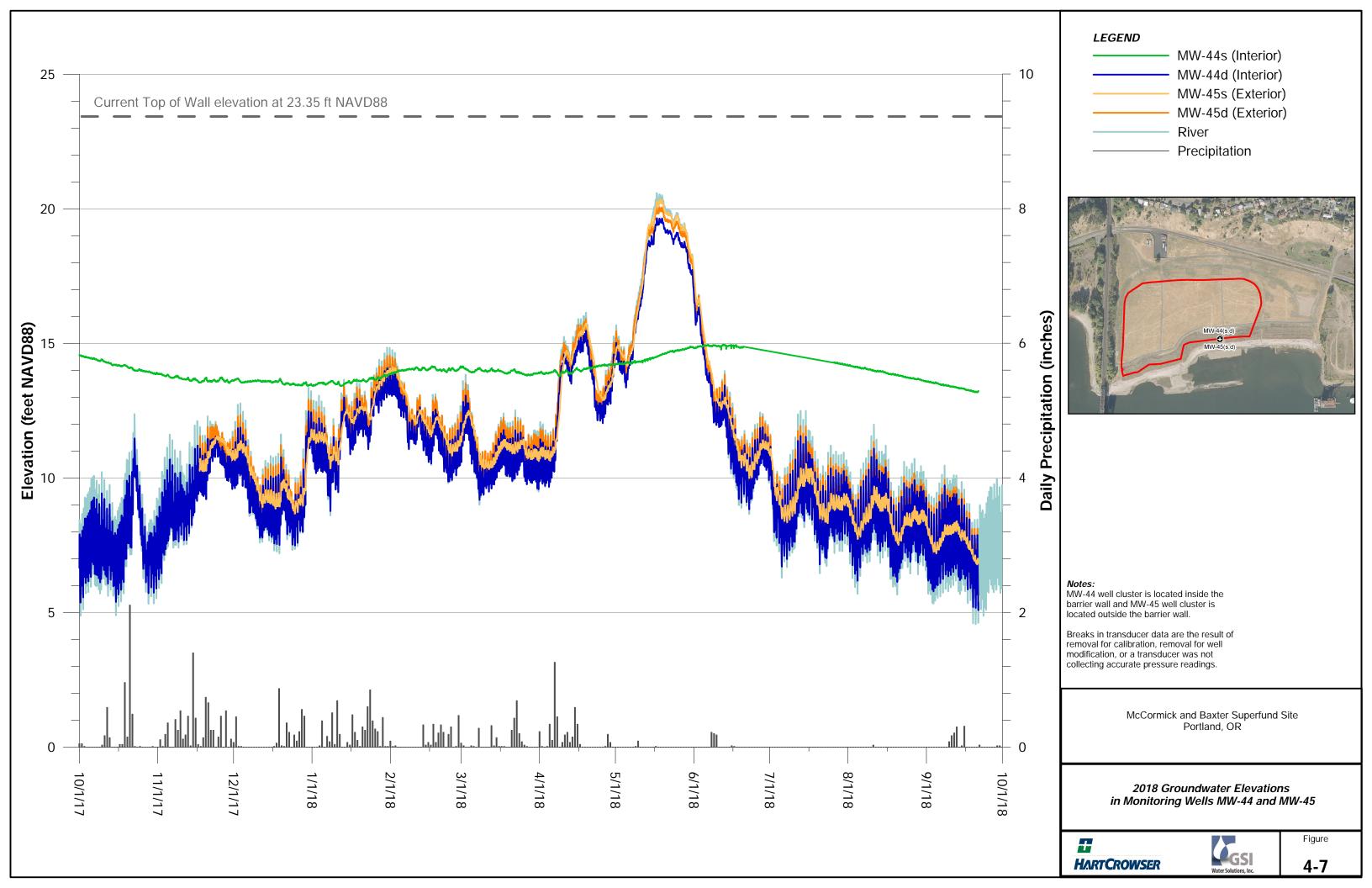


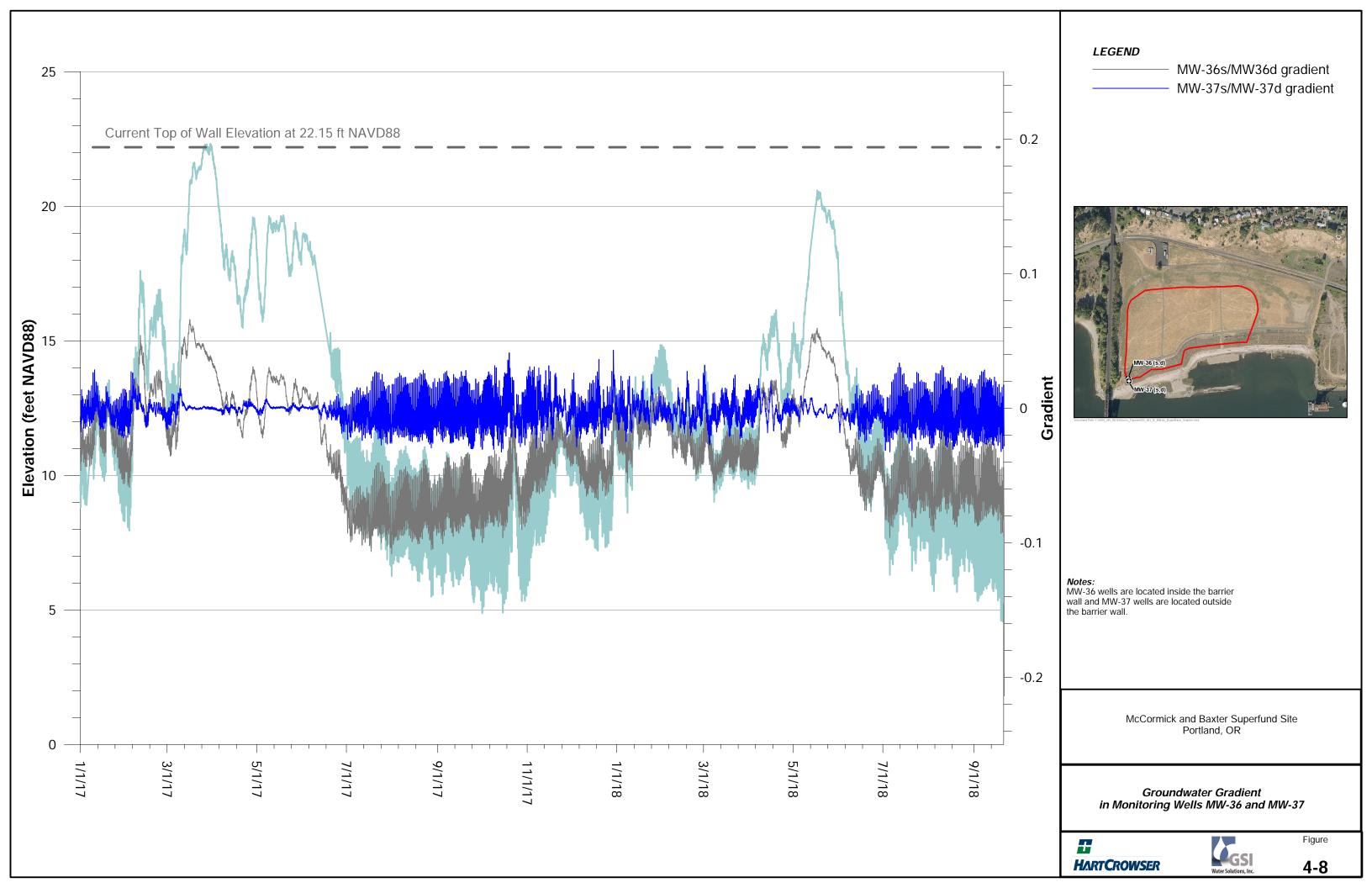


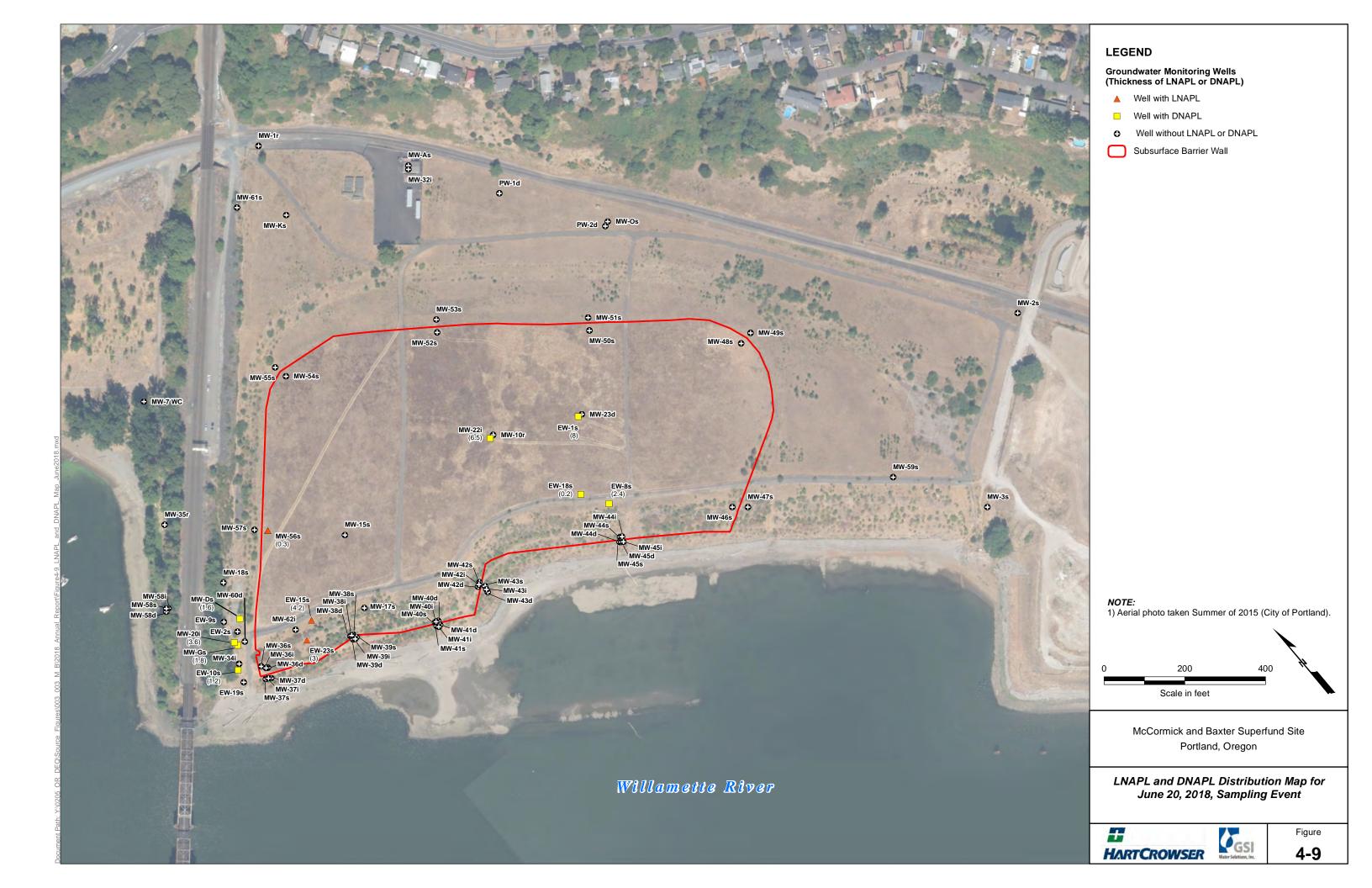


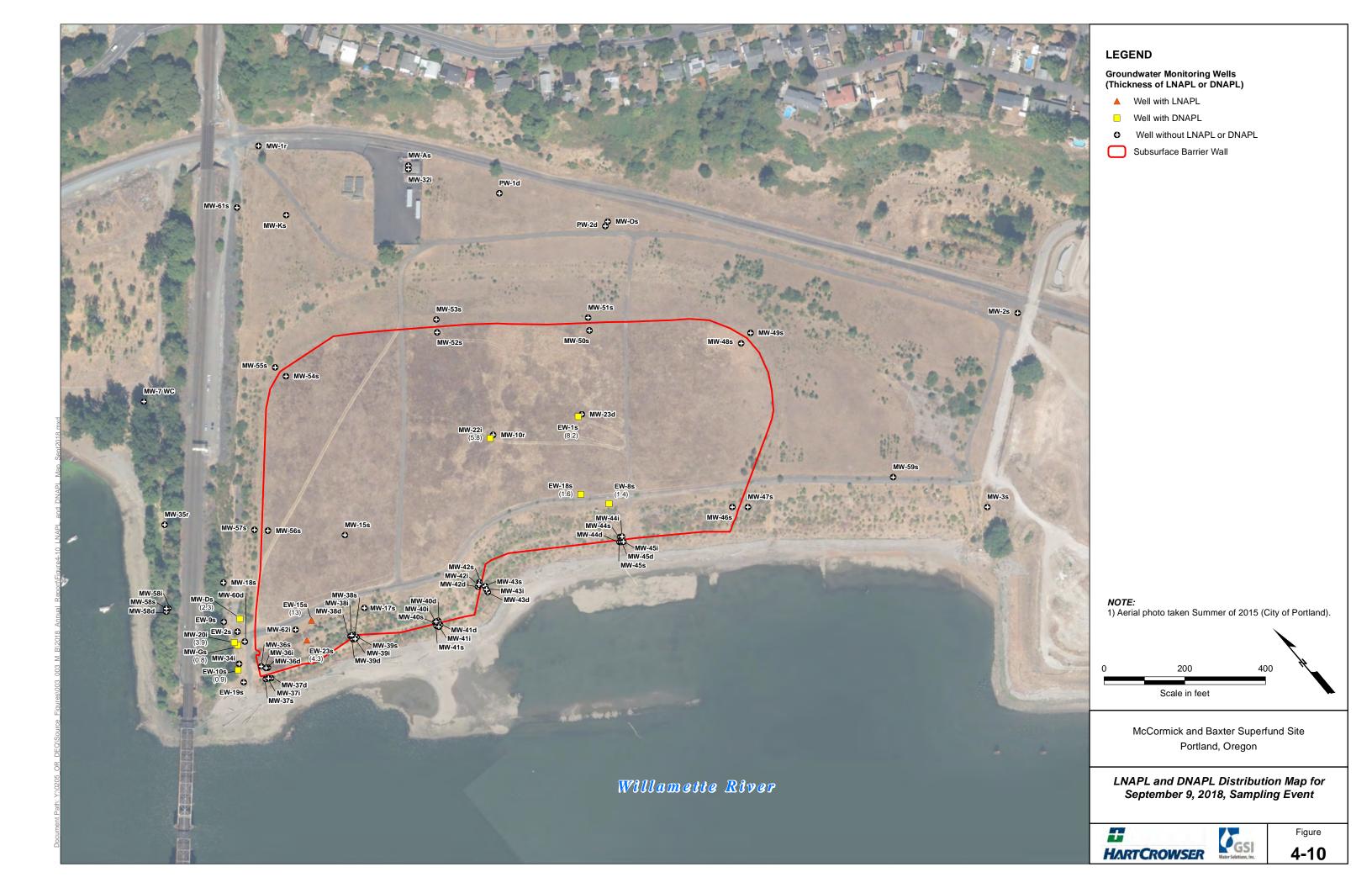


