RECORD OF DECISION

SELECTED REMEDIAL ACTION

For

PORTLAND WILLAMETTE INLET
WHITAKER SLOUGH
PORTLAND, OREGON

Prepared By

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
Northwest Region Office

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1. INTRODUCTION

1.1 INTRODUCTION

This Record of Decision (ROD) presents the selected remedial action for contaminated sediment in an inlet off of the Whitaker Slough (a tributary of the Columbia Slough), known as the Portland Willamette Inlet. The inlet is located approximately 1.11 to 1.17 miles upstream of the Whitaker Slough’s confluence with the main stem of the Columbia Slough in Portland, Oregon. The selected action was developed in accordance with Oregon Revised Statutes (ORS) 465.200 et. seq. and Oregon Administrative Rules (OAR) Chapter 340, Division 122, Sections 0010 through 0115.

The selected remedial action is based on the administrative record for this site. A copy of the Administrative Record Index is attached as Appendix A. This report summarizes the more detailed information contained in the Remedial Investigation (RI) and streamlined Feasibility Study (FS) reports completed by Portland Willamette Company under a Letter Agreement with DEQ, and by DEQ using funds provided by private parties as part of liability releases for their contribution to sediment contamination in the Whitaker Slough.

1.2 SCOPE AND ROLE OF THE SELECTED REMEDIAL ACTION

The cleanup action selected in this document is designed to meet an objective of the Columbia Slough remedial action approach established in the Columbia Slough Record of Decision (ROD) (DEQ, 2005). The remedial approach for the slough consists of four elements:

1. Source control,
2. Hot spot cleanup,
3. Natural recovery and institutional controls, and
4. Long-term monitoring.

Source control efforts are documented in the Watershed Action Plan (WAP), specific site cleanup reports (e.g., Portland Willamette (ECSI #976 and 2767), Johnson Lake/Owens Brockway (ECSI #1311), Halton Co. (ECSI #121), NuWay Oil (ECSI #88)), and stormwater pollution controls plans developed in conjunction with specific COLS stormwater permits. The WAP also describes the approach used to prioritize sections of the Slough for more focused source control efforts based on sediment concentrations and TSS levels in stormwater discharge from City outfalls. The Whitaker Slough was one of the areas identified in the WAP as a priority area.

Hot spot sediment cleanup consists of identifying those locations where contaminant
concentrations significantly exceed the general “baseline” levels of contamination detected throughout the Slough sediment. Baseline concentrations were initially developed by DEQ using data collected in the City’s 1994/95 sampling effort and have been updated and refined as a result of the more recent investigations completed in particular segments of the Slough. Whitaker Slough specific baseline values were generated using an incremental sampling approach described in DEQ’s Whitaker Slough report (DEQ, 2012).

Long-term monitoring for the Columbia Slough is described in the pertinent Long-Term Monitoring Reports (City of Portland 2009, 2007). Long-term monitoring includes sediment and fish tissue sampling every 10 years to assess progress in reducing contaminant concentrations to protective levels. The most recent City of Portland fish tissue and sediment sampling was completed in 2005 and 2006.

The ROD anticipates that once source control is in place and sediment with the highest levels of contaminants has been cleaned up, natural recovery mechanisms will result in decreasing levels of contaminants in surface sediment, and correspondingly in fish tissue, over time. The primary natural recovery mechanisms anticipated for the Slough are deposition of cleaner sediments from stormwater runoff on top of contaminated sediments combined with some degradation of organic chemicals.

The action selected in this document addresses task 2 of the remedial approach for the Columbia Slough – cleanup of sediment with significantly elevated levels of contaminants. The proposed remedial action consists of removing and isolating metal-contaminated sediment in the inlet to the extent that residual surface concentrations will be consistent with baseline concentrations for metals throughout the Whitaker Slough. Residual metals concentrations in surface sediment in the inlet and adjoining Whitaker Slough are expected to decline over time as clean sediment is deposited on top of contaminated sediments.

