Draft Analysis of Brownfield Cleanup Alternatives

Preliminary Evaluation for Terminal 5 Alcoa Vancouver Project Area, Vancouver WA

INTRODUCTION AND BACKGROUND

Project Area Location

The Terminal 5 property is located along the Columbia River at 5701 NW Old Lower Road, river mile 103 in Vancouver, Washington. Terminal 5 consists of the upland facility and adjacent sediment, as shown on Figure 1. Terminal 5 is included on Ecology's Confirmed and Suspected Contaminated Sites List under Facility Site ID 21 and Cleanup Site ID 2867. The proposed brownfield project area (Project Area) consists of the in-water portion of Terminal 5 which lies in the federally designated flood plain of the Columbia River.

Previous Uses and Remedial Activities

The upland portion of the Terminal 5 facility was developed in the 1930s with aluminum smelter operations beginning in 1940. Alcoa operated the entire facility for approximately 45 years, until 1986, after which the facility was operated by several entities over time, primarily Alcoa and Evergreen. During this time, a variety of materials and potential contaminants were handled at the property, which contributed to soil, groundwater, and sediment contamination. There were numerous aboveground storage tanks present on-site that stored various fuel oils and two transformer/rectifier stations present that were a source of polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs).

Numerous cleanups were completed by Alcoa on its 97 upland acres of the original 208-acre smelter property; additional remedial actions were performed by Evergreen in their 111 acres of uplands. Contamination was found in sediments starting in 1997 in the vicinity of a Clark County Public Utilities (CPU) outfall that was installed to discharge non-contact cooling water into the Columbia River. Subsequent sampling of soil, groundwater, and sediment identified a hot spot of PCB contamination near the outfall leading to the conclusion that PCB contamination in riverbank soils had been released to the river sediments during construction of the outfall.

In June 2008, Ecology issued an Enforcement Order to Alcoa (Ecology Order No. DE 5660) for a series of upland and shoreline remedial actions. In January 2009, Alcoa entered into Consent Decree No. 09-2-00247-2 with Ecology, which required Alcoa to implement a December 2008 Cleanup Action Plan (CAP) to address contamination described in a September 2008 Remedial Investigation/Feasibility Study (RI/FS) as part of a final cleanup action for the Project Area.

Alcoa conducted cleanup actions in the Project Area in response to the Consent Decree and CAP, including dredging, dewatering, and disposal of PCB-contaminated sediment. The cleanup actions also included enhanced natural recovery (ENR), a technology where a layer of clean sand

is placed after dredging the most contaminated sediments. This clean sand is intended to mix naturally with the remaining sediments which have low levels of contamination to bring the overall contamination levels below the applicable cleanup standards. This technology relies on accurate characterization of the contamination in the sediments left after dredging and will only be successful if there are only low levels of contamination. The initial dredging and ENR placement was completed in 2009. However, no confirmation samples of the post-dredge surface were collected prior to placement of ENR sand; performance sediment samples were only collected from the placed ENR sand layer.

Ownership of Terminal 5 uplands was transferred to the port between January and March 2009, following the Alcoa-led cleanup. The in-water portion of Terminal 5 including the Project Area consists of six parcels, which are owned by or managed by the port under a Port Management Agreement which was updated in March 2009. The port was identified as a potentially liable party (PLP) for the project site in 2020.

Site Assessment Findings

During port-led sampling in 2018 and 2019 conducted to support future maintenance dredging, the port identified PCB and PAH contamination in sediment within the footprint of the 2008—2009 remedial action. This discovery prompted Ecology to request Alcoa to perform additional data to support its 2020 periodic review. Based on sampling conducted between 2018 and 2022 by the port and Alcoa, Ecology determined that an interim action is warranted to eliminate or substantially reduce exposure to hazardous substances associated with the failed 2009 remedy. Subsequently, the port voluntarily entered into Agreed Order (AO) No. DE 23653 with Ecology in order to perform the Interim Action and ensure timely progress. The approximate area requiring remedial action based on this data is shown on Figure 2 represented by preliminary interpolated surface sediment exceedances of the sediment cleanup standard.