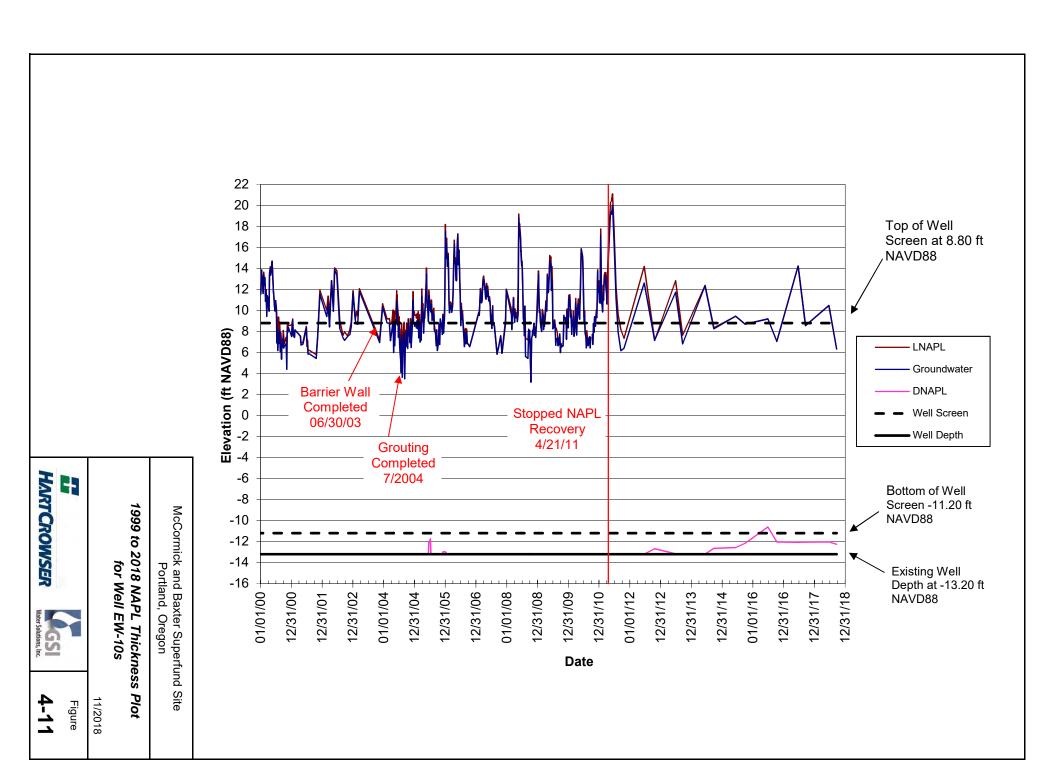


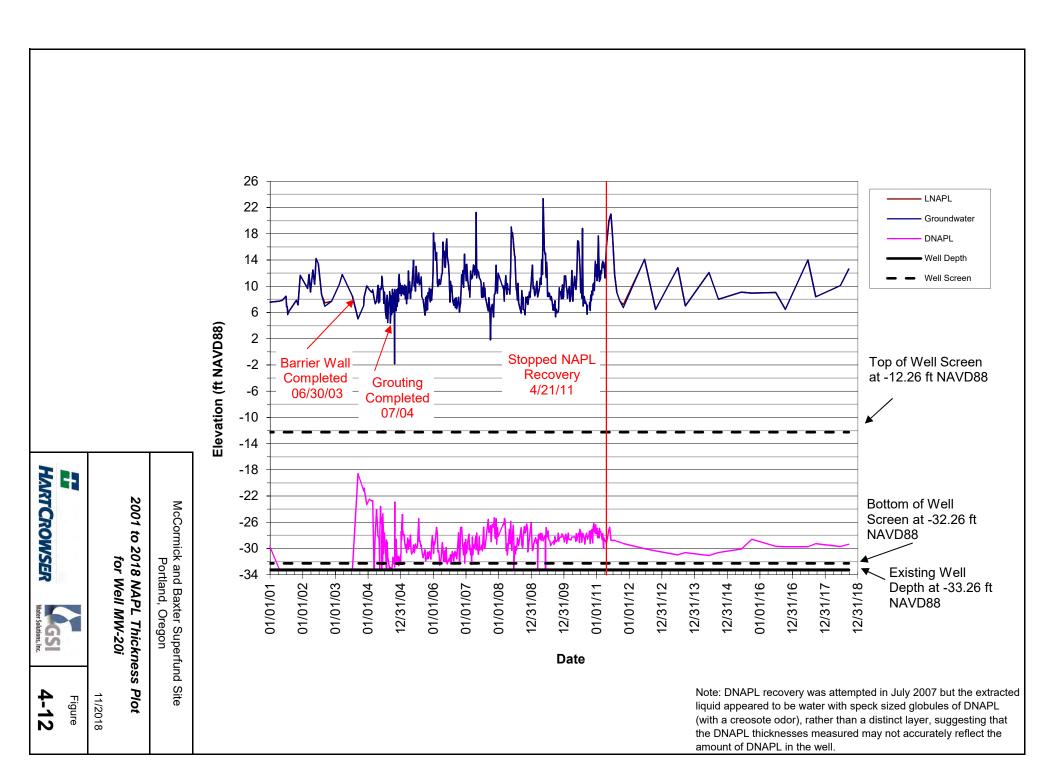


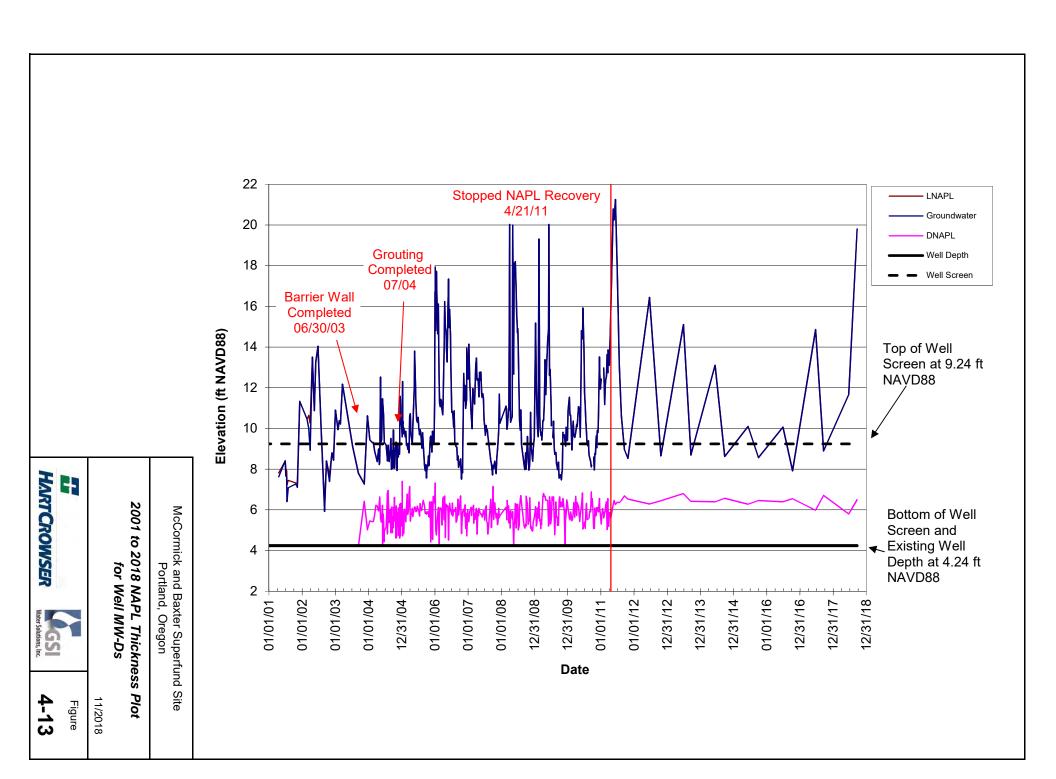