The selected remedial action consists of the following elements:

- Conducting a survey of the inlet to map bottom elevation and topography of adjacent shoreline areas.
- Moving a barge-mounted dredge into the inlet.
- Temporarily blocking the outlet connecting the inlet to the Whitaker Slough with a coffer dam.
- Dredging sediment with the highest concentrations of lead and copper from central portions of the inlet and placing it on top of contaminated sediments closer to the shorelines.
- Dredging cleaner sediment from deeper in the dredge area and placing it on top of previously deposited sediment.
- After sufficient dewatering, planting shoreline areas with native vegetation.
- Removing the coffer dam and restoring the inlet to its natural conditions.
2. SITE HISTORY AND DESCRIPTION

2.1 SITE LOCATION AND LAND USE

Portland Willamette Inlet is an approximately 1-acre embayment of the Whitaker Slough located approximately 1.1 miles from the confluence of the Whitaker Slough and the main stem of the Columbia Slough (Figure 1). The inlet is bordered to the west by the Portland Willamette Company (fireplace equipment manufacturing) and to the east and south by residential, farm-zoned properties. Water flow in this section of the Columbia Slough is managed by the Multnomah County Drainage District, which controls water levels via a series of pumps for the purposes of stormwater management and flood control. The area adjacent to the southeast shore of the inlet is relatively flat, with a gentle slope towards the slough. Stormwater runoff from the Portland Willamette facility drains primarily to the inlet via two outfalls and incidental overland sheet flow. An area of mixed industrial/commercial/residential usage along NE Portland Highway also drains to the Portland Willamette inlet via City Outfall 77A. Outfall locations are shown in Figure 2.

The inlet is used for recreational purposes by people kayaking this section of the Slough and provides habitat for birds, fish, and other wetland organisms. An adjacent landowner has water rights to pump water for irrigation from the inlet.

2.2 PHYSICAL SETTING

2.2.1 Climate

Average annual gross precipitation for the area is approximately 40 – 45 inches/year. The majority of the precipitation falls between October and March, with July being the driest month and December the wettest.

2.2.2 Surface Water Features and Geology

Subaqueous sediment conditions encountered within the Whitaker Slough and associated inlet area consist of an upper layer of soft sediments (which also includes some gravelly layers) ranging from 0.25 to five feet in thickness, underlain by firm, sandy silts to silty sands. The underlying firm layer is likely representative of fine grained Overbank Deposits, which in turn are underlain by coarser sands and gravels belonging to the Troutdale Formation.
Water depth in the inlet is generally less than 6 feet. MCDD has historically maintained a channel to allow for water intake for irrigation from the southern end of the inlet. Active springs are located in the southern portion of the inlet.

### 2.3 SITE HISTORY

Current and historical operations at the Portland Willamette site include metal plating, and metal plating wastes were historically landfarmed onsite. Overland flows from these areas and/or treatment system upset events are possible sources of contamination detected in the inlet. Before 1978, process wastewater was discharged to lined, settling ponds at the east side and northeast corner of the building prior to discharge to the Slough inlet. After 1978 wastewater was treated before discharge; and after 1993, wastewater was evaporated in tanks. Direct discharge of treated wastes is the primary source of contamination to the inlet from the Portland Willamette facility. Drainage to the City of Portland OF 77a has also contributed to the sediment contamination.

The upland portion of the site was investigated and cleaned up with DEQ oversight in the early 1990s. Contaminated soils in the upland sludge treatment area were removed, a historical settling pond was filled, and DEQ issued a No Further Action determination for these areas in 1996. In 2007, Portland Willamette Company entered into a cleanup agreement with DEQ under which they completed an investigation to characterize the extent of contamination in the inlet (PNG Environmental, Inc. 2010) and complete a stormwater source control evaluation. As a result of the stormwater evaluation, Portland Willamette Co. cleaned out a ditch containing roofing sand and implemented best management practices for stormwater runoff which have been incorporated into the facility’s stormwater pollution control plan. Stormwater management at the facility continues under the facility’s stormwater discharge permit (#71443) overseen by the City of Portland. In 2009, Portland Willamette entered into a settlement with DEQ and received a release from liability for historic sediment contamination associated with their facility. Funds from that settlement are being used to complete this evaluation.

