BRADFORD ISLAND FFA APPENDIX A

Bradford Island NPL Site

Cascade Locks, Oregon

(Docket Number No. EPA-HQ-OLEM-2021-0462

FFA Docket Number CERCLA-10-2024-0042)

UPLAND AND RIVER OPERABLE UNITS

Initial Site Management Plan

U.S. Army Corps of Engineers

Table of Contents

ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
AOPC	area of potential concern
BaP	benzo(a)pyrene
bgs	below ground surface
BRA	Baseline Risk Assessments
CAG	Community Advisory Group
CEC	contaminant of ecological concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of concern
COPC	contaminants of potential concern
CPEC	contaminant of potential ecological concern
CSM	conceptual site model
DoD	Department of Defense
EPA	Environmental Protection Agency
FFA	Federal Facilities Agreement
ft/d	feet per day
FY	Fiscal Year
HPAH	high molecular weight polycyclic aromatic hydrocarbon
IEUBK	Integrated Exposure Uptake Biokinetic
MW	monitoring wells
NGVD	National Geodetic Vertical Datum
NPL	National Priorities List
ODEQ	Oregon Department of Environmental Quality
OU	Operable Unit
PA/SI	Preliminary Assessment/Site Investigation
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PP	Proposed Plan
RI	Remedial Investigation
ROD	Record of Decision
SMP	Site Management Plan
SVOCs	semi-volatile organic compounds
USACE	US Army Corps of Engineers
VOCs	volatile organic compounds
WDOE	Washington Department of Ecology

Introduction

This Site Management Plan (SMP) provides a summary of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities, schedules, and associated documentation for Bradford Island, Cascade Locks, OR conducted by the U.S. Army Corps of Engineers (USACE). It is intended to assist with planning, reviewing, and setting priorities for response actions at the Bradford Island National Priorities List (NPL) Site consistent with the Bradford Island Federal Facility Agreement (FFA).

CERCLA Cleanup and the US Army Corps of Engineer (USACE) Lead Federal Agency Role:

Executive Order 12580 delegates the authority to conduct certain remedial and removal actions under CERCLA § 104 on Federal facilities to Federal agencies, including the Department of Defense (DoD). DoD has delegated this authority to the Army for Army facilities and properties, and the Army has assigned USACE responsibility for the Bonneville Lock and Dam Project including Bradford Island. USACE has been and will continue to respond under CERCLA § 104 to releases at and from Bradford Island. CERCLA § 120 states that when there have been releases on the Federal facility, and EPA has listed the facility on the NPL, the responsible Federal agency must conduct a remedial investigation and feasibility study and consult with EPA and appropriate state authorities. If a remedial action is necessary, CERCLA requires that the Lead Federal Agency and EPA enter into an interagency agreement for the selection and completion of all necessary remedial action.

EPA listed Bradford Island on the NPL in March 2022. EPA, USACE, and the States of Oregon and Washington have negotiated an FFA to govern the consultation process for remedial actions to be conducted there. CERCLA response actions at the Bradford Island NPL Site began well in advance of placement on the NPL.

The FFA for the Bradford Island NPL Site requires an SMP be developed by USACE with consultation by EPA, Oregon Department of Environmental Quality (ODEQ), and the Washington Department of Ecology (WDOE). The SMP describes the response actions that USACE intends to conduct under CERCLA § 104 to address the Bradford Island NPL Site contamination and a schedule for the work. The SMP will be amended annually by USACE to update any changes in the proposed remedial response actions, schedules, and milestones.

Contents of SMP

The SMP includes the following elements to meet the CERCLA requirements for response and to satisfy the FFA:

- Provide site history information and basic physical, geographical, and hydrologic descriptions of all Operable Units (OUs) for the Site.
- Describe the nature and extent of the Site contamination and the Site risks.
- Describe completed response actions.

- Plan and schedule all necessary and appropriate CERCLA remedial response actions, and include:
  - identification of primary actions;
  - all deadlines;
  - all near-term milestones;
  - all out-year milestones;
  - all target dates;
  - schedule for initiation of Remedial Designs and other response actions covered by the FFA; and
  - all Project End Dates.

The following sections represent the U.S. Army Corps of Engineers' current understanding of data collected to date and the conceptual site model. This information will be updated for all areas of the site through supplemental remedial investigation as described in the SMP. USACE will update the SMP annually in accordance with Section XII of the FFA. Any additional OUs may be proposed in accordance with Section IX, paragraph 9.2 of the FFA.

Site Background

Site Location and Description

Bradford Island is located within the Columbia River and is part of the Bonneville Lock and Dam complex at Cascade Locks, Oregon. The spatial relationship of Bradford Island to the Bonneville Dam features is illustrated on Figure 1. The dam is located approximately 40 miles east of Portland, Oregon and approximately 145 miles upstream of the Columbia River mouth. The dam is located near the upper limit of tidal influence from the Pacific Ocean. Bonneville Pool is a 48-mile reservoir that extends upstream from the Bonneville Dam to The Dalles Dam. The pool is up to 100 feet (ft) deep within the forebay of the Bonneville Dam spillway. The current navigation channel and locks are located between the south shore of Robins Island (located south of Bradford Island) and the Oregon Shore. Two Federally authorized power plants are included in the complex and provide power to the Bonneville Power Administration for the regional power grid.

Construction of Bonneville Dam began in 1933, and operations began in 1938. The First Powerhouse began producing power in 1943. The Second Powerhouse was constructed adjacent to the Washington State shore between 1974 and 1981. The current, operational navigation lock was constructed on the Oregon side between 1989 and 1993. Associated with construction of the new lock, the southeastern edge of Bradford Island was excavated to improve the approach channel. Soils from that excavation were placed approximately 0.5 miles upstream near the Oregon shore to form Goose Island (Figure 3).

Bradford Island includes a visitor center and fish ladders on the western portion of the island that are accessible to the public. The eastern portion of Bradford Island is fenced and is not accessible to the public. A service center building, an equipment building, a

hazardous materials storage area, and laydown areas are on the eastern portion of the island. A former sandblast building was partially demolished in 2012 after being previously damaged in a storm; the concrete foundation and basement are still present.