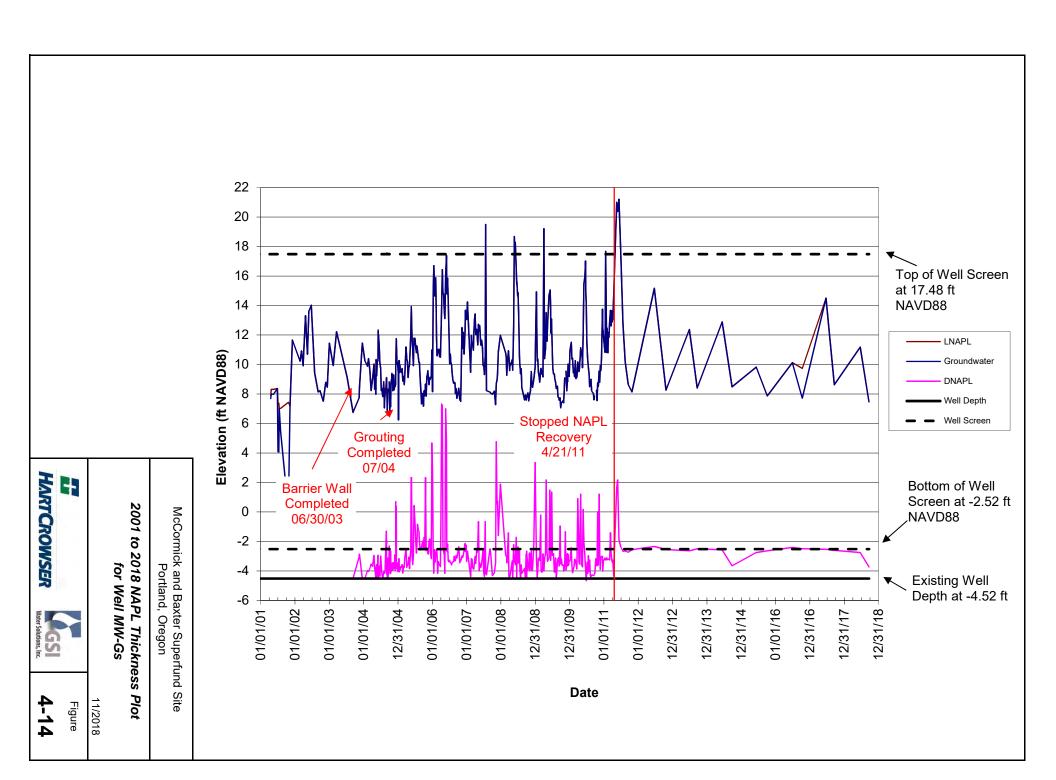


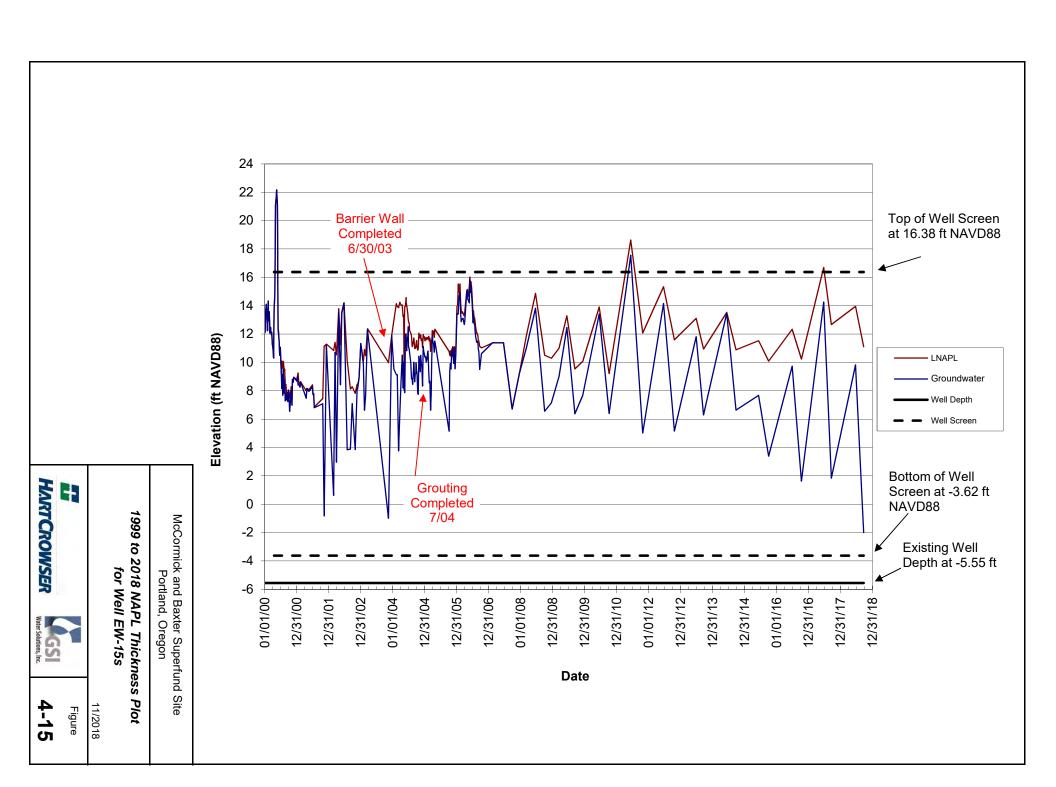


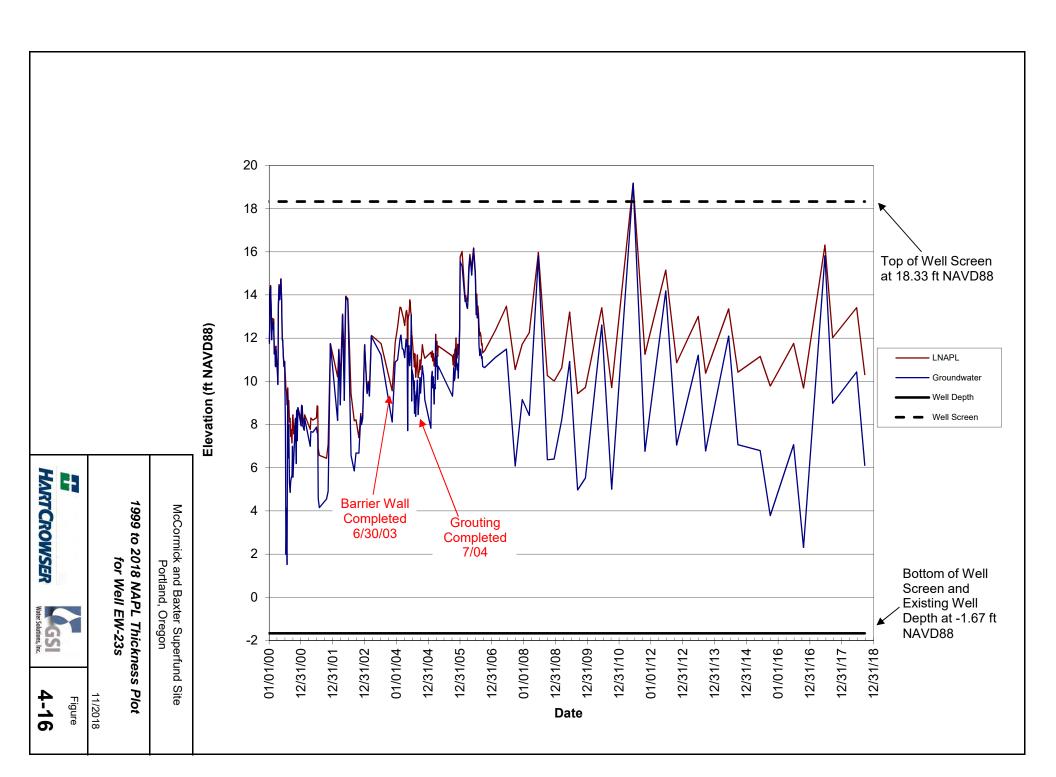


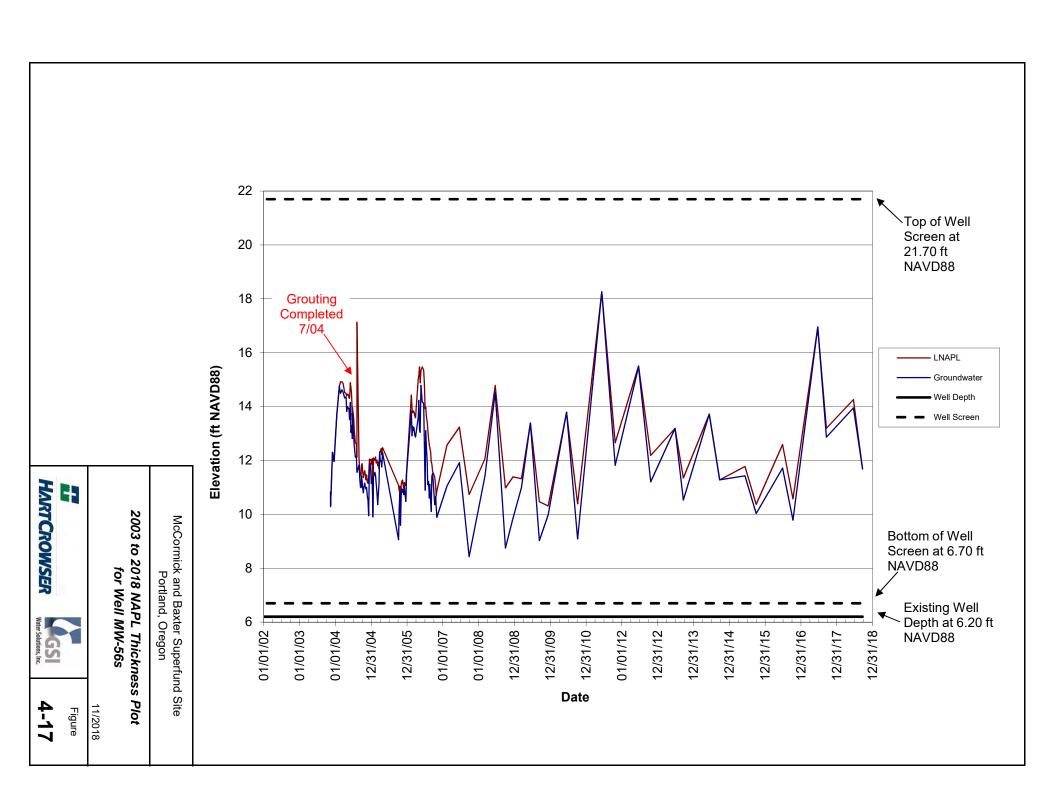