Sediments in lines and catch basins draining to City of Portland OF 77a were collected and analyzed as part of the Portland Willamette Co. investigation and subsequently, by the City of Portland Bureau of Environmental Services. Elevated levels of metals were detected at several locations. Follow-up measures are under evaluation.
3. RESULTS OF INVESTIGATION(S)

3.1 NATURE AND EXTENT OF CONTAMINATION

The primary contaminants of concern in this area are metals. Based on the range of exceedances of baseline values for the Whitaker Slough, DEQ identified copper and lead concentrations as indicative of the areas warranting cleanup evaluation. The baseline concentration of copper in the Whitaker Slough, as determined by the incremental sampling conducted by DEQ in 2011, is 45 ppm. The baseline value for lead is 74 ppm. The toxicity-based screening levels for these metals are 36 ppm for copper and 35 ppm for lead.

Copper concentrations in surface sediment in the Portland Willamette inlet range from 15 to 3,750 ppm. Data locations and associated concentrations are shown in Figure 3. A theissen polygon evaluation determined that remediating all areas with copper concentrations exceeding 700 ppm would bring the reach average down to the baseline concentration. This evaluation consists of creating polygons around each sample point that are sized based on the distance to the next nearest sampling points. An area-weighted average concentration can then be calculated by assuming the concentration in each polygon represents the area of the polygon. Polygons with the highest concentrations are sequentially reduced to baseline concentrations until the resulting weighted average concentration for the area investigated is below the baseline concentration.

Available data indicate that the highest copper concentrations are present in the southern and westernmost portions of the inlet, close to the outfalls. Subsurface samples collected as part of the Portland Willamette Company investigation completed in 2007 generally indicate concentrations decrease with depth; however, several samples in the southeastern quadrant of the inlet had higher concentrations in the 1 – 3 feet depth interval.

Lead concentrations in surface sediment range from 10.5 to 741 ppm. Data locations and associated concentrations are shown in Figure 4. The theissen polygon evaluation determined that remediating sediment with lead concentrations exceeding 220 ppm would bring the reach average lead concentration down to baseline levels. Again, the highest concentrations are present in the southern and easternmost portions of the inlet and, similar to the trends observed for copper, lead concentrations decrease with depth, with the exception of several samples collected in the southeastern quadrant where lead concentrations at 1 – 3 feet below the surface were higher than surface sediment samples.
3.2 RISK ASSESSMENT

As documented in DEQ’s sediment sampling report (DEQ 2012), the Portland Willamette inlet was identified for sediment cleanup evaluation based on concentrations of copper and lead detected in samples collected as part of that study. These metals have not been detected in fish tissue from the Whitaker Slough at concentrations exceeding acceptable tissue levels; however, bioassays conducted on sediment from the inlet have indicated toxicity to benthic organisms (DEQ 2012). The highest detected concentrations exceed risk-based levels for human direct contact under a residential scenario; however, the areas of exceedance are very limited. Also, the risk-based levels established for the residential exposure scenario assume daily contact with contaminated soil which significantly exceeds likely projected human exposures to sediment in the inlet. Consequently, the risk pathway of concern is protection of benthic organisms.

Table 1 Contaminant Concentrations and Screening Criteria

<table>
<thead>
<tr>
<th>Contaminant/Pathway</th>
<th>Maximum concentration detected in ppm</th>
<th>Residential</th>
<th>Occupational</th>
<th>Benthic toxicity</th>
<th>Whitaker Slough baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>741</td>
<td>400</td>
<td>800</td>
<td>35</td>
<td>74</td>
</tr>
<tr>
<td>Copper</td>
<td>3,750</td>
<td>3,100</td>
<td>41,000</td>
<td>36</td>
<td>45</td>
</tr>
</tbody>
</table>

3.3 SOURCE CONTROL

Sources of contamination to the inlet are primarily associated with stormwater discharge via the Portland Willamette Company private outfalls and City of Portland Outfall 77a. Portland Willamette Company completed source control measures at their facility consisting of cleaning contaminated soils from a drainage ditch and instituting best management practices in drainage areas. Best management practices include: quarterly sweeping of the parking lot, installation of catch basin filters, removal of equipment and all operations from outside areas, annual inspections of outfalls, employee education, and other housekeeping measures. These actions are part of the facility’s stormwater management plan which is overseen by the City of Portland. The City will be working with Portland Willamette to investigate a recently discovered stormwater lateral that joins Portland’s Outfall 77, immediately west of the property. This may involve pipe cleaning and additional monitoring.