Project Goals and Reuse Plan

A final sediment remedial action is planned at the Project Area to address surface and subsurface contaminated sediment with PCB and PAH concentrations greater than cleanup standards. Currently Berth 17 is being used as a lay berth for vessel moorage and not actively in use for cargo operations. Following completion of the sediment remedial action, the port

intends to continue to market the Terminal 5 facility with the goal of putting the upland and in-water facility into the intended active tenant use to support commercial and cargo activities.

APPLICABLE REGULATIONS AND CLEANUP STANDARDS

Cleanup Oversight Responsibility

The cleanup will be conducted under the authority of Ecology. The port will be responsible for the overall Interim Action project management, implementation, oversight, contracting, and community engagement. Floyd|Snider is the port's Qualified Environmental Professional and will lead the Interim Action planning, design, permitting, and reporting.

Cleanup Standards for Major Contaminants

The cleanup action is being designed to achieve applicable cleanup standards in sediment. The cleanup standards define the concentration of a contaminant in environmental media that is protective of human health and ecological receptors. The receptors, cleanup standards, and cleanup standard comparison methodology are presented in Table 1.

Table 1
Interim Action Sediment Cleanup Standards

Analyte	Receptor	Cleanup Standard (µg/kg)	Cleanup Standard Comparison Methodology (1) and Source
Total PCB Aroclors	Human Health	97	SWAC; sediment CUL developed in the RI/FS and established as the sediment cleanup standard in the CAP and Consent Decree
Total PCB Aroclors	Benthic	110	Point-by-point; SMS freshwater sediment cleanup objective (2)
Total PAHs	Benthic	17,000	Point-by-point; SMS freshwater sediment cleanup objective (2)

Notes:
1 The point of compliance in sediment is the top 10 centimeters.
2 Per Ecology guidance (2021), the SCO (WAC 173-204-560(3)) is the long-term sediment quality goal.

Abbreviations:
CUL Cleanup Level
µg/kg Micrograms per kilogram
SMS Sediment Management Standards
SWAC Surface area–weighted average concentration

The site-specific SWAC-based cleanup level (CUL) for total PCB Aroclors of 97 µg/kg based on human health exposures was established in the RI/FS (Anchor Environmental 2008) and confirmed as the CUL in the CAP (Ecology 2008), Consent Decree (Clark County Superior Court 2009), and AO (Ecology 2025).

The Washington State SMS benthic freshwater sediment cleanup objective (SCO) for total PCB Aroclors, of 110 µg/kg, and for total PAHs, of 17,000 µg/kg are also applicable and will be met on a point-by-point basis.

Laws and Regulations Applicable to the Cleanup

The Terminal 5 sediment Interim Action is being completed in accordance with Model Toxics Control Act (MTCA) regulations (WAC 173-340). This includes, in particular, both the minimum threshold requirements described in WAC 173-340-360(2)(a) and additional requirements described in WAC 173-340-360(2)(b).

EVALUATION OF CLEANUP ALTERNATIVES

Three cleanup action alternatives were evaluated as part of this ABCA:

1) Removal of Contaminated Sediment Via Dredging
2) Containment of Sediment via Capping
3) No Action

Alternative 1, removal of contaminated sediment via dredging, proposes removal of approximately 40,000 - 50,000 cubic yards of contaminated sediment and transport to a licensed upland disposal facility or for approved reuse. Sediment would be dredged using standard means of a mechanical clamshell bucket. Removed sediment would be transloaded to a nearby upland facility with capacity to manage and treat dredge return water in accordance with water quality regulations. Localized armored capping may be necessary around existing structures and shoreline caps to protect these features and would be evaluated in the Engineering Design Report.

Alternative 2, containment of sediment via capping, proposes the placement of approximately 34,000 cubic yards of sand and 14,000 cubic yards of armor rock to cap contaminated sediment in place. The cap material and thickness would be evaluated in the Engineering Design Report.

Alternative 3, no action, evaluates not taking any action in the Project Area.

Below is an evaluation of each alternative including effectiveness, permanence (including susceptibility to potential extreme weather events), implementability, and a preliminary cost estimate.

Effectiveness

- **Alternative 1, Removal of Contaminated Sediment Via Dredging:** Removal and disposal of contaminated sediment is the most protective and effective alternative for long-term success. Alternative 1 also is in line with the port's goal to ensure unencumbered use of the facility post-remedy, including for future in-water construction and maintenance dredging. Alternative 1 has higher short-term risk due to management of a large volume

of contaminated sediment, but common best management practices and selection of a qualified dredging contractor would effectively manage these risks during remediation.