The Upland OU was designated in the early stages of the Remedial Investigation (RI) as a result of preliminary investigations into the landfill area and other adjacent locations with visible signs of contamination. These areas are of limited size, are in close proximity with each other, and have some commonalities for contamination, making a coordinated response the most efficient way to proceed. The Upland OU includes the four areas of potential concern (AOPC) identified below. All four AOPCs are on the eastern side of Bradford Island and are not accessible to the public. The Upland OU with AOPCs is shown on Figure 2.

1. Landfill AOPC, a former waste disposal site on the northeast tip of Bradford Island, covering approximately 1.36 acres.

2. Sandblast AOPC, near the former sandblast building on the north-central part of Bradford Island, covering approximately 3.1 acres.

3. Pistol Range AOPC, formerly used for small arms target practice on the south-central portion of Bradford Island, covering approximately 0.26 acre.

4. Bulb Slope AOPC, an approximately 0.05 acre fan-shaped accumulation of glass and electrical light bulb debris in a steeply sloped area on the north side of Bradford Island between the landfill access road and the Columbia River.

The River OU was identified in 2000, when electrical equipment and other solid waste were discovered in the Columbia River along the north shore of Bradford Island. Following preliminary characterization of area sediments and hydrologic modeling of river currents, the River OU was generally defined as those portions of the Columbia River from the Bonneville Dam to a point upstream of Goose Island. The lateral boundaries were set as the riverbanks of the Columbia River from the Oregon shoreline to the Washington shoreline. The River OU is shown on Figure 3.

Site History

Below is a brief chronology of cleanup actions by USACE at Bradford Island. Removal and remedial actions have been and are being performed under CERCLA.

Table 2.2-1 - History of Cleanup Actions

Date	Action
1996	Landfill on Bradford Island identified to EPA Region 10 and ODEQ, and EPA requested sampling of Columbia River sediments and groundwater seeps.
1998	Investigation begins at landfill.

2000	Discovery of ballasts from fluorescent lights adjacent to the landfill and three distinct piles of electrical waste-related items submerged in the Columbia River just offshore of the landfill. Underwater dive surveys completed to locate debris piles. Removal action taken with approximately 60 electrical items removed from Debris Pile #1 with several sediment samples collected.
2001	USACE developed and implemented a regular maintenance and inspection program to prevent the discharge of sediment into the storm drain system (i.e. replacement of the filter socks on a regular basis). In-water investigations of river contamination called for a removal action to excavate debris piles of electrical waste due to the risk to human health and the environment.
2002	Removal action to excavate electrical debris and co-located solid waste within the river.
2003	Investigation of the sediments in the river near the removed debris piles to determine if there was remaining contamination.
2006	Additional sediment and surface water samples.
2007	Removal action of the most contaminated sediments along north shore of island using diver directed dredging.
2008	Additional sampling of sediment, clams, crayfish, and fish.
2011	Additional sampling of sediment, clams, crayfish, and fish.
2012	Remedial Investigation Report completed for both the Upland and River OUs
2016	Issued “Baseline Human Health and Ecological Risk Assessment reports.
2017	Prepared “Feasibility Study, Bradford Island Upland Operable Unit” report.
2017	Prepared Draft Feasibility Study, River Operable Unit
2018	Stormwater sampling prior to and following catch basin cleanout. Stormwater catch basin solids also sampled; line-cleaning and sediment trap cleanout of stormwater drain system.
2020	In-river sampling and analysis including a passive sampling study, including temperature sensors; bass, crayfish, and clam tissue sampling and chemical analysis; and bass tracking study.

2021	Bulb Slope geotechnical exploration; Sandblast Area soil sampling. USACE Environmental and Munitions Center of Expertise Optimization Study completed.
2022	Groundwater sampling; Spring bass sampling and tracking study; Bradford Island added to the National Priority List.

Geology and Hydrogeology

General Geology.

The Site is located in the Columbia River Gorge within the Cascade Range physiographic province. The Columbia River has eroded through the following bedrock formations near the Site, from top to bottom:

- Columbia River Basalt Group - Flood basalts uplifted several hundred feet above the current river level, Miocene in age, that originated from a series of fissures in eastern Washington, Oregon, and Idaho.

- The Eagle Creek Formation - Primarily sandstones and conglomerates, with individual units of sedimentary tuffs, with nearly horizontal bedding and crops out close to current river elevation.

- Ohanapecosh Formation (also referred to as the Weigle Formation) - Volcaniclastic siltstones and sandstones with minor conglomerates, late Oligocene in age, that have been subject to folding and faulting. As much as two-thirds of the clasts consist of glass fragments that have been altered to a dominantly clay mineral assemblage, greatly weakening the formation. Bedding generally strikes northeast and north, with a dip near the Site of 5 to 20 degrees to the east and southeast. No outcrops of the Ohanapecosh formation are found at the Site.

Two large landslides have contributed to the current topography near the Site:

- The Tooth Rock Landslide was a large rotational block failure that originated south of Bradford Island on the Oregon side of the Columbia River. This slide contributed to the formation of Bradford Island. Large slide blocks of the Eagle Creek Formation form the bedrock surface beneath Bradford Island. The river bottom in the immediate vicinity of Bradford Island consists of submerged Eagle Creek Formation resulting from the Tooth Rock Landslide, overlain by a thin layer of sands and silts deposited in lower velocity areas. Although the slide blocks of the Eagle Creek are relatively undisturbed, the uppermost 2 to 5 ft of this unit is fractured.

- The Bonneville (Cascade) slide is a younger slide that originated on the Washington side of the Columbia River. The toe of the landslide forms the

northern abutment of the Second Powerhouse, and debris from the slide overlies the Tooth Rock Landslide on portions of Bradford Island.

Up to 30 ft of alluvium overlies the Eagle Creek Formation bedrock on Bradford Island. The alluvium is associated with Holocene to recent flooding of the Columbia River and consists of silty sands and gravels that include increasing amounts of Eagle Creek Formation clasts with depth. The alluvium pinches out near the northern shore of Bradford Island. In some locations there is weathered slide block below the alluvium and above the competent slide block (Eagle Creek Formation). Where present, the weathered slide block includes silty sand and clayey sand, with angular gravel in some locations.

Based on the 2012 RI, the pool elevation between 1999 and 2009 ranged from 71.80 ft above mean sea level (amsl) to 76.10 ft amsl, with most values approximately 75 ft amsl. The water table on Bradford Island is generally within the alluvium and appears to be largely perched above the less-permeable Eagle Creek slide block material. Where the fractured bedrock crops out on the north shore of the island, seeps form in the winter months.