DEQ is working with the City to identify sources of contamination to the inlet associated with Outfall 77a. A significant portion of this drainage basin historically consisted of runoff from NE Portland Highway which is part of the State highway system. DEQ is working with ODOT to ensure the lines and catch basins along the portion of the highway draining to Outfall 77a are cleaned and appropriate stormwater management procedures are implemented.
4. PEER REVIEW SUMMARY

A DEQ project manager/hydrogeologist has reviewed this staff report and supports the selected remedial action. Technical input was also provided by staff at Multnomah County Drainage District, City of Portland Bureau of Environmental Services, and DEQ’s contractor – Ash Creek.
5. DESCRIPTION OF REMEDIAL ACTION OPTIONS

5.1 REMEDIAL ACTION OBJECTIVES

The ultimate remedial action objective for the Columbia Slough and associated side channels is to reduce sediment concentrations to protective risk-based levels. As described in the Columbia Slough ROD, this will be achieved through a combination of source control, contaminated sediment cleanup, and natural recovery. The objective of the cleanup evaluated in this document is to actively remediate sediment with the highest concentrations of metals to the extent that natural recovery processes can further reduce concentrations to risk-based levels in a reasonable time frame. Specifically, the objective of this action is to remediate sediment with copper concentrations at or exceeding 700 ppm and lead concentrations at or exceeding 220 ppm. As indicated in Section 3.1, this should result in average sediment concentrations for the Whitaker segment that are consistent with baseline levels.

5.2 REMEDIAL ACTION ALTERNATIVES

Typical remedial measures for contaminated sediment include dredging and capping. Because a certain depth must be maintained in the Columbia Slough system for flood control, capping opportunities are limited or must be considered in conjunction with dredging. The area of the inlet to be addressed to achieve remedial action objectives (RAOs), shown in Figure 5, is estimated to cover approximately 21,000 square feet. Based on coring conducted by PNG Environmental (2010), the depth of sediment in the inlet varies between 0.25 and 5 feet. The spatial distribution of sediment depths was used to approximate the volume of sediment in this area at just under 2,000 cubic yards. Considering the depth of sediment concentrations exceeding RAOs, the volume of sediment that would need to be removed to address all sediment with concentrations exceeding RAOs would be approximately 1,100 cubic yards.

Subsurface concentration data indicate that there were several locations where samples collected from 2 – 3 feet below the sediment surface were higher than the surface sediment sample concentrations and/or exceeded RAOs, while at most locations concentrations declined with depth to levels below the RAOs.

The following alternatives were developed for evaluation:

A. No Action – sediment hot spots would be left in place. There would be a potential for spreading of contaminated sediments and an increased time frame for natural recovery.

B. Dredging sediments that exceed RAOs – Contaminated sediment exceeding 700 ppm copper and 220 ppm lead would be removed from the inlet and taken off-site for disposal either in a solid waste landfill or placed on the landward side of dikes maintained by MCDD for flood control. This alternative would require dredging of approximately
1,100 cubic yards of sediment, turbidity controls, and post dredging confirmation sampling.

C. Dredging the entire area where RAOs are exceeded to 1 foot below mudline and placing six inches of clean sand in the dredged area. This alternative would require dredging of approximately 800 cubic yards of sediment, controlled placement of approximately 400 cubic yards of clean sand, turbidity controls during both dredging and capping, and confirmation sampling to ensure coverage of the clean sand.

D. Dredging the central portion of the contaminated area and placing the contaminated sediments on top of the adjacent contaminated sediments on the eastern and western shorelines of the inlet. Dredging an additional one to two feet of clean sediments from this area and placing it on top of the contaminated material and surrounding contaminated sediments in the inlet. This alternative would require dredging 400 to 600 cubic yards of contaminated sediment and 300 to 700 yards of cleaner sediment to be used as a cap.

Consideration was also given to filling the inlet, thereby capping contaminated sediment and converting the area to an emergent wetland. However, this was considered impractical due to the ecological value of the inlet as a quiescent off-channel body of water and the impact this would have on surface water intake rights at the south end of the inlet.

5.2.1 Alternative A - No action

The No Action alternative is developed as a point of comparison for other options. It would not achieve remedial action objectives as highly contaminated sediments would remain in place, continuing to present an unacceptable benthic toxicity risk and providing a source of contamination to surrounding sediments.

