

# Memo

**Date:** January 19, 2024

**To:** Arkema Project File (ECSI 0398)

**From:** Katie Daugherty, Project Manager

**Subject:** Alternative to Feasibility Study

## Background and Objectives

The September 2023 *Feasibility Study* (FS), prepared by ERM, Inc., does not meet the minimum requirements described in the Oregon Administrative Rules Chapter 340-Division 122 (OAR 340-122), does not meet the minimum requirements described in Section VII.C.8 and VI.C.9 of Attachment B (Scope of Work) to the Order, and requires significant revisions to resolve DEQ's comments. DEQ believes that these revisions will require a considerable amount of time and effort, ultimately delaying important elements of the cleanup work needed to address risks to human health and the environment.

Based on previous input from Arkema on a desire to preform additional interim removal action measures (IRAMs) and initial review of the Draft FS, DEQ has prepared this alternative path forward to achieve the following objectives:

- 1) Expedite the necessary cleanup action to address high-risk and/or well-defined contamination.
- 2) Decrease potential uncertainty in the FS by filling data gaps and conducting additional performance monitoring.

## Proposed Alternative Path Forward

DEQ proposes the following alternative path forward:

- 1) Implement four IRAMs consisting of:
  - a) IRAM 1 – Acid Plant Soil/NAPL (ISS) and Groundwater ISCR - Insitu Solidification and Stabilization (ISS) combined with enhanced insitu chemical reduction (ISCR) of non-aqueous phase liquid (NAPL) in soil and groundwater (located within Acid Plant Area (functional unit [FU]-4 and FU-9). The FS recommends ISS of NAPL and enhanced ISCR as the remedial action for Acid Plant groundwater and coincident ISS of NAPL in Acid Plant soil. (Note. the FS recommends implementing this action as part of the first phase of the remedial action [Section 9.4 #2].)
  - b) IRAM 2 - Enhanced ISCR of perchlorate and hexavalent chromium located within Chlorate Plant Area/Salt Pads (FU-10). (Note. the FS recommends implementing this action as part of the first phase of the remedial action [Section 9.4 #4].)
  - c) IRAM 3 - Remove all currently known human health direct contact hot spots not addressed by other IRAMs.
  - d) IRAM 4 - Enhanced ISCR of dissolved chlorinated VOCs and perchlorate located within Northern Groundwater Barrier Wall Area (FU-8) and Acid Plant (FU-9)



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groundwater. The FS recommends ISCR injections and enhanced ISCR to address chlorinated VOCs these areas. (Note. the FS recommends implementing this action in Acid Plant groundwater (FU-9) as part of the first phase of the remedial action [Section 9.4 #2] and in Northern Groundwater Barrier Wall Area groundwater (FU-8) as part of the second phase of remedial action [Section 9.5].)

- 2) Collecting pre-design data to support each IRAM design and implantation. Pre-design data may include (but is not limited to) additional delineation/refinement of nature and extent, documentation of current conditions, and treatability testing.
- 3) Collecting performance monitoring data associated with the groundwater IRAMs. The FS recommends conducting performance monitoring as part of the first phase of the remedial action.
- 4) Collecting additional performance monitoring of the groundwater source control measure to inform evaluation of its effectiveness and long-term reliability and confirm its role as an element of the final remedy. The groundwater extraction enhancement (GEE) implemented in 2022 has not yet achieved its design objectives.
- 5) Completing a robust FS data gaps investigation in parallel with the IRAM consisting of:
  - a) Collecting additional data to refine the understanding of the nature and extent of contamination in Lots 1 and 2. Sampling in Lots 1 and 2 must include investigation of historical waste disposal areas, including the brine waste piles and brine residue ponds, asbestos pond and trenches, and DDT trench. The FS recommends conducting additional investigation of soil and groundwater in Lots 1 and 2 as part of the first phase of the remedial action.
  - b) Collecting additional data to confirm or adjust the hot spot screening criteria and establish compliance points for soil and groundwater. Establishing groundwater points of compliance must incorporate sediment, transition zone water, and porewater sampling results completed as part of the in-water pre-design investigation. The FS recommends conducting additional investigation of current conditions and evaluating site-specific hot spot screening criteria and compliance points as part of the pre-design investigation in advance of implementing the first phase of the remedial action.
  - c) Collecting data to support monitored natural attenuation as a viable remedial action for groundwater in Lots 3 and 4-Shallow/Intermediate (FU-7), Lots 3 and 4-Deep/Basalt (FU-11), and Lots 1 and 2 Deep/Basalt (FU-12).
  - d) Conducting a sitewide investigation to resolve data gaps in current dataset for COIs/COCs, such as a lack of data for the 2,4'DDD, DDE and DDT isomers, PCB congener, and per-and polyfluoroalkyl substances (PFAS).
  - e) Conducting additional investigation to assess vapor intrusion risk.