Landfill AOPC:

- The direction of groundwater flow at the Landfill AOPC is from south to north.
- Hydraulic gradients in the landfill ranged from 0.10 to 0.13 foot per foot.
- As noted above, the forebay pool elevation is approximately 75 ft amsl. Based on comparison of the top of competent slide block elevation to the forebay pool elevation, the top of the competent slide block at the Landfill AOPC is generally above the forebay pool elevation. The alluvium and weathered slide block are not in direct contact with the river. For water to get to the river it either seeps out along the bank (consistent with seeps that have been observed) and/or migrates down into the competent slide block and is then transported to the river within the slide block (possible but less likely).
- One of the monitoring wells (MW-8) within the Landfill AOPC is completed relatively deep within the competent slide block. Groundwater elevations measured in the slide block are significantly deeper than elevations measured in the shallower units (alluvium and weathered slide block), indicating poor hydraulic connection between the shallower units and the deeper competent slide block. Taken together, these data suggest that groundwater discharge via seepage along the bank adjacent to the river at the Landfill AOPC is likely to be the more significant component of groundwater discharge. Vertical migration of groundwater into the competent slide block, and subsequent groundwater migration to the river within the competent slide block, is likely to be a minor (and perhaps negligible) component of groundwater discharge at the Landfill AOPC.
- Measured hydraulic conductivities in the fill/alluvium based on slug tests conducted in 2002 range from approximately 14 to 317 feet per day (ft/d), whereas in the weathered slide block and competent slide block the hydraulic conductivity is much lower, ranging from approximately 0.001 to 0.2 ft/d. A subsequent slug test at MW-10 in 2008, screened in the competent slide block

and located in the “reference area” south of the Landfill AOPC, also indicated a low hydraulic conductivity of 0.033 ft/d in the competent slide block. The low hydraulic conductivity in the weathered slide block and competent slide block also suggests that there is a limited potential for groundwater migration in the slide block relative to groundwater migration potential in the shallower alluvium.

Sandblast Area AOPC:

The direction of groundwater flow at the Sandblast AOPC is to the north and northwest. Based on well logs, the monitoring wells at the Sandblast AOPC are generally screened in the weathered slide block. However, the upper portion of screen interval for three of the five wells (MW-12, MW-14, and MW-15) appears to be in alluvium.

Groundwater levels in the Sandblast AOPC are just above the contact between the alluvium and the weathered slide block in most areas. The contact between the alluvium and the slide block is close to the normal forebay pool level (approximately 75 ft amsl) at the northern edge of the Sandblast AOPC. Unlike at the Landfill AOPC, the groundwater elevation near the river (e.g.,MW-14 and MW-15) is similar to the forebay pool elevation (~75 ft NGVD),indicating relatively good connection between the groundwater (alluvium) and the river at the Sandblast AOPC.

The discussion regarding the connection between the alluvium and the slide block/bedrock materials at the Landfill AOPC would be applicable to the Sandblast Area as well.

Horizontal hydraulic gradients at the Sandblast AOPC range from 0.07 to 0.11 foot per foot. Measured hydraulic conductivities beneath the Sandblast AOPC based on slug tests conducted in 2008 range from 0.01 feet per day (MW-11, screened in weathered slide block and located farther upgradient than other wells in the Sandblast AOPC) to 285 feet per day (MW-14, screened in alluvium and located close to the Columbia River).

Pistol Range AOPC:

There are no monitoring wells at the Pistol Range AOPC or the Bulb Slope AOPC. At the Pistol Range AOPC, located on the southern side of Bradford Island, topographic elevation is approximately 94 ft amsl and topography slopes south. It is therefore expected that shallow groundwater near the Pistol Range AOPC, if present, would flow south and likely discharge as seeps above the shoreline and/or to the river.

Bulb Slope AOPC:

At the Bulb Slope AOPC, which is adjacent to the Columbia River on the north side of Bradford Island, the RI states that the substrate below the waste consists of a mixture of soils, rock that may have been placed in some areas, and what appear to be natural rock outcrops, all of which is underlain by siltstone bedrock. In this area, rainfall directly into the waste material could leach contaminants and discharge to the river.

Groundwater Discharge to the River

The entire eastern portion of Bradford Island is approximately 1,400 ft by 600 ft . North Bonneville, WA gets 71 inches of precipitation per year (North Bonneville, Washington Climate (www.bestplaces.net)). Conservatively assuming 50% of the precipitation recharges groundwater, the annual average rate of water recharging the study area is approximately 35 gallons per minute (gpm). This would be the total approximate groundwater flow into the surrounding river (via seeps or groundwater discharge) from this recharge area; however, only a fraction of the eastern portion of Bradford Island would potentially be contaminated by AOPCs. The quantity of discharge is minute compared to the flow in the river and dilution of dissolved-phase contaminations would be rapid and substantial.

Summary of Investigations

Upland OU

Landfill AOPC

Aerial photo analysis, available site records, electrical resistivity data, and seismic refraction data were used to indicate where disposal activities occurred in the past, develop a preliminary conceptual site model (CSM), and inform the sampling strategy. Samples were collected in locations which coincided with past disposal areas from surface (0-1') and subsurface (1-10').

Sandblast AOPC

The Sandblast Area AOPC includes several different potential sources of contamination: the septic tank drain field area, the spent sandblast media disposal area, two temporary hazardous material storage areas, a transformer disassembly area, an equipment laydown area, and a former burn pit. Extensive soil sampling has occurred throughout the AOPC and has included each of the areas of suspected contamination. Groundwater was sampled throughout the Sandblast area. Following the RI, further soil investigations were extended into a wooded area within the AOPC to address data gaps and to support remedial design. In addition, groundwater and stormwater sampling programs were conducted to update the CSM and better understand the recontamination potential to the River OU.

Pistol Area AOPC

The Pistol Range AOPC incorporates the former small firearms shooting range and adjacent areas. The 2012 RI summarizes soil samples collected from surface (0-1.5') representing the entire AOPC, with contamination being concentrated to the firing zone and the backstop. The primary contaminant is lead.