- **Alternative 2, Containment of Sediment via Capping:** Capping contaminated sediment in place would protect human health and the environment by blocking the exposure pathway and isolating PCBs and PAHs in-situ. The cap design would have to consider Columbia River currents to ensure the cap is effective and would not erode over time, which may not be practical to achieve.
- **Alternative 3, No Action:** No action would leave PCB and PAH contaminated sediment in place at concentrations greater than cleanup standards. Contaminated sediment would continue to pose a risk to human and benthic health in the Project Area and potentially downstream, and natural recovery would not be effective to reduce concentrations to less than cleanup standards within a reasonable timeframe.

Permanence

- **Alternative 1, Removal of Contaminated Sediment Via Dredging:** Contamination would be permanently removed from Project Area sediments and would not pose a risk due to long-term terminal use changes or extreme weather events. Any contaminated sediment that remained capped due to dredging restrictions around existing structures would be protected by a sufficient placement of sand and armor rock. A geotechnical engineer would evaluate capping material, thickness, and dredged slope angles during design to ensure they meet engineering standards. However, any remaining contamination would pose a very small future risk.
- **Alternative 2, Containment of Sediment via Capping:** An engineered cap would be required to be designed to withstand high-velocity Columbia River currents with consideration of future use of the terminal for ship loading and unloading. Contaminated sediment remaining in place would continue to pose a risk of being exposed in the future, and therefore this alternative is less permanent than full removal. A cap would also be susceptible to future extreme weather events which could destabilize parts of the cap and expose underlying contaminated sediment, thereby affecting the long-term permanence of the cap.
- **Alternative 3, No Action:** No action is the least permanent alternative and would leave contaminated sediment in place. This alternative also poses the highest risk of contamination migrating off-site due to either expected Columbia River currents or extreme weather events mobilizing sediment.

Implementability

- **Alternative 1, Removal of Contaminated Sediment Via Dredging:** Dredging is a common technology and there are multiple contractors within the local area who have the qualifications to complete the work.
- **Alternative 2, Containment of Sediment via Capping:** Capping is a common technology and there are multiple contractors within the local area who have the qualifications to complete the work.

- **Alternative 3, No Action:** No implementability considerations.

Preliminary Cost Estimate

- **Alternative 1, Removal of Contaminated Sediment Via Dredging:** $23,900,000
- **Alternative 2, Containment of Sediment via Capping:** $8,300,000
- **Alternative 3, No Action:** $0

RECOMMENDED CLEANUP ALTERNATIVE

The final recommended remedy for the Interim Action based on the relative costs and benefits of each alternative is Alternative 1, removal of contaminated sediment via dredging. Consistent with the planned use and intended future use of the Berth, including largely unencumbered use of the use of the in-water facility and with consideration of river hydrodynamics, the remedial action includes removal of PCB- and PAH-impacted sediments via dredging. The intent of the proposed Interim Action is to remove contaminated sediments in accordance with cleanup standards to a final clean surface. Based on the existing sediment data, this appears to be feasible, but additional vertical and horizontal delineation data obtained during pre-design will inform the development of dredge extents to be presented in the EDR for Ecology review and approval. In addition, the EDR will include evaluation of other site-related constraints, such as the potential need for localized armored capping if dredging to clean depth is not feasible around existing structures or riprap.

The proposed Interim Action, with the goal of this being the final cleanup action, will actively address PCB and PAH contamination in Project Area sediments and comply with cleanup standards in accordance with WAC 173-340-430. Sediment will be dredged using standard means of a mechanical clamshell bucket and transported off-site to a licensed upland disposal facility or evaluated for reuse.

Terminal 5
2009 Remedial Action Area Boundary (1)
U.S. Geological Survey River Mile

NW OLD LOWER RIVER RD
NW LOWER RIVER RD
Terminal 5
102
103
104
Columbia River

Notes:
1. The 2009 Remedial Action Area Boundary is sourced from Figure 1: Site Vicinity in Anchor QEA's 2024 Final Periodic Review Data Report.
· Aerial imagery from Google Satellite, 2024.