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## Rationale

The proposed alternative path forward has the following advantages:

- Accelerates cleanup of highest risks (i.e., NAPL) and other well documented hot spots (chlorinated VOCs, perchlorate, and hexavalent chromium in lots 3 and 4).
- Reduces DDx co-solvency with chlorobenzene and potentially improves GWET influent characteristics.
- Improves near-term source control status in the stranded wedge outside of the GWBW.
- Reduces FS/remedy selection uncertainty by:
  - Potentially reduces COC list in certain FUs
  - Incorporating empirical evidence to evaluate effectiveness and long-term reliability of the IRAM and groundwater source control measure.
  - Improving the characterization of Lots 1 and 2, including collecting data more contemporaneously with the in-water pre-design investigation and collecting enough information to support a trespass determination.
  - Improving the identification and delineation of hot spots.
  - Improving the ability to identify necessary institutional controls to support remedial actions.
- Reduces the likelihood of a post-ROD administrative change (i.e., ESD or ROD Amendment).
- Reduces the scope/magnitude of post-ROD cleanup actions.
- Provides a clearer path to site closure.

## Attachments

Figure 6-1 – Soil Functional Units

Figure 6-2 – Groundwater Functional Units



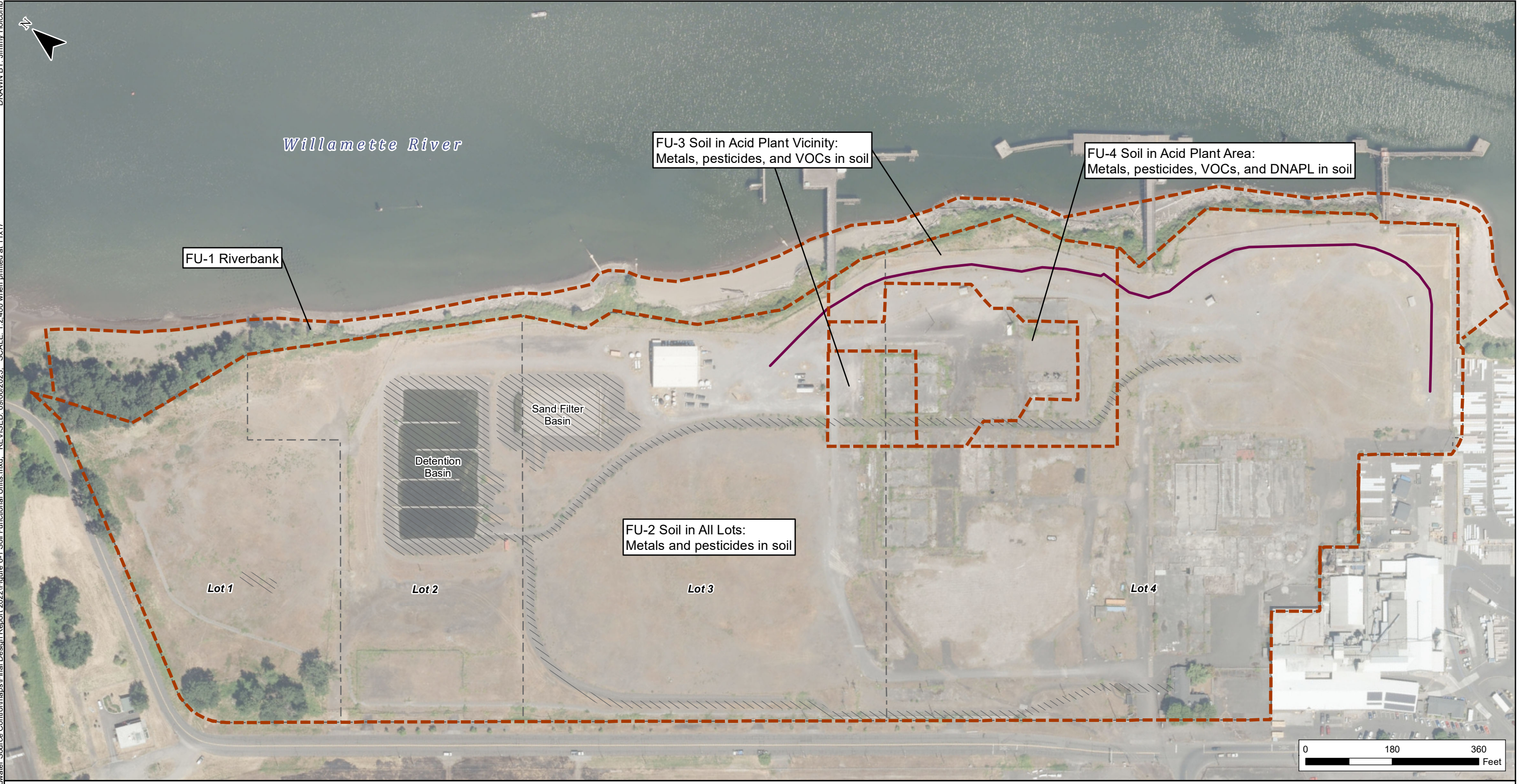
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M:\US\Projects\S-U\Total\Arkema Portland\Groundwater Source Control\maps\Final Design Report 2022\Figure 6-1 Soil Functional Units.mxd REVISED: 09/06/2023 SCALE: 1:2,400 when printed at 11x17 DRAWN BY: Jimmy Holcomb