Bulb Slope Area AOPC

The Bulb Slope AOPC includes a portion of the embankment along the northern shore of Bradford Island. This AOPC was defined by visible signs of broken glass bulbs and associated electrical debris. The 2012 RI summarizes soil samples that have been collected from surface and subsurface soils on the embankment and at the base and top of the slope within this AOPC. Aroclor 1260, lead, and mercury were present in soils in isolated areas associated with visible glass debris.

Groundwater

Groundwater has been sampled from multiple wells within the Upland OU. Sampling was performed at multiple elevations and concentrated to the Landfill and Sandblast Areas. There are low levels of chlorinated volatile organic chemicals inferred to discharge to the river from groundwater at the Sandblast AOPC and volatile organic compounds and metals measured to discharge to the river from seeps at the Landfill AOPC, but overall, Bradford Island loading to the Columbia River is considered negligible. Additional groundwater data was recently collected is currently being evaluated.

Ongoing Work Activities

- In FY 2022 and 2023, USACE has prepared or is preparing the following reports concerning the Upland OU: Stormwater and Catch Basin Solids Data Report and Best Management Practices Evaluation, Sandblast AOPC Data Report; and Groundwater Sampling Field and Data Report.

River OU

The River OU generally encompasses that area between the Oregon and Washington shorelines from the Bonneville Dam to a point immediately upstream of Goose Island. The boundaries of extent of Bradford Island Site contamination within the river will be further defined as part of the remedial investigation and may result in identification of an additional operable unit.

The electrical equipment and debris that had been discarded into the Columbia River off the north shore of Bradford Island was excavated by USACE under two removal actions (diver guided) in 2000 and 2002 and disposed of in an offsite disposal facility. River OU debris removal areas are shown in Figure 4. The sediments in this area of the River OU were sampled and found to be contaminated with polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), and metals. In a removal action (diver guided) conducted in 2007, USACE dredged contaminated sediments from this area and disposed of the sediments at an offsite licensed hazardous waste landfill. River OU sediment removal areas are shown in Figure 5. Further sampling indicated that contamination remains in the sediment in this area.

Sampling of tissue from resident fish has shown smallmouth bass and sculpin with PCBs, chlordane, endrin, and bis(2-ethylhexyl)phthalate. The sampling of sediments in the River OU has shown detections of copper, lead, mercury, PCBs, and the SVOCs: benzo(a)anthracene, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, and pyrene. Clam samples contain elevated concentrations above background of PCBs and the SVOCs acenaphthene, benzo(a)pyrene, benzo(b)fluoranthene, and pyrene. Crayfish samples contained elevated concentrations above background of antimony and the SVOCs fluoranthene and pyrene.

Sediment samples have also been collected from reference locations upstream of the forebay and downstream of the dam to support the Supplemental Remedial Investigation.

Ongoing Work Activities

- In FY 2022 and 2023, USACE has prepared or is preparing the following reports concerning the River OU: Updated 2020 Smallmouth Bass, Crayfish, and Clam Data Report; Passive Sampling Report; and 2022 Smallmouth Bass Analysis Report; and Phase I Supplemental River OU Work Plan.

Summary of Baseline Risk Assessments

Summaries of completed human health and ecological baseline risk assessments for Upland OU AOPCs and the River OU are presented below. Updates to the baseline risk assessments for both the Upland OU and River OU will be presented in the Upland and River Supplemental RI Reports.

Contaminants of potential concern (COPCs) are contaminants that were identified during the Remedial Investigation as being present at concentrations that exceeded the most conservative screening levels, warranting further evaluation in a site-specific Baseline Risk Assessment. Contaminants of concern (COCs) are former COPCs that after being carried through the site-specific Baseline Risk Assessments were determined to still present potential unacceptable risks and were recommended for further evaluation in the Feasibility Study phase. Contaminants of potential ecological concern (CPECs) and contaminants of ecological concern (CECs) are equivalent to COPCs and COCs, except that CPECs and CECs apply to ecological receptors while COPCs and COCs apply to human receptors.

Upland OU

Landfill AOPC

The human health baseline risk assessment for the Upland OU evaluated risks associated with soil exposure pathways at this AOPC for both tribal and occupational receptors. For the fishing platform user (tribal fisher), exposure to surface [0-1' below ground surface (bgs)] and subsurface (1-3' bgs) soils that could occur at any location in the AOPC and on a daily basis would occur over areas generally considered to be small, such as for day camping. For occupational users, exposures considered not only surface and shallow subsurface soils, but also exposure to soils in deeper excavations (up to 10' bgs). The 2016 baseline human health risk assessment concluded that there was lifetime excess cancer risk greater than $1x10^{-6}$ primarily due to exposure to arsenic, polycyclic aromatic hydrocarbons (cPAHs), and PCBs.

The 2016 baseline human health risk assessment also estimated risks associated with groundwater pathways for an excavation/trench worker potentially exposed to groundwater at the AOPC. Other exposure pathways to groundwater were considered to be incomplete. Cumulative cancer risks were well below acceptable cancer and non-cancer risk thresholds.

The 2016 baseline ecological risk assessment evaluated risks to terrestrial receptors potentially exposed to soils, including plants, soil invertebrates, small mammals and birds. Unacceptable risk was found for chromium, copper, lead, mercury, nickel, chlordane, and HPAHs. These CECs will be further evaluated in the Supplemental Remedial Investigation due to the potential for adverse effects to populations of birds and mammals feeding upon invertebrates, or community level impacts to plants and invertebrates.

Updates to the baseline human health risk assessment will include, but not be limited to, the 2017 updated toxicity values for benzo(a)pyrene (BaP) and carcinogenic PAHs whose toxicity is based upon BaP, and updated exposure assumptions.

Sandblast AOPC

The 2016 baseline human health risk assessment evaluated risks associated with surface and subsurface soil exposure for both tribal and occupational receptors. As with the landfill, exposures for fishing platform users considered daily use over a relatively small area occurring anywhere throughout the AOPC. Occupational worker exposures included both surface and shallow subsurface soils, as well as deeper soils. The baseline risk assessment found lifetime excess cancer risk greater than $1x10^{-6}$for the occupational and tribal fishing platform receptors primarily due to exposure to cPAHs, arsenic, PCBs, and bis-2-ethylhexyl phthalate.

The baseline human health risk assessment also estimated risk of an excavation/trench worker potentially exposed to groundwater at the AOPC. Cumulative cancer and noncancer risks were below acceptable thresholds. Soil gas data was used to assess the potential for unacceptable risk to occupants at current and potential future buildings from the vapor intrusion pathway and were all found to be below levels of concern.