5.2.2 Alternative B - Dredging and disposal

This alternative would achieve remedial action objectives by removing contaminated sediments exceeding RAOs and disposing of them at a permitted upland location. The estimated volume of sediment warranting removal is 1,100 cubic yards. A coffer dam would be constructed between the inlet and the Whitaker Slough to limit the spread of increased turbidity generated during dredging to the inlet. Access to the inlet would be coordinated with Portland Willamette, as indicated in their Consent Judgment, to allow for construction of a material transfer platform on the western bank of the inlet. DEQ would coordinate with the City to allow for collection of mussels in the impact area prior to invasive work. Mussels would be replaced once the action is complete or relocated somewhere within the Slough. Large woody debris would be moved from the dredging area and temporarily stored in a non-dredging zone so that it could be replaced following sediment removal. Contaminated sediments would be removed using a barge-mounted dredge (Alternative B1) and transferred upland via a track hoe located on the transfer platform. Alternatively, a drag line operating from the shoreline platform could be used to remove sediment (Alternative B2). If sediments require dewatering, a staging area will be created in Portland Willamette’s northern parking lot where material can be temporarily stockpiled and mixed with absorbent material, or mixing could take place within the haul trucks. Confirmation samples would be collected in the removal area to confirm that residual concentrations achieved
RAOs. Once removal is complete, woody debris would be replaced and the area planted with appropriate vegetation.

5.2.3 Alternative C - Combination dredging and cap

This alternative would achieve remedial action objectives by removing a minimum of 1 foot of sediment from the area where RAOs are exceeded and then placing a thin layer cap of clean sand in the removal area to cover residual concentrations where RAOs are exceeded at depth. In this scenario, the estimated volume of sediment to be removed would be approximately 800 cubic yards and approximately 400 cubic yards of clean material would be required for the thin layer cap. The steps described above for the dredging alternative would otherwise be the same. Confirmation sampling of the cap and adjacent sediment would be conducted to ensure that contaminated sediment was not displaced or mixed with the cap material.

5.2.4 Alternative D – Dredging With Inwater/Shoreline Placement

This alternative would achieve remedial action objectives by removing contaminated sediments from the central portion of the inlet and placing them on top of contaminated sediments along the shoreline areas. Additional clean sediments would be dredged from the removal area and placed on top of the contaminated sediments, creating wetland benches along the eastern and western shorelines of the inlet. To maintain quality water habitat in the inlet, benches would extend no more than 20 feet (including slope) from the shoreline into the inlet. The benches would be planted with native vegetation. To maintain optimum conditions for wetland vegetation, the height of the benches would be limited to no more than two feet above the winter water level. Additional clean material may be dredged and placed over remaining areas of the inlet to further reduce metals concentrations in surface sediment throughout the inlet. In this scenario, the estimated volume of contaminated sediment to be moved and capped within the inlet would be 400 to 600 cubic yards. An additional 300 to 700 cubic yards of sediment would then be dredged to create a 6 to 12 inch cap of clean soil over the shoreline benches and surrounding inlet area. Actual volumes will depend on the area over which benches can practically be created considering topography and shoreline restrictions.
6. EVALUATION OF REMEDIAL ACTION ALTERNATIVES

6.1 EVALUATION CRITERIA

The remedial alternatives described above were evaluated based on:

- The protectiveness of the alternatives based on the standards set forth in OAR 340-122-040;
- The extent to which the remedial action alternatives treat or remove hot spots; and
- The feasibility of the alternatives based on a balancing of the remedy selection factors including effectiveness, long-term reliability, implementability, implementation risk, and cost reasonableness.

With the exception of No Action (Alternative 1), the alternatives achieve RAOs, either through removing contaminated material from the site, or a combination of removal and capping in place. Once these “hot spot” areas are remediated, it is expected that natural recovery mechanisms will further reduce contaminant levels in sediment over time.

6.2 REMEDIAL FACTORS

The remedial action alternatives are evaluated against the following remedial factors set forth in OAR 340-122-090(3):

- **Effectiveness in achieving protection.** The evaluation of this factor includes the following components:
  
  - Magnitude of the residual risk from untreated waste or treatment residuals, without considering risk reduction achieved through on-site management of exposure pathways (e.g., engineering and institutional controls). The characteristics of the residuals are considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, propensity to bio-accumulate, and propensity to degrade.
  