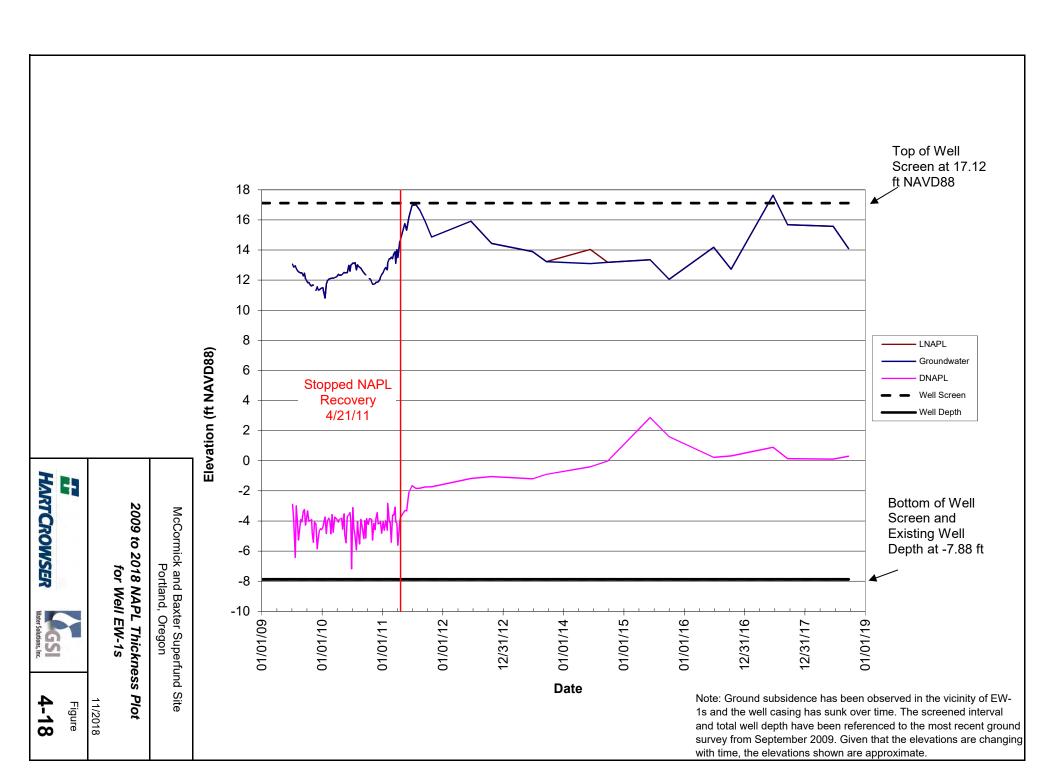


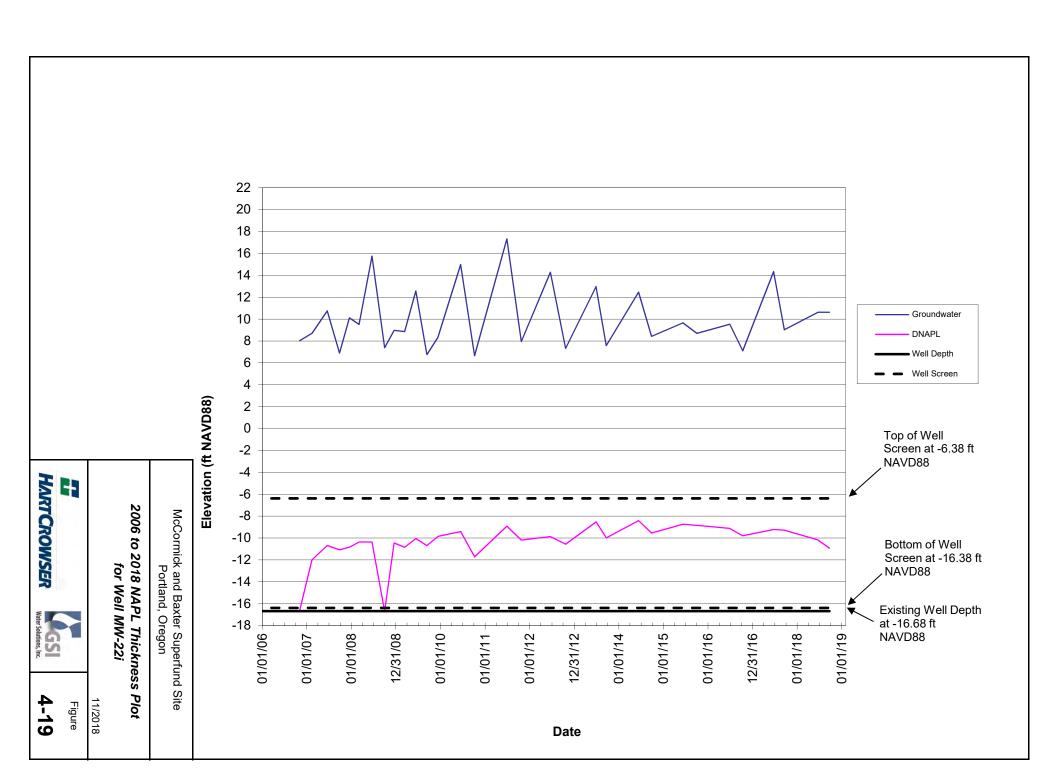


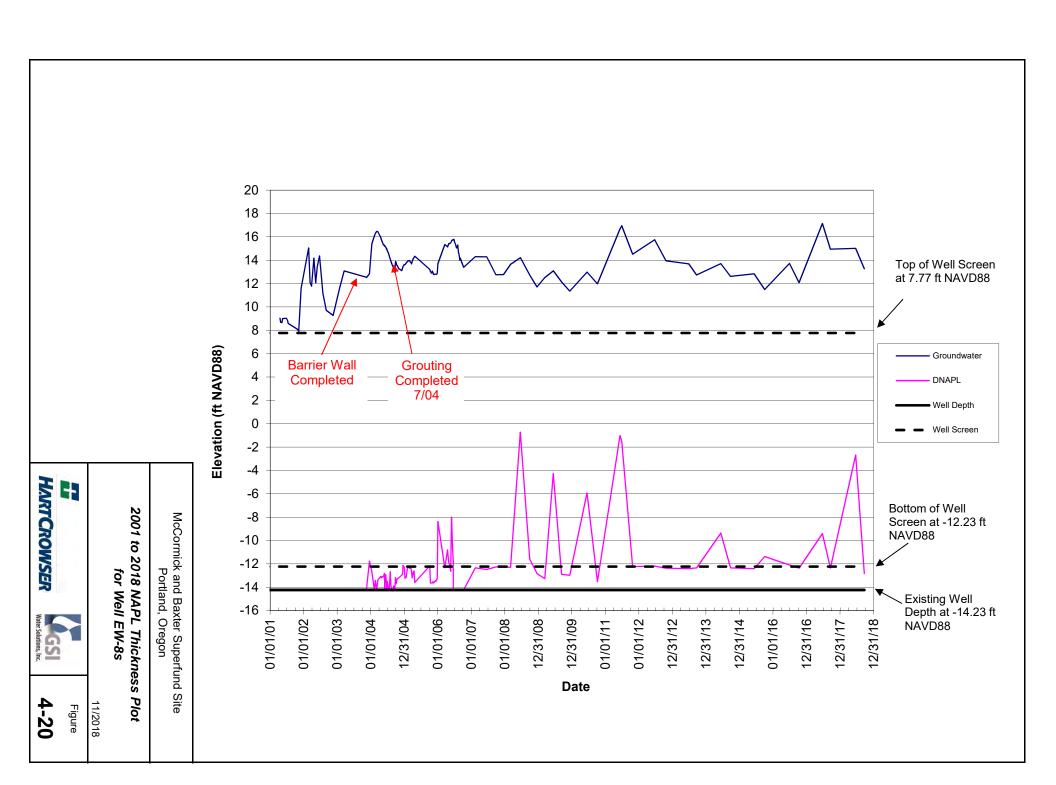


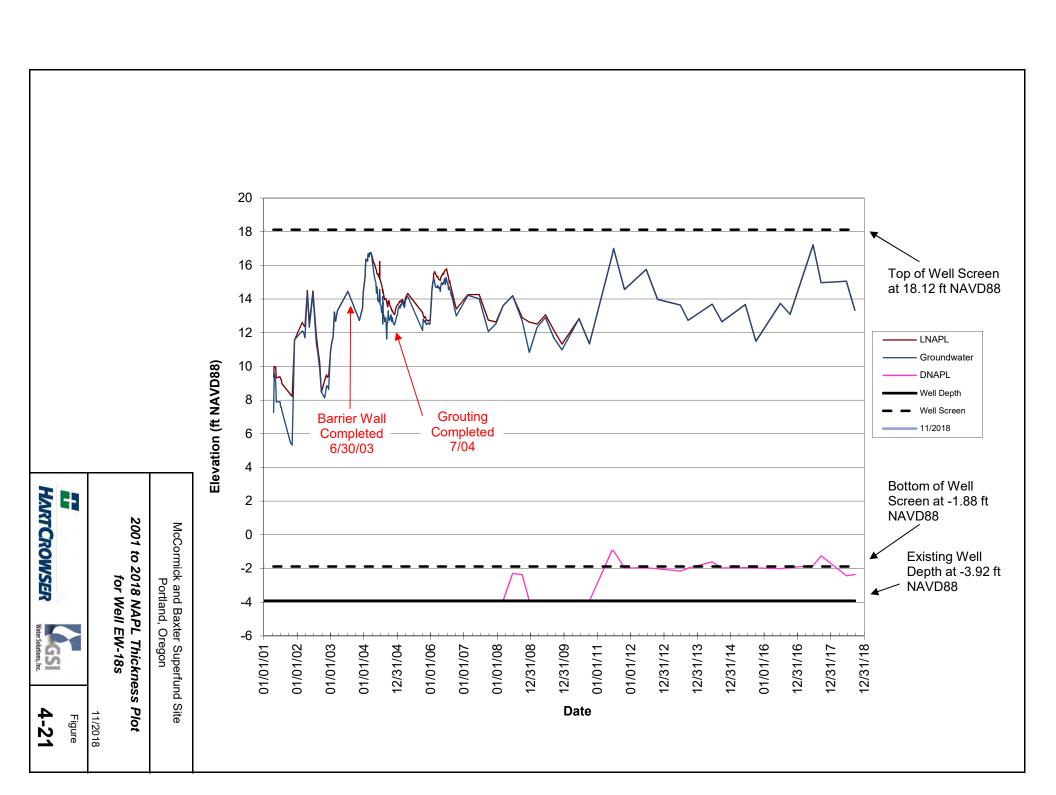












APPENDIX A Photograph Log – Site Activities and Observations





Photograph 1 – Animal burrow observed during April 2018 site inspection.