The 2016 baseline ecological risk assessment identified chromium, lead, nickel, and high molecular weight PAHs as posing unacceptable risk to ecological receptors, including the American robin, vagrant shrew, and terrestrial plants.

Revisions to the human health risk assessment include, but will not be limited to, updating toxicity values for BaP and carcinogenic PAHs whose toxicity is based upon BaP, revisions to exposure assumptions.

Pistol Range AOPC

Lead was the sole COPC identified for evaluation in the 2016 baseline human health risk assessment at this AOPC. No COPCs were identified for current occupational worker exposure. The adult lead model and IEUBK model was performed on soil data assuming exposure to soils by the fishing platform user and results were well below levels of concern.

The baseline risk assessment evaluated risks to terrestrial receptors exposed to surface and subsurface (to 3-ft bgs) soils. Unacceptable risk was identified for the American robin exposed to surface soils and the Vagrant shrew exposed to lead in subsurface soils.

Bulb Slope AOPC

Lead was the only COPC in the 2016 baseline human health assessment for this AOPC for the fishing platform user. No COPCs were identified for the current occupational worker exposure scenario. The adult lead model and Integrated Exposure Uptake Biokinetic model (IEUBK) was performed on soil data assuming exposure to soils by the fishing platform receptor and results were well below levels of concern.

Lead and mercury were the CPECs evaluated in the 2016 baseline ecological risk assessment at the Bulb Slope AOPC. The assessment indicated no unacceptable ecological risk from lead, but did determine mercury required further assessment. While HQs greater than 1 were calculated for ecological receptors exposure to mercury, discrete surface soil samples contributing to the unacceptable risk are bounded by other samples with concentrations below relevant risk based threshold concentrations.

River OU

The 2016 human health baseline risk assessment for the River OU evaluated risks to tribal subsistence fishers, recreational fishers, and other river users potentially exposed to contaminants in sediments (direct or indirect), surface water, and fish and shellfish tissues (ingestion). Supplemental risk analysis for the tribal fishing receptor was presented in the Draft Feasibility Study. The baseline human health risk assessment concluded that there was lifetime excess cancer risk greater than $1x10^{-6}$ to tribal subsistence and recreational fishers, primarily due to exposure to PCBs and selected organochlorine pesticides.

The 2016 ecological baseline risk assessment evaluated risks to aquatic receptors including benthic invertebrates, clams, crayfish, and resident fish, as well as semi-aquatic wildlife (e.g. mink, raccoon) and fish-eating birds (e.g. osprey, eagles). Unacceptable risk was found for benthic invertebrates, clams, crayfish, and resident fish (e.g. smallmouth bass) directly exposed to PCBs, organochlorine pesticides, and HPAHs in sediments or indirectly exposed through food web transfer.

Updates to the baseline human health risk assessment included the 2017 updated toxicity values for benzo(a)pyrene and carcinogenic PAHs whose toxicity is based upon BaP and updated tribal fish consumption rates assumptions.

Ongoing work relative to the Baseline Risk Assessments

Additional data collection is ongoing to further characterize the site and evaluate alternatives. That data will also be used to update the existing risk assessments and will be presented in the Supplemental Remedial Investigation reports (Upland and River OUs).

USACE Early Action Plan

Early actions under CERCLA § 104 will be evaluated for the River Operable Unit and Upland Operable Unit (Landfill, Pistol Range, Bulb Slope AOPCs, and a portion of the Sandblast AOPC). Once any early actions are completed data collected will be incorporated in the Supplemental RI Reports. The goal for discussing early actions would plan to be by August 2023 for the Upland OU and by July 2024 for the River OU.

Primary Remedial Actions

Operable Units (OUs)

Upland OU

Landfill AOPC

- Nature and Extent of Contamination. Wastes disposed of within the landfill include household waste and project-related wastes such as grease, electrical equipment, light bulbs, sandblast grit, and miscellaneous metal. Landfill materials and visibly impacted soils did not appear to extend beyond 15 feet in depth. Sampling of the Landfill AOPC indicates surface and subsurface soils contain levels of arsenic, chromium, copper, lead, mercury, nickel, chlordane and PAHs that exceed human health and ecological risk thresholds. Groundwater contained low concentrations of VOCs, SVOCs, petroleum hydrocarbons, and metals that were below human health risk levels. One seep was found, and results indicated that low concentrations of metals were detected in the seep water. A soil cover approximately 8 inches thick was placed on the landfill in 1989.

- Primary Response Actions

    - A Supplemental Remedial Investigation Report which will be prepared under CERCLA § 104 to consolidate data on the nature and extent of contamination in the Landfill AOPC and to update the baseline risk assessment.

<u>Sandblast Area AOPC</u>

- Nature and Extent of Contamination. The Sandblast AOPC includes the areas containing grit from historic sandblast operations, the storm drains from this area, two hazardous waste storage areas, a former burn pit, and groundwater below the surface. Contamination includes arsenic, antimony, chromium, lead, nickel, chlordane, PCBs, and PAHs at concentrations that exceed human health and/or ecological risk thresholds. Actions have included cleanout of storm drains (twice) and catch basins, filter sock replacement, and installation of straw waddle filters, as well as other maintenance activities that have removed structures and some of the contaminated surface materials. Additional sampling may be needed to define the nature and extent of contamination, refine the CSM, or evaluate alternatives.

- Primary Response Actions

    - A Supplemental Remedial Investigation Report which will be prepared under CERCLA § 104 to consolidate data on the nature and extent of contamination in the Sandblast AOPC and any updates to the baseline risk assessment.

<u>Pistol Range AOPC</u>

- Nature and Extent of Contamination. This is an area of approximately 4,550 square feet. The maximum soil concentrations indicated that lead was the only metal elevated above relevant screening criteria (EPA Region 9 Preliminary Remediation Goals [PRGs]), and it was found primarily near the former firing shed and around the backstop. These areas appeared to be relatively small (600 square feet around the firing shed, and 1,400 square feet

of soil around the backstop) and shallow (impacts likely extend up to 2 feet bgs).

- Primary Response Actions
  - A Supplemental Remedial Investigation Report which will be prepared under CERCLA § 104 to consolidate data on the nature and extent of contamination in the Pistol Range AOPC and to update the baseline risk assessment.