  - Adequacy of any engineering and institutional controls necessary to manage residual risks.
- The extent to which the remedial action restores or protects existing or reasonably likely future beneficial uses of water.
- Adequacy of treatment technologies in meeting treatment objectives.
- The time until remedial action objectives are achieved.

**Long-term reliability.** The following components are considered when evaluating this factor, as appropriate:

- The reliability of treatment technologies in meeting treatment objectives.
- The reliability of engineering and institutional controls needed to manage residual risks, taking into consideration the characteristics of the hazardous substances being managed, the ability to prevent migration and manage risk, and the effectiveness and enforceability over time of the controls.
- The nature and degree of uncertainties associated with any necessary long-term management (e.g., operations, maintenance, monitoring).

**Implementability.** This factor includes the following components:

- Practical, technical, legal difficulties and unknowns associated with the construction and implementation of the technologies, engineering controls, and/or institutional controls, including the potential for scheduling delays.
- The ability to monitor the effectiveness of the remedy.
- Consistency with regulatory requirements, activities needed to coordinate with and obtain necessary approvals and permits from other governmental bodies.
- Availability of necessary services, materials, equipment, and specialists, including the availability of adequate treatment and disposal services.

**Implementation Risk.** This factor includes evaluation of the potential risks and the effectiveness and reliability of protective measures related to implementation of the remedial action, including the following receptors: the community, workers involved in implementing the remedial action, and the environment; and the time until the remedial action is complete.

**Reasonableness of Cost.** This factor assesses the reasonableness of the capital, O&M, and periodic review costs for each remedial alternative; the net present value of the preceding; and if a hot spot has been identified at this site, the degree to which the cost is proportionate to the benefits to human health and the environment created through treatment or removal of the hot spot.
In general, the least expensive remedial action is preferred unless the additional cost of a more expensive action is justified by proportionately greater benefits under one or more of the other remedial factors. For sites with hot spots, a higher threshold is used for evaluating the reasonableness of costs for treatment or removal of hot spots than for remediation of areas other than hot spots. Hot spots for soil are defined in OAR 340-122-115(32) as material containing hazardous substances that:

A) Are present in concentrations exceeding risk-based concentrations corresponding to:
   (i) 100 times the acceptable risk level for human exposure to each individual carcinogen;
   (ii) 10 times the acceptable risk level for human exposure to each individual noncarcinogen; or
   (iii) 10 times the acceptable risk level for exposure of individual ecological receptors or populations of ecological receptors to each individual hazardous substance.

(B) Are reasonably likely to migrate to such an extent that the conditions specified in subsection (a) or paragraphs (b)(A) or (b)(C) would be created; or

(C) Are not reliably containable, as determined in the feasibility study.

### 6.3 EVALUATION AND COMPARATIVE ANALYSIS OF ALTERNATIVES

This section evaluates and compares each of the remedial action alternatives carried forward for detailed analysis using the factors described in Sections 6.1 and 6.2.

#### 6.3.1 Effectiveness

The effectiveness of Alternative B is somewhat higher than that for Alternatives C and D due to the fact that more highly contaminated sediment will be removed from the water body. This is balanced, however, for Alternative C since placement of a clean sand cap over the excavation area will result in somewhat lower concentrations in surface sediment. Alternative D may also provide a better kick-start to natural recovery if a larger portion of the inlet can be covered with clean material. Alternative A – No Action is not effective in achieving RAOs.

#### 6.3.2 Long-Term Reliability

Alternatives B, C, and D have high reliability over the long term because contaminated sediment is either removed or exposure pathways are cut off. Alternative B has somewhat greater long-term reliability than alternatives C and D, due to the fact that higher levels of contamination are removed from locations proximal to a surface water body. Alternative A has low reliability due to the potential for erosion and spreading of contaminated sediments into the Whitaker Slough.
6.3.3 Implementability

All alternatives involve standard technologies and should be relatively easily implemented. There are some additional implementability issues associated with the controlled cap placement required by Alternative C, due to the need to ensure that material placed does not displace the residual contamination. This would also be a concern for Alternative D; however, capping the newly created wetland areas will be more straightforward as they will be above the water level in the inlet at the time of placement. A Section 404 Clean Water Act permit would be required from the Corps of Engineers for alternatives B, C, and D. Because this portion of the Slough is not connected to the Willamette River, endangered salmon are not present and the permit would not likely require consultation with the National Marine Fisheries Service. Because the work is being performed as part of a cleanup project, it would likely fall under a nationwide permit which can be obtained relatively expeditiously. There are no implementability issues associated with Alternative A.