Photograph 2 – Geese observed in April 2018.





Photograph 3 – Looking northwest at the September 2018 fire damage at the northeast end of the site.



Photograph 4 – Revegetation of grass in the fire area at the northeast end of the site in October 2018.





Photograph 5 – Cut hole in the second-most northwestern riverside gate fence in September 2018.



Photograph 6 – Chain link fence patch repair performed in October 2018.





Photograph 7 – Removal of empty, rusting 55-gallon drums during February 2018 maintenance site visit.



Photograph 8 – Site shop canopy after the removal of 55-gallon drums in February 2018.





Photograph 9 – Animal burrow filled in with gravel in February 2018.



Photograph 10 – Looking south on central portion of upland soil cap in April 2018.





Photograph 11 – Looking northwest on southern portion of upland soil cap in May 2018.



Photograph 12 – Looking west at the ACB armoring in Willamette Cove in October 2018.





Photograph 13 – Looking northwest at the July 2018 fire damage in the riparian area.



Photograph 14 – Looking northeast at the July 2018 fire damage in the riparian area from the shoreline.





Photograph 15 – Looking southeast at the July 2018 fire damage in the riparian area.



Photograph 16 – Looking at the July 2018 fire damage in the lower portion of the riparian area.





Photograph 17 – High river level observed at the middle portion of the riparian area in May 2018.



Photograph 18 – Middle portion of the ACB armoring in April 2018.





Photograph 19 – Temporary dumpsite in the riparian area in September 2018.



Photograph 20 – Derelict boats in the Willamette Cove in October 2018.



APPENDIX B Site Activity Documentation



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.)
18/18	2:300			•	Phil Coolell	H C	Sife Inspech
1	- 42		A th X		Evin (con) Hysto	651	
V	1	1			Sarah Miller	DEQ	1
2/22/18	9:00	an	4:00	pn	Kaylan Snnyth	146	Site Maintenance
1/27/16	8:30	am	4:30	pm	Kaylon Smyth	I+C	Site Mainteners
1/11/18	8:30	an	10:15	AM	Phil Cordal	HC	Site Inspect Mind
5/15/1R	9:30	6~	12:30	no	Phil Corde U	W	Site Walk / Veg
5/15/19	9:30	an	12:30	10	Jim Shanner	170	Sitehalkivo
5/23/18	9:00	gm	10:20	am	Sarah Milly	OEQ	Sife Inspetion
1			10:20	an	Frin C. Husher	GSI	((1
V	1	4	11:00	am	Phil Cordell	HC	Sife Ingretion Maint
12	1.51				Phil		
					Kaylan		
6 27/11	8:45				Rag Authory	•	
6/27/1	8:45	AM	11:00	an	Phil Cardy 11	#C	Veg Fapretin
	98:45		11:00	an	Tim Walter	HC.	Vig Juspechn
, ,	10:00		4:00	PM	Transdover M	4	Transducer Maint

K. Snyth

Tab e 2.2

Example Site Visitation Record
McCormick and Baxter Cressoting Company
Portland, Oregon

SITE VISIT LOG

VISITORS AND WORKERS MUST CHECK IN AND OUT

Date	Time II	a.m./ p.m.?		a.m., p.m.		Name of Company, Agency, or Organization	Comment (Purpose of Visit, etc.)
8/2	8 930	m	11:00	am	Phil wordell	+(
6/2			1	4	Erin Hughes	GS1	Site Inspection
	\				Sarah Milia	CSI DEG	7
- ((Rodry . Progue	GSI	1
\	/	per	V	9	Kaylan Smyla	1-1-	
	8 8:30	1500	1600	pm	Konyth & Dan Knopp	HC	land title Man Silvers
	8730	an	1300		Chris Martin	He	Low tide Meni torn
	9.00	4:00	11:00	PN	K. Smyth	140	Fine Taggertin
0/19/18		an	13:00	1	Ke Smyth	HC	Fire Ingrection Ste Inspection
	′′ .	-			Erin Hughs	CSI	11
	()	-	4	V	Sarch Willer	DEQ	10
		4					
0/23					Ke Smyth + Ferre	HC + McDonald Fene	Ferce Repair
							·
		-		_			
				-			
					xter O&M\Workspace\2015 O&N		

47 25 Cos

Thursday 2/8/2018 2:30 P.M. 6900 N. Edgewater Street Portland, OR 97203

Meeting called by:	Oregon Department of	Type of Meeting:	Quarterly Progress
	Environmental Quality (DEQ)		Meeting
Facilitator:	Sarah Miller	Note Taker:	Phil Cordell
Attendees:	Sarah Miller	Project Officer	DEQ
	Phil Cordell	Site Manager	Hart Crowser
	Erin Hughes	Hydrogeologist	GSI

Site Status Meeting Notes

Site Walk and Inspection

The attendees completed a thorough inspection of the entire site on February 8, 2018. The next inspection is scheduled for April 2018.

Site Walk - Shoreline

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

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

September 2017 shoreline ACB repairs appear to be in good condition and will be monitored throughout the winter.

River levels crested 2 to 4 feet above the elevation of the TRM in spring of 2017, resulting in driftwood accumulation that caused damage to the TRM in scattered areas. Deposited sediment and debris appear to be securing loose TRM in most areas; however, two areas of TRM need to be secured with new anchors driven into the ACB.

The Willamette River at the time of inspection (between 2:30 PM and 4:00 PM) was between 7.24 and 7.03 feet COP (or 12.24 – 12.03 NAVD88). Low tide was at approximately 9:30 PM with a tide of approximately 6.53 feet COP (or 11.53 NAVD88). All buoys were visible.

Discharge from the outfall was estimated at 5-10 gallons per minute. The outfall is in good condition, but moss is covering much of it. Roughly 50% of the rock armoring below the outfall was washed away from the drainage channel, but the ACB and overlying filter fabric remains in place and erosion of the cap doesn't appear to be a concern. No repairs are planned.

One derelict boat was anchored within Willamette Cove during the site walk. The river level was high, so the ACB in Willamette Cove was not exposed.

No ebullition was observed in the area above the granular organoclay along the Willamette River shoreline or in Willamette Cove.

Scattered debris was observed along the shoreline.

Site Walk - Upland

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

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

The site perimeter fence was intact. Animal burrows were frequently observed around the site, but are generally less than 6 inches deep and don't require repairs. A few larger burrows (~0.5 foot deep) were observed along the perimeter gravel roads, but only appear to be providing a point of access for the coyote that frequents the site. One fence post is damaged, and the fence is sagging along the east perimeter.

Stormwater drainage at approximately 10 gpm was observed by opening manhole SDMH-B. This coupled with the discharge from the stormwater outfall indicate that the stormwater drainage system within the RCRA-style soil cap is functioning as designed.

The distance between the inner and outer casing of MW-23d was 2.75 inches, which is the same as recent measurements.

The warning sign located in the SE corner of the site has fallen down and needs to be repaired.

Old drums located in the drum storage area are rusting and need to be recycled.

Action Items: Continue to Monitor MW-23d inner/outer casing relationship for movement.	Person Responsible Phil Cordell	Deadline Quarterly
■ Vegetation Management	Phil Cordell	June 2018 monitoring
Low-tide monitoring	Phil Cordell	June 2018
 Repair perimeter sign and fence 	Phil Cordell	Winter/Spring 2018
Transducer download	Phil Cordell	February 2018
Drum recycling	Phil Cordell	Spring 2018

Site Activities / Miscellaneous Field Activities

■ A drone operated by Verizon crashed on the site and was recovered in early January 2018.

None.

Action Item:
Person
Responsible:

Annual Report
Phil Cordell
February 2018

Budget Status: November 2017 through February 2018 we are at/or below the anticipated budget.
New budget requests will be prepared in February 2018.