Bulb Slope AOPC

- Nature and Extent of Contamination. Sampling in this steeply sloped and small area indicates PCBs as Aroclor 1260, lead, and mercury are present in soils within the area of visually observed glass debris at the Bulb Slope. Approximately 95 to 125 cubic yards of debris and impacted soil is present at the Bulb Slope on top of a bedrock base. Further investigation indicates possible erosion or mass wasting is occurring from the north face of the Bulb Slope AOPC. A geotechnical slope stability assessment was conducted in December 2021 and summarized in a report in 2022.

- Primary Response Actions
  - A Supplemental Remedial Investigation Report which will be prepared under CERCLA § 104 to consolidate data on the nature and extent of contamination in the Bulb Slope AOPC and to update the baseline risk assessment.

- Additional sampling is needed to define the nature and extent of contamination, refine the CSM for groundwater.

River OU

Site Characterization

- Additional sampling is needed in the River OU to define the nature and extent of contamination in the forebay and downriver, refine the CSM, and evaluate alternatives.

Nature and Extent of Contamination.

- The River OU encompasses that area between the Oregon and Washington shorelines from the Bonneville Dam to a point immediately upstream of Goose Island. Concentrations of total PCBs exceeded human health and ecological risk thresholds for both sediments and tissues. The highest concentrations were observed along the north shore of Bradford Island. Selected metals were detected in river sediment, however for all metals, concentrations observed in the Forebay sediment samples were not significantly higher than the concentrations observed in the Reference Area. Unacceptable human health risks were observed for tribal fishers exposed to mercury, chlordane, and dieldrin; however, sediment concentrations at the site were not above those in

the Reference Area. Contaminant concentrations in downstream sediment samples did not exceed those of the Reference Area.

Primary Response Actions.

- A Supplemental Remedial Investigation Report will be prepared under CERCLA § 104 to consolidate data on the nature and extent of contamination and any updates to the risk assessment.

FFA Considerations.

All Primary and Secondary Documents will be subject to the Consultation process and schedules provided in the Bradford Island FFA. All FFA time extensions for Consultation and Dispute Resolution will automatically result in an equal extension of a deadline established in the SMP in effect at the time. All events of Force Majeure and requests for Extension under the FFA by USACE will also result in automatic extensions of the deadlines established in the SMP for the work impacted by the Force Majeure and the basis for the Extension.

Timeline and Schedule

CERCLA Process Implementation Schedule

Primary Documents Deadlines (Fiscal Years 2024 and 2025 (1 and 2))

- Phase 1 Supplemental River OU Work Plan – initial submission by USACE for Consultation – 1 September 2023 (actual)

Table 5.1-1 - Timeline assumptions after initial submission:

Phase	Days	Comment
Review by FFA parties	60	
USACE response to comments & revisions	60	
RAB Review	30	Present at RAB meeting
USACE response to RAB and finalize report	30	

- Phase 2 Supplemental River OU Work Plan – initial submission by USACE for Consultation – 1 July 2024

Table 5.1-2 - Timeline assumptions after initial submission:

Phase	Days	Comment

Review by FFA parties	60	
USACE response to comments & revisions	60	
RAB Review	30	Present at RAB meeting
USACE response to RAB and finalize report	30	

- Supplemental Upland OU Work Plan – initial submission by USACE for Consultation – 20 May 2024 (Caveat – date may be adjusted until FFA is in effect.)

  Table 5.1-3 - Timeline assumptions after initial submission:

Phase	Days	Comment
Review by FFA parties	60	
USACE response to comments & revisions	60	
RAB Review	30	Present at RAB meeting
USACE response to RAB and finalize report	30	

Long Term Milestones (Fiscal Years 2026 and 2027 (3 & 4))

- Supplemental River OU RI Report – initial submission by USACE for Consultation – 7 January 2026 (Caveat –In-water work can only take place in the fall to spring so a later start to the Work Plan will delay field work and that will delay the submittal of the Supplemental River OU SRI Report.)

  Table 5.1-4 - Timeline assumptions after initial submission:

Phase	Days	Comment

Review by FFA parties	60	
USACE response to comments & revisions	60	
RAB Review	30	Present at RAB meeting
USACE response to RAB and finalize report	30	

- River OU Feasibility Study Report – initial submission by USACE for Consultation – 11 November 2026

  Table 5.1-5 - Timeline assumptions after initial submission:

Phase	Days	Comment
Review by FFA parties	60	
USACE response to comments & revisions	60	
RAB Review	30	Present at RAB meeting
USACE response to RAB and finalize report	30	

- River OU Proposed Plan – initial submission by USACE for Consultation – 27 September 2027

  Table 5.1-6 - Timeline assumptions after initial submission:

Phase	Days	Comment
Review by FFA parties	60	
USACE response to comments & revisions	60	
RAB Review	30	Present at RAB meeting

USACE response to RAB and finalize report	30	

Out-Year Milestones (Beyond FY 2027)

- Supplemental Upland OU RI Report – initial submission by USACE for Consultation – October 2027
- River OU ROD – initial submission by USACE for Consultation – September 2028
- Upland OU Feasibility Study Report – initial submission by USACE for Consultation – November 2028
- Upland OU PP – initial submission by USACE for Consultation – December 2029
- Upland OU ROD – initial submission by USACE for Consultation – January 2031
- River OU Final Remedial Design – submission by USACE for Consultation – December 2031 (interim versions of design and submission dates will be provided in an SMP annual update)
- River OU Remedial Action Work Plan – initial submission by USACE for Consultation – August 2033
- Upland OU Final Remedial Design – submission by USACE for Consultation – July 2034 (interim versions of design and submission dates will be provided in an SMP annual update)
- Upland OU Remedial Action Work Plan – initial submission by USACE for Consultation – February 2036
- River OU Remedial Action Completion Report – initial submission by USACE for Consultation – July 2037
- Upland OU Remedial Action Completion Report – initial submission by USACE for Consultation – February 2040

Deadline and Milestone Table – Upland OU

	Deadlines			Long Term Milestones		Out Year Milestones			
Document Title	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**	**FY30+**
SRI WP		20May2024							

SRI*						11Oct2027			
FS							14Nov2028		
Proposed Plan								19Dec2029	
Record of Decision									6Jan2031
Remedial Design									11July2034
Remedial Action Work Plan									19Feb2036
Remedial Action Completion Report									10Feb2040

*Timeframe for SRI is estimated based on assumption of early action (see Section 3).