6.3.4 Implementation Risk

Short term implementation risks are similar for each of the active alternatives with potential for some short-term exposures to higher contaminant concentrations present at depth in some locations and potential for releases during removal. All three options involve short term risks associated with heavy equipment use. There is no implementation risk associated with Alternative A.

6.3.5 Reasonableness of Cost

Alternate costs are summarized below:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative A - No Action</td>
<td>$0</td>
</tr>
<tr>
<td>Alternative B1 – Removal with barge-mounted dredge</td>
<td>$212,000</td>
</tr>
<tr>
<td>Alternative B2 – Removal with a drag line</td>
<td>$230,000</td>
</tr>
<tr>
<td>Alternative C – Removal and capping</td>
<td>$209,000</td>
</tr>
<tr>
<td>Alternative D – Removal and wetland creation</td>
<td>$187,000</td>
</tr>
</tbody>
</table>

6.3.6 Hot Spots

The definition of hot spots is provided in Section 6.2. Alternative B would remove the majority of material that meets hot spot criteria. Alternative C would remove less hot spot material than Alternative B. Alternative D would move hot spot material such that it would no longer meet the hot spot criteria since contaminated material would be buried below the benthic habitat. Alternative A would not address hot spots.
7. SELECTED REMEDIAL ACTION

7.1 Selected Action

Considering the evaluation of the alternatives provided in Section 6, DEQ selects Alternative D, removing sediment with a barge mounted dredge from the central portion of the inlet and placing it on contaminated sediments closer to the eastern and western shorelines. This option is selected because it meets RAOs, is effective, is more easily implementable, provides the opportunity to improve shoreline habitat, and is less costly than other alternatives. The long-term reliability is expected to be high due to the more stable containment of contaminated material and the low-energy environment. Short term impacts are also expected to be low. In addition, Alternative D results in fewer greenhouse gas emissions as material will not need to be trucked to a disposal location. The No Action alternative does not achieve RAOs, is not protective, and does not address contaminant hot spots so is not an acceptable option.

Because detailed topographic information is not available but will be collected as part of remedial design, it was not possible to accurately determine if the volume of sediment to be removed can be adequately managed in shoreline areas of the inlet with the restrictions indicated in Section 5.2.4. If data collected during remedial design indicates there is insufficient capacity within the inlet to manage the contaminated sediment, all or a portion of the removed material would be managed as described in Alternative B.

7.2 Description of Selected Option

Alternative D involves the following tasks:

1. Complete a survey of the inlet to assess capacity available in shoreline areas to create wetland benches.
2. Coordinate with adjacent property owner for site access and potentially dewatering sediment under contingency plan.
3. Obtain Corp of Engineers 404 permit for dredging and coordinate with City of Portland Bureau of Development Services to ensure substantive land use requirements are met.
5. Transport barge mounted dredge into inlet.
6. Construct a sand bag cofferdam to isolate the inlet from the Whitaker Slough.

7. Remove large woody debris and reserve for replacement following dredging.

8. Dredge metal contaminated sediment from the central portion of the lagoon and place along western and eastern shoreline areas.

9. Collect sediment samples in removal area and analyze for lead and copper as removal is completed.

10. Conduct any necessary additional removal based on confirmation sample results.

11. Dredge an additional two feet of clean sediment from the removal area and place on top of impacted material in shoreline areas, and in other portions of the inlet to achieve a minimum 6-inch thickness of clean material over the contaminated material.