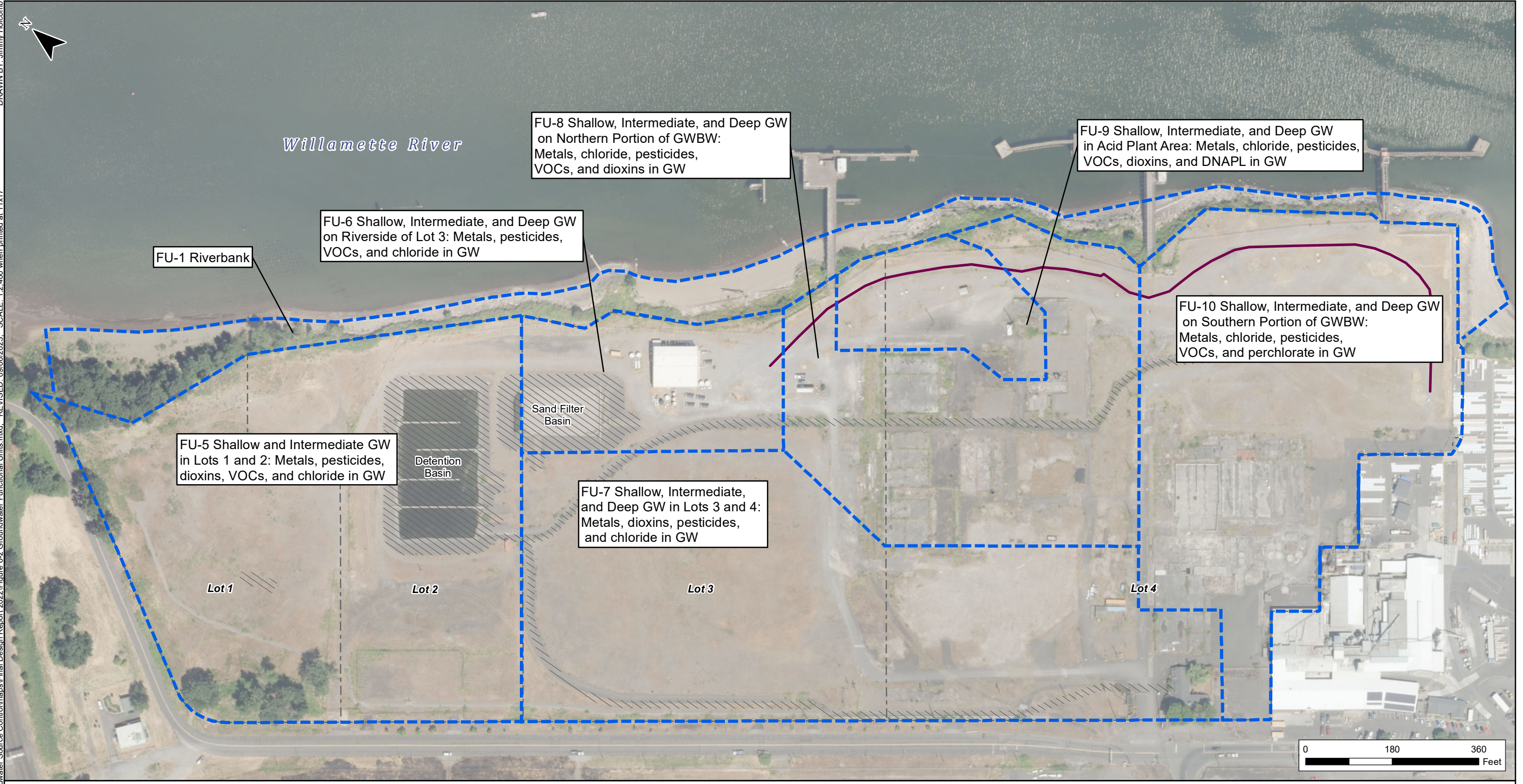
- Legend**
- Soil Functional Unit
  - Parcel and Property Boundaries
  - Previously Excavated Area
  - Barrier Wall Alignment