Deadline and Milestone Table – River OU

	Deadlines			**Long Term Milestones**		**Out Year Milestones**			
Document Title	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**	**FY30+**
Phase I SRI WP	1Sep2023 (a)								
Phase II SRI WP		1 July 2024							
SRI				7Jan2026					
FS					11Nov2026				
Proposed Plan					27Sep2027				
Record of Decision						5Sept2028			
Remedial Design									22Dec2031
Remedial Action Work Plan									1Aug2033
Remedial Action Completion Report									23July2037

Project End Dates.

- Upland OU – LTM with end date TBD
- River OU – LTM with end date TBD

SMP Updates

Annual SMP Update Submittal for Expedited Consultation under FFA Section XII – 30 June XXXX

Target Dates for Secondary Documents related to Near Term Milestones.

Community Involvement

Administrative Record

CERCLA requires the establishment of an Administrative Record, which makes investigative plans, reports, and remedial decision documents available to the public. Public information repositories have been established for the Bradford Island Site to provide convenient access to these documents and other site-related information. The Bradford Island CERCLA Administrative Record file is located online at: Bradford Island, Admin Record (oclc.org). A central repository containing copies of the administrative record is located at the USACE Portland District library: 333 SW 1st Ave, Portland, Or 97208. A local Information Repository has been established at the Stevenson, Washington Public Library, where online access through library equipment is available and the library staff will assist the public with access to the online Administrative Record.

Community Involvement Plan

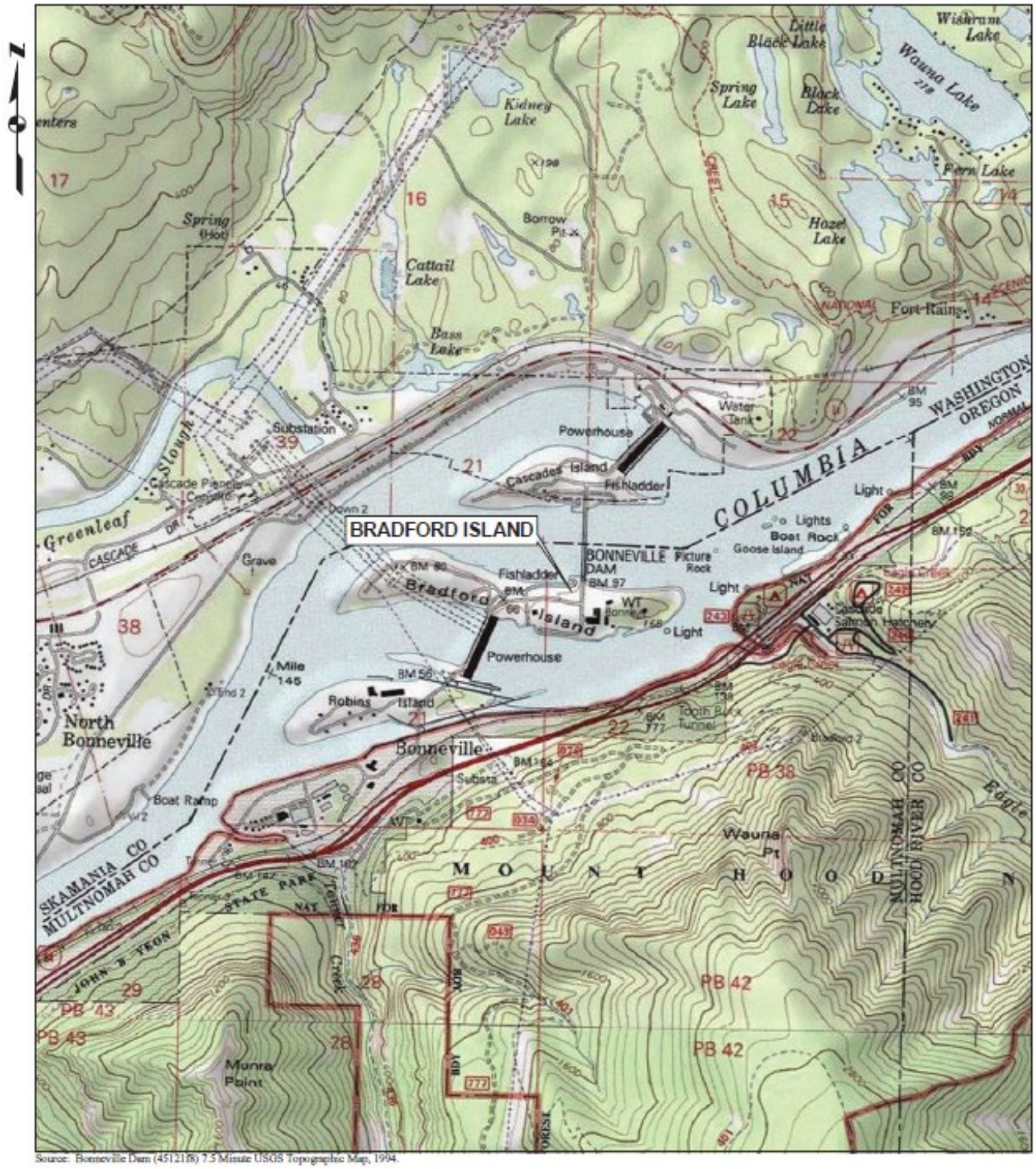
USACE has updated the Community Involvement Plan for the Bradford Island NPL Site, after conducting numerous interviews of community members. Public information meetings have been held by USACE since the NPL Listing, and will continue to be offered on a regular basis, no less often than annually and more often as appropriate based on community interest.

Restoration Advisory Board (RAB)

USACE has established a Restoration Advisory Board of voluntary participants from across the spectrum of interested community members, including from Indian Tribes, local governments, environmental groups, local workers, and commercial interests. The RAB established its operating procedures based on DoD Restoration Advisory Board regulations published at 32 CFR Part 202 and DoD RAB guidance. The RAB will meet regularly to discuss the CERCLA response actions at Bradford Island. Members of the RAB may change over time based on their availability and the interest of other community members. EPA, ODEQ, and WDOE, and representatives from tribal governments have been invited to participate as non-voting RAB members and will be engaged for other public outreach activities by USACE.