Meeting Status:

Date / Time TBD – April 2018

Location McCormick & Baxter Facility Site

Thursday 5/23/2018 9:00 A.M. 6900 N. Edgewater Street Portland, OR 97203

Meeting called by:	Oregon Department of	Type of Meeting:	Quarterly Progress
	Environmental Quality (DEQ)		Meeting
Facilitator:	Sarah Miller	Note Taker:	Phil Cordell
Attendees:	Sarah Miller	Project Officer	DEQ
	Phil Cordell	Site Manager	Hart Crowser
	Erin Hughes	Hydrogeologist	GSI

Site Status Meeting Notes

Site Walk and Inspection

The attendees completed a thorough inspection of the entire site on May 23, 2018. The next inspection is scheduled for July 2018.

Site Walk - Shoreline

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

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

September 2017 shoreline ACB repairs appear to be in good condition and will be monitored throughout the year.

River levels crested 2 to 4 feet above the elevation of the TRM in spring of 2017, resulting in driftwood accumulation that caused damage to the TRM in scattered areas. Deposited sediment and debris appear to be securing loose TRM in most areas; however, two areas of TRM need to be secured with new anchors driven into the ACB. One of these areas was observed to now be covered with driftwood during the May 2018 inspection, the other area will be secured during the summer of 2018. River conditions appear to have not crested above the TRM in 2018, but additional driftwood was observed to be accumulating at the top of the ACB.

The Willamette River at the time of inspection (between 9:00 AM and 11:00 AM) was between 14.92 and 14.98 feet COP (or 19.92 – 19.98 NAVD88). Low tide was at approximately 8:00 AM with a tide of approximately 14.89 feet COP (or 19.89 NAVD88). No buoys were visible, but that is typical of higher water levels.

Discharge from the outfall was estimated at 3-5 gallons per minute. The outfall is in good condition, but moss is covering much of it. Roughly 50% of the rock armoring below the outfall was washed away from the drainage channel, but the ACB and overlying filter fabric remains in place and erosion of the cap doesn't appear to be a concern. No repairs are planned.

One derelict boat was anchored within Willamette Cove during the site walk. The river level was high, so the ACB in Willamette Cove was not exposed.

No ebullition was observed in the area above the granular organoclay along the Willamette River shoreline or in Willamette Cove.

Scattered debris was observed along the shoreline.

Site Walk – Upland

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

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

The site perimeter fence was intact. Animal burrows were frequently observed around the site, but are generally less than 6 inches deep and don't require repairs. A few larger burrows (~0.5-foot-deep) were observed along the perimeter gravel roads, but only appear to be providing a point of access for the coyote that frequents the site. The damaged fence and toppled sign noted during the winter site walk repaired.

Stormwater drainage at approximately 3-5 gpm was observed by opening manhole SDMH-B. This coupled with the discharge from the stormwater outfall indicate that the stormwater drainage system within the RCRA-style soil cap is functioning as designed.

The distance between the inner and outer casing of MW-23d was 2.75 inches, which is the same as recent measurements.

Drums located in the drum storage area were removed this past winter.

Action Items:	Person Responsible	Deadline
 Continue to Monitor MW-23d inner/outer casing relationship for movement. 	Phil Cordell	Quarterly
Vegetation Management	Phil Cordell	June & Oct 2018
Low-tide monitoring	Phil Cordell	June 2018
Transducer download	Phil Cordell	June 2018

Site Activities / Miscellaneous Field Activities

■ None noted.

Deliverables

None.

Action Item:	Person	Deadline:
	Responsible:	

Annual Report Phil Cordell January 2019

Budget Status: February 2018 through May 2018 we are at/or below the anticipated budget. New O&F budget requests will be prepared in August 2018.

Meeting Status:

Date / Time	TBD – July 2018		
Location	McCormick & Baxter Facility	Site	

Thursday 8/2/2018 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:	Sarah Miller	Note Taker:	Phil Cordell
			Kaylan Smyth
Attendees:	Sarah Miller	Project Officer	DEQ
	Phil Cordell	Site Manager	Hart Crowser
	Kaylan Smyth	Site Manager	Hart Crowser
	Erin Carroll Hughes	Hydrogeologist	GSI
	Rodrigo Prugue	Hydrogeologist	GSI

Site Status Meeting Notes

Site Walk and Inspection

The attendees completed a thorough inspection of the entire site on August 2, 2018. The next inspection is scheduled for October 2018.

Site Walk - Shoreline

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

- Gravel overlay on ACB.
- Buoy locations.
- Stormwater discharge.
- Willamette River and Willamette Cove shoreline conditions.
- Ebullition from sediment cap.
- Shoreline vegetation repairs.
- Fire damage along Willamette River shoreline.

The September 2017 shoreline ACB repairs continue to appear to be in good condition and will be monitored throughout the year.

The Willamette River at the time of inspection (between 9:00 AM and 11:00 AM) was between 4.34 and 3.62 feet COP (or 9.34 – 8.62 NAVD88). Low tide was at approximately 6:00 AM with a tide of approximately 2.26 feet COP (or 7.26 NAVD88). The five buoys were visible and appeared to be in good condition and functional.

River levels crested 2 to 4 feet above the elevation of the TRM in spring of 2017, resulting in driftwood accumulation that caused damage to the TRM in scattered areas. Deposited sediment and debris appear to be securing loose TRM in most areas; however, two areas of TRM need to be secured with new anchors driven into the ACB. One of these areas was observed to now be covered with driftwood during the May 2018 inspection, the other area will be secured during the summer of 2018. The river did not crest above the TRM in 2018, but additional driftwood has accumulated at the top of the ACB.

Discharge from the outfall was estimated to be less than a gallon per minute. The outfall is in good condition, but moss is covering much of it. Roughly 50% of the rock armoring below the outfall was washed away from the drainage channel, but the ACB and overlying filter fabric remains in place and erosion of the cap doesn't appear to be a concern. No repairs are planned.

Three derelict boat was anchored within Willamette Cove during the site walk. The boats did not appear to be anchored on top of the ACB in Willamette Cove.

Some ebullition was observed in the area above the granular organoclay along the Willamette River shoreline or in Willamette Cove. No sheen was observed with the ebullition.

A brush fire burned approximately 1 acre of the of the riparian area vegetation (Photo 1) as shown on the attached figure. Larger/mature trees may have survived as their bark did not appear to be chard; however smaller trees, brush and grass was burned. Wells in the vicinity of the fire were inspected and remain in good condition (Photo 2). The fire did appear to burn several holes (~3 inch diameter) in the TRM.

Scattered debris was observed along the shoreline and two active tent camp sites were observed. The Portland police were notified.

Site Walk - Upland

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

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

The site perimeter fence was intact. Locks and gates were damaged during the fire department response. Perimeter locks have been replaced with combination locks to allow the fire department better access to the riparian area. Animal burrows were frequently observed around the site, but are generally less than 6 inches deep and don't require repairs. A few larger burrows (~0.5 foot deep) were observed along the perimeter gravel roads, but only appear to be providing a point of access for the coyote that frequents the site.

Stormwater drainage observed at manhole SDMH-B was estimated at less than 1 gpm. This coupled with the discharge from the stormwater outfall indicate that the stormwater drainage system within the RCRA-style soil cap is functioning as designed.

The distance between the inner and outer casing of MW-23d was 2.75 inches, which is the same as recent measurements.

A few plastic drums and a stack of plastic buckets are still present in the storage area.

Actio	n Items: Continue to Monitor MW-23d inner/outer casing relationship for movement.	Person Responsible Kaylan Smyth	Deadline Quarterly
-	Monitor burned holes (`3 inch diameter) in the TRM in brush fire area.	n Kaylan Smyth	Quarterly
•	Vegetation Management (Watering)	Kaylan Smyth	August/September 2018
•	Riparian Area Repair Memorandum	Kaylan Smyth	August/September 2018
-	Low-tide monitoring	Kaylan Smyth	October 2018
•	Transducer download	Kaylan Smyth	October 2018
•	Site Inspections	Kaylan Smyth	Quarterly
	Annual Report	Kaylan Smyth Erin Carroll Hughes	February 2019
Site A	Activities / Miscellaneous Field Activit	ties	
	None noted.		
Deliv	erables		
None.			
Actio	n Items: Annual Report	Person Responsible Kaylan Smyth Erin Carroll Hughes	Deadline February 2019
budge	pet Status: February 2018 through July 20 trequests will be prepared in August 2018.	•	ated budget. New O&F
Date /		- October 2018	
Locati		ormick & Baxter Facility	

Photos:



Photo 1 –View of fire damage along the service road in the riparian area.



Photo 2 – Northwest view of fire damage surrounding monitoring wells (MW-40i, MW-40s, MW-40d, MW-41i, MW-41s, and MW-41d).