**Figure 6-1**  
Soil Functional Units  
Feasibility Study  
Arkema Inc.  
Portland, Oregon

Source: City of Portland Aerial Imagery, Flow 7/2018 at 6in per pixel; NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl



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 M:\US\Projects\S-U\Total\Arkema Portland\Groundwater Source Control\maps\Final Design Report 2022\Figure 6-2 Groundwater Functional Units.mxd



FU-1 Riverbank

FU-6 Shallow, Intermediate, and Deep GW on Riverside of Lot 3: Metals, pesticides, VOCs, and chloride in GW

FU-8 Shallow, Intermediate, and Deep GW on Northern Portion of GWBW: Metals, chloride, pesticides, VOCs, and dioxins in GW

FU-9 Shallow, Intermediate, and Deep GW in Acid Plant Area: Metals, chloride, pesticides, VOCs, dioxins, and DNAPL in GW

FU-5 Shallow and Intermediate GW in Lots 1 and 2: Metals, pesticides, dioxins, VOCs, and chloride in GW

FU-7 Shallow, Intermediate, and Deep GW in Lots 3 and 4: Metals, dioxins, pesticides, and chloride in GW

FU-10 Shallow, Intermediate, and Deep GW on Southern Portion of GWBW: Metals, chloride, pesticides, VOCs, and perchlorate in GW

Detention Basin

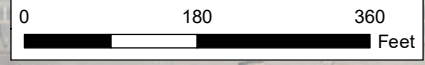
Sand Filter Basin

Lot 1

Lot 2

Lot 3

Lot 4



- Legend**
- Groundwater Functional Unit
  - - - Parcel and Property Boundaries
  - Previously Excavated Area
  - Barrier Wall Alignment

**Notes:**  
 FU-11 Gravel/Basalt Zone - Lots 3 and 4; not shown on figures  
 FU-12: Deep and Gravel/Basalt Zone - Lots 1 and 2; not shown on figures

**Figure 6-2**  
 Groundwater Functional Units Feasibility Study  
 Arkema Inc.  
 Portland, Oregon