Site Figures

FIGURE 1 - Site Vicinity Map



Source: Bonneville Dam (4512178) 7.5 Minute USGS Topographic Map, 1994.

VICINITY MAP

FIGURE 2 – Upland OU Map

FIGURE 3 – River OU Map

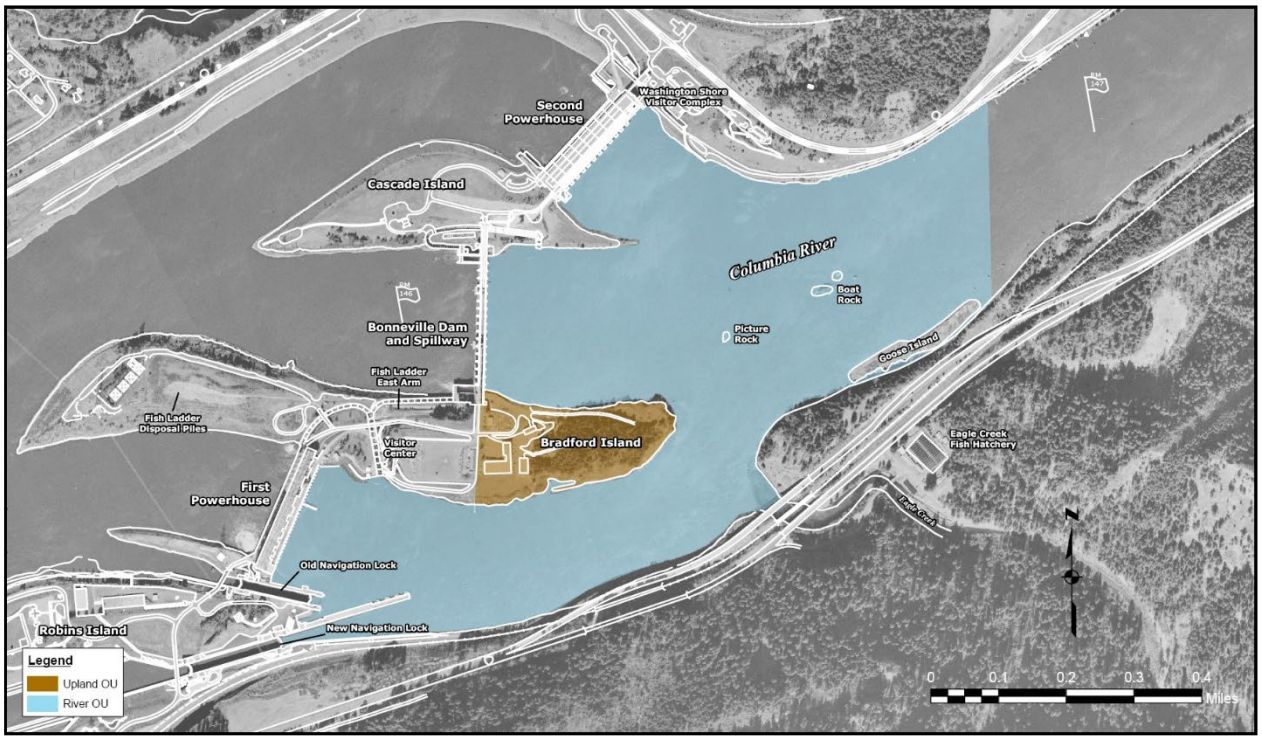


FIGURE 4 – Former Debris Pile Locations

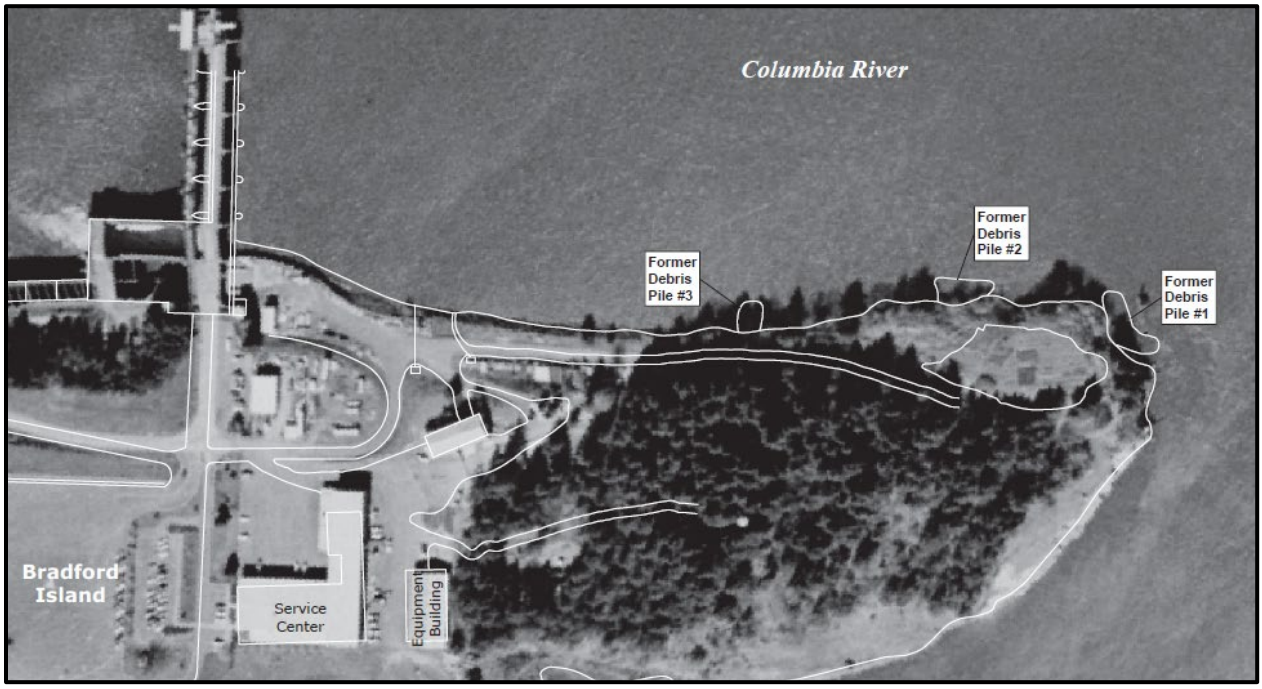


FIGURE 5 – 2007 Sediment Removal Areas