Friday 10/19/2018 8:30 A.M. 6900 N. Edgewater Street Portland, OR 97203

Meeting called by:	Oregon Department of	Type of Meeting:	Quarterly Progress
	Environmental Quality (DEQ)		Meeting
Facilitator:	Sarah Miller	Note Taker:	Kaylan Smyth
Attendees:	Sarah Miller	Project Officer	DEQ
	Kaylan Smyth	Site Manager	Hart Crowser
	Erin Carroll Hughes	Hydrogeologist	GSI
	Stephanie Rawson	Metro's RID program	Metro

Site Status Meeting Notes

Site Walk and Inspection

The attendees completed a thorough inspection of the entire site on October 19, 2018. Stephanie Rawson from Metro attended the meeting to assist with the inspection of homeless activity in the riparian area and along the Willamette River shoreline. The next inspection is scheduled for January or February 2019.

Site Walk - Shoreline

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

- Gravel overlay on ACB.
- Buoy locations.
- Stormwater discharge.
- Willamette River and Willamette Cove shoreline conditions.
- Ebullition from sediment cap.
- Shoreline vegetation repairs.
- Gate fence damage.
- Fire damage along Willamette River shoreline and at the northeast end of the property near the railroad.

Several gaps (2- to 4-inch-wide, 4 to 8 feet long) in the ACB were noted along the shoreline in Willamette Cove at the northwestern end of the site (see Photo 1). The gaps were visible due to the low Willamette River water surface elevation conditions (end of summer, low tide) at the time of inspection. The September 2017 shoreline ACB repairs continue to appear to be in good condition and will be monitored throughout the year.

The Willamette River at the time of inspection (between 9:00 AM and 11:00 AM) was between 3.35 and 2.97 feet COP (or 8.45 and 8.08 NAVD88). Low tide was at approximately 10:45 AM with a tide of approximately 2.97 feet COP (or 8.07 NAVD88). The five buoys were visible and appeared to be in good condition and functional.

In the spring of 2017, river levels crested 2 to 4 feet above the elevation of the TRM, resulting in driftwood accumulation that caused damage to the TRM in scattered areas. The deposited sediment and debris appear to be securing loose TRM in most areas; however, two areas of TRM will need to be secured with new anchors driven into the ACB. One of these areas was observed to now be covered with driftwood during the May 2018 inspection and the other area requires additional monitoring/inspection. The river did not crest above the TRM in 2018, but additional driftwood has accumulated at the top of the ACB.

There was no discharge from the stormwater discharge outfall. The outfall is in good condition, but moss is covering much of it. Roughly 50% of the rock armoring below the outfall was washed away from the drainage channel, but the ACB and overlying filter fabric remains in place and erosion of the cap doesn't appear to be a concern. No repairs are planned.

Four derelict boat were anchored within Willamette Cove during the site walk. The boats did not appear to be anchored on top of the ACB in Willamette Cove.

No ebullition was observed in the area above the granular organoclay along the Willamette River shoreline or in Willamette Cove.

A brush fire burned approximately one acre in the riparian area on August 18, 2018. Larger/mature trees may have survived as their bark did not appear to be charred; however smaller trees, brush and grass were burned. Vegetation appears to be thriving with evident signs of grass spouting in the undergrowth and new buds appearing on existing brush. The fire appeared to burn several holes (~3-inch diameter) in the TRM in the riparian area. The TRM will be monitored in future inspections.

Scattered debris was observed along the shoreline and multiple abandoned camp sites were observed (see Photo 2). Metro and DEQ discussed plans for removing debris from the abandoned camps. No active camps we observed.

Site Walk - Upland

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

- Site perimeter and fence, and drainage basin.
- Subsurface drainage (manholes).
- Soil cap (burrows, erosion, etc.).
- EW-1s and MW-23d area of subsidence.
- Fire damage at the northeast end of the site.

The site perimeter fence was intact. Locks damaged during the fire department response have been replaced with combination locks to allow access for the fire department. A two by two foot cut in a northwester gate was noted on September 21, 2018. The cut was repaired on October 23, 2018 by a fencing contractor (Photo 3). Animal burrows were frequently observed around the site but are generally less than 6 inches deep and don't require repairs. A few larger burrows (~0.5-foot-deep) were observed along the perimeter gravel roads, but only appear to be providing a point of access for the coyote that frequents the site.

There was no stormwater drainage observed at manhole SDMH-B. This outfall, coupled with the discharge from the stormwater outfall will be monitored in the future to determine if the stormwater drainage system within the RCRA-style soil cap is functioning as designed.

The distance between the inner and outer casing of MW-23d was 2.75 inches, which is the same as recent measurements.

A few plastic drums and a stack of plastic buckets are still present in the storage area.

A brush fire burned approximately one acre on the northeast end of the site near the railroad on September 24, 2018 (Photo 4). The brush had been burned, but it appears there was no damage to the cap. Vegetation is thriving with evident signs of spouting grass.

Actio	n Items:	Person Responsible	Deadline
	Continue to Monitor MW-23d inner/outer casing relationship for movement.	Kaylan Smyth	Quarterly
•	Monitor burned holes (approximately 3-inch diameter) in the TRM in brush fire area.	Kaylan Smyth	Quarterly
•	Site Inspections	Kaylan Smyth	Quarterly
•	Annual Report	Kaylan Smyth Erin Carroll Hughes	February 2019
Site A	activities / Miscellaneous Field Activities	5	
_	None noted.		
-	None noted.		
_ Delive	erables		
Delive		eptember 26, 2018 to continue	e Groundwater
•	erables A Task Order (72-18-6) was authorized on Se		e Groundwater Deadline
■ Actio	A Task Order (72-18-6) was authorized on Se Operational and Functional activities.	eptember 26, 2018 to continue Person Responsible Kaylan Smyth Erin Carroll Hughes	
Action	erables A Task Order (72-18-6) was authorized on Se Operational and Functional activities.	Person Responsible Kaylan Smyth Erin Carroll Hughes	Deadline
Action	A Task Order (72-18-6) was authorized on Se Operational and Functional activities. n Items: Annual Report	Person Responsible Kaylan Smyth Erin Carroll Hughes	Deadline
Action	A Task Order (72-18-6) was authorized on Se Operational and Functional activities. Items: Annual Report et Status: Currently at/or below the anticipating Status:	Person Responsible Kaylan Smyth Erin Carroll Hughes	Deadline

Photos:



Photo 1 –View of separation gaps in the ACB along the Willamette Cove Shoreline.



Photo 2 –View of debris left from dump site in the riparian area.

Photos:



Photo 3 – View of repaired gate fence that was damaged from a 2-foot by 2-foot cut in the chain link fence.



Photo 4 – View of the fire damage at the northeastern end of the site along the railroad.

APPENDIX C Photograph Log – Vegetation Observations







Photograph 1 – Earthen cap and drainage swale in the foreground with the impermeable cap in the background. Taken looking south from Photo Station 1 comparing baseline and current conditions (Left - June 2011; Right - June 2018).

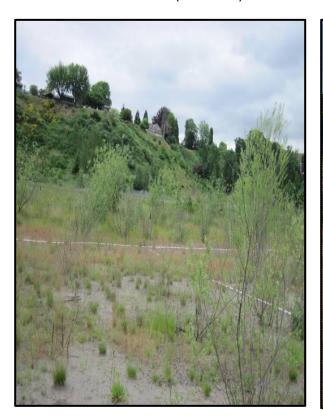


Photograph 2 - Tree and shrub plantings on the earthen cap. Taken looking southeast from Photo Station 2 (June 2018).





Photograph 3 – Eastern edge of the earthen cap looking toward the drainage swale. Taken looking west from Photo Station 3 (June 2018).





Photograph 4 – View of stormwater pond. Willow and alder have increased in size, although most of the pond remains barren or vegetated with grasses. The irrigation system was removed in 2015. Taken looking northeast from Photo Station 4 comparing baseline and current conditions (Left - June 2011; Right - June 2018).





Photograph 5 – Tree plantings on the earthen cap. Taken looking north from Photo Station 5 (June 2018).





Photograph 6 – Impermeable cap dominated by grasses and herbaceous vegetation. Baseline photograph on the left taken looking east from Photo Station 6 (Left – June 2011; Right – June 2018).







Photograph 7 – Vegetation growth and wood debris within the lower riparian component and along the shoreline. Taken looking southeast from Photo Station 7 comparing baseline and current conditions. (Left - September 2011; Right - June 2018)



Photograph 8 – Upper riparian component with native trees and shrubs performing well. Taken looking southwest from Photo Station 8 (June 2018).







Photograph 9 – Lower riparian component with large wood debris along the edge. Taken looking northwest from Photo Station 9 comparing baseline and current conditions. (Left - June 2011; Right – June 2018)



Photograph 10 - Canada thistle, a B-listed noxious weed in Oregon, was found scattered (June 2018)







Photograph 11 – Two species that are not on the noxious plant list but have been known to become invasive in other parts of the country are common teasel (*Dipsacus sylvestris*) and tansy (*Tanacetum vulgare*) (June 2018)