12. Replace large woody debris in removal area.

13. Plant capped areas with appropriate vegetation according to revegetation plan.

14. Remove coffer dam.

15. Conduct long-term monitoring and maintenance of bench areas.
8. PUBLIC NOTICE AND COMMENT

DEQ’s notice of the proposed remedial action was published on March 1, 2013 in the Secretary of State’s Bulletin and the *Oregonian*. The notice was also sent to DEQ’s interested party mailing list for the Columbia Slough and to the two owners of private property adjacent to the subject inlet. Copies of the Staff Report for Proposed Remedial Action, and other documents that make up the administrative record were made available for public review at DEQ’s Northwest Region office in Portland and DEQ’s web page. The public comment period began on March 1 and ended on April 1, 2013.

Two comments were received. A summary of the comments and DEQ’s responses are provided below.

**Comment 1** Susan Barthel, a private citizen and Portland resident, expressed concern about impacts the action will have on natural springs in the inlet and the quality of recreational experience for those visiting the inlet via kayak. She recommended restricting the shoreline benches to no more than 5 feet. She also suggested that discussion of the project with Multnomah County Drainage District (MCDD) prior to completing the public comment period was not appropriate.

**DEQ response:** The selected remedy limits the shoreline benches to no more than 20 feet extending from the shoreline into the inlet (including slope) and a height of no more than 2 feet above the winter high water elevation. These constraints were based on discussions with habitat experts at the City of Portland and are specified to ensure that recreational activity in the inlet is not limited. The proposed dredging will increase the channel depth in the central portion of the inlet and is expected to improve physical characteristics of the aquatic habitat as well as reduce contaminant exposures and improve recreational boating access during low water periods. While some of the springs may be covered by the benches, they will not be eliminated but will likely express along the new slope that is created. The remedy includes planting the benches with native vegetation prescribed by the City of Portland revegetation experts; consequently, vegetation in the area will be improved. This option was selected based on its cost effectiveness, and considering the negative impacts of additional handling and transporting of sediments that other options require.

DEQ has not yet contracted with MCDD for the work but has been discussing the action with MCDD to take advantage of their knowledge and experience with completing similar projects in other portions of the Columbia Slough. We consider the input provided by MCDD to be both appropriate and critical to developing a viable option.
Comment 2  The Columbia Slough Watershed Council also expressed concerns about impacts the action might have on the character and accessibility of the inlet, particularly for local school children who the Council leads into the inlet on paddling trips several times a year. They asked that encroachment of the wetland benches be strictly limited such that the size of the inlet is not substantially diminished.

DEQ response:  As described in the response to comment 1 above, the limits imposed on the size of the benches were developed in consultation with City of Portland staff who are intimately involved with the activities of the Columbia Slough Watershed Council. As discussed above, we expect the character of the inlet will be improved by this action in that the depth of the inlet will be increased, native vegetation will be planted, and contaminant levels toxic to aquatic life will be removed from the biologically active zone. The entrance to the inlet will not be impacted by this action, so access will not be reduced. The natural springs will remain active and, where covered by the new benches, are expected to express on the new slope created. We expect the action will improve the experience of paddling in the inlet and increase educational opportunities for participating schoolchildren.
8. DOCUMENTATION OF SIGNIFICANT CHANGE

No changes were made to the remedial action proposed in the Staff Report.
The selected remedial action for contaminated sediment in the Portland Willamette Inlet is protective, and reflects the best balance of tradeoffs considering effectiveness, long-term reliability, implementability, implementation risks, and reasonableness of cost. The selected action therefore satisfies the requirements of ORS 465.314 and OAR 340-122-0090.
10. SIGNATURE

Nina DeConcini, Administrator
Northwest Region
Department of Environmental Quality
11. APPENDIX

ADMINISTRATIVE RECORD INDEX
PORTLAND WILLAMETTE INLET
Portland, Oregon

The Administrative Record consists of the documents on which the recommended remedial action for the site is based. The primary documents used in evaluating remedial action alternatives for the Portland Willamette Inlet are listed below. Additional background and supporting information can be found in the Columbia Slough project file (ECSI #1283) located at DEQ Northwest Region Office, 2020 SW 4th Ave., Portland, Oregon.

SITE-SPECIFIC DOCUMENTS


DEQ 2012b. *Columbia Slough Sediment Study Whitaker Slough between River Mile 0 and 3.2.* Oregon Department of Environmental Quality, Environmental Cleanup Program, January 2012.


**STATE OF OREGON**


**GUIDANCE AND TECHNICAL INFORMATION**


Figure 1 Portland Willamette Inlet Location