0 500 1,000 2,000
Scale in Feet

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Port of Vancouver
Terminal 5 Alcoa Vancouver Site
Vancouver, Washington

Figure 1
Site Vicinity Map

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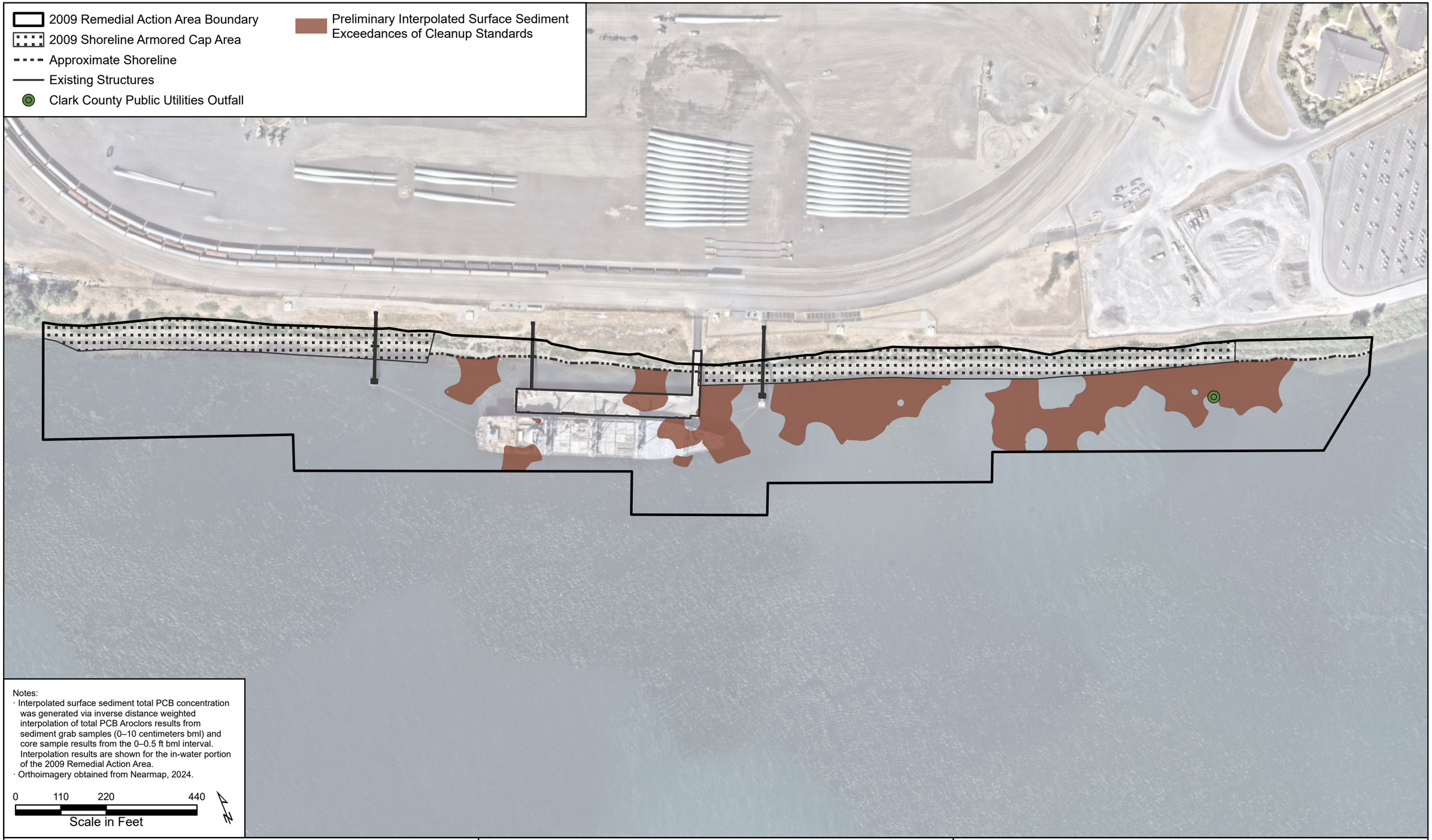

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Figure 2
Approximate Area of Interim Action Dredging

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