

Mitigation Statement
Attachment J to the Joint Permit Application
Zidell Waterfront Remediation Project
Portland, Oregon

Prepared for
ZRZ REALTY COMPANY
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1. Introduction

This Mitigation Statement was prepared as an attachment to the Joint Permit Application (JPA) for the Zidell Waterfront Remediation Project. The purpose of the Mitigation Statement is to describe (1) the avoidance and minimization of impacts to waters of the United States, and (2) why compensatory mitigation should not be required for the proposed impacts.

The project purpose and description are presented in the JPA application form and in the Detailed Project Description (JPA Attachment A), which are incorporated here by reference. A detailed analysis of project alternatives, including efforts to avoid and minimize project impacts to waters of the United States, is contained in the Alternatives Analysis (JPA Attachment D). Of particular note regarding potential impacts of the proposed project are the documents Wetland and Waters Determination Report (JPA Attachment F), and the Biological Assessment (JPA Attachment B).

The Zidell project site consists of a total of 16.28 acres, of which 3.22 acres are above ordinary high water (OHW), and 13.06 acres are below OHW, including the sediment cap on the river bottom.

2. Mitigation Statement Framework

The discussion of avoidance and minimization of potential impacts to waters of the United States is discussed first in terms of project design, followed by discussion of potential environmental impacts organized by flora, fauna, and ecological functions within habitat zones. A variety of sources was used to develop this list of topics, including:

- Adamus, P.R. and D. Field. 2001. Guidebook for Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites. I. Willamette Valley Ecoregion, Riverine Impounding and Slope/Flats Subclasses. Volume IA: Assessment Methods. Oregon Division of State Lands, Salem, OR.
- Roegner, G. C., H. L. Diefenderfer, A. B. Borde, R. M. Thom, E. M. Dawley, A. H. Whiting, S. A. Zimmerman, and G. E. Johnson. 2008. Protocols for Monitoring Habitat Restoration Projects in the Lower Columbia River and Estuary. PNNL-15793. Prepared for the U.S. Army Corps of Engineers, Portland District, Portland, Oregon under a Related Services Agreement with the U.S. Department of Energy Contract DE-AC05-76RL01830.
- City of Portland, Oregon Bureau of Planning. 2007. Natural Resource Inventory: Riparian Corridors and Wildlife Habitat. Discussion Draft Report June 2007.

The discussion of why compensatory mitigation should not be required follows the same organization as the discussion of potential impacts. Some quantitative

information is presented and used for this discussion; however, due to the lack of a generally-accepted quantitative assessment method for large river ecosystems, professional judgment is also used to evaluate impacts and mitigation.

3. Avoidance and Minimization of Impacts of the Remediation Project

3.1. Remedial Design Alternatives

The project Alternatives Analysis (JPA Attachment D) describes in detail the remedial action objectives (RAOs) of the project, and the alternatives considered for meeting these. The project RAOs are:

- Soils (sands, silt, clay and gravels above the toe of bank armor):
 - Human Health – prevent human receptors from having unacceptable exposures to chemicals of concern in soil;
 - Ecological – prevent terrestrial ecological receptors from having unacceptable exposures to chemicals of ecological concern in soil;
 - Migration – prevent chemicals of concern and chemicals of ecological concern from migrating to other media such as surface water and river sediment and causing adverse effects to beneficial uses of these other media;
 - Hot spots of contamination – treat hot spots of contamination in soil by reducing their concentration, volume, or mobility, to the extent practicable.
- Sediment (sands, silt, clay and gravels below the toe of bank armor):
 - Human Health – prevent human receptors from having unacceptable exposures to chemicals of concern in sediment of the sediment management area (SMA);
 - Ecological – prevent ecological receptors from having unacceptable exposures to chemicals of ecological concern in sediments of the SMA;
 - Migration – reduce migration of chemicals of concern and chemicals of ecological concern in sediment of the SMA to surface water and other areas of the river;
 - Hot spots of contamination – treat hot spots of contamination in sediment by reducing their concentration, volume, or mobility, to the extent practical.

The Alternatives Analysis discusses the seven alternatives considered for meeting the RAOs, including a No Action alternative, and the process by which the recommended soil and sediment alternatives were selected. The recommended soil alternative is a soil cap with hot spot excavation; the recommended sediment alternative is a full sediment cap. Elements of these selected alternatives are discussed below.

The Alternatives Analysis also discusses alternatives considered during remedial design, including:

- reduce the amount of existing rock armor and flatten slopes;
- reduce the size and amount of bank replacement rock armor;
- minimize the amount of in-water fill;
- cap armor alternatives;
- barge ramp armor alternatives.

Efforts were also made to avoid and minimize impacts to waters of the United States by carefully determining the size of the sediment cap during the remedial design process. The size of the sediment cap alternative described in the Record of Decision (ROD) was no smaller than 7.8 acres (from the Feasibility Study) and no larger than 17.3 acres (DEQ Sediment Management Area (SMA)). The final sediment cap configuration covers 11.7 acres, as determined during remedial design, including collaborative technical work by the ZRZ team and DEQ staff.¹

3.2. Avoidance and Minimization of Impacts by Habitat Zone

For purposes of this report, the project site is divided into the following habitat zones: riparian, shallow water, and deep water. Avoidance and minimization of potential impacts are discussed by habitat zone.

3.2.1. Riparian Habitat Zone

3.2.1.1. Existing Physical Conditions – Riparian Habitat

The riparian habitat zone on the Zidell site, for the purposes of this project, extends from the proposed top of bank (approximately elevation +30 feet²) to the lowest elevation at which woody plant species are known to grow, approximately +10 feet. The National Marine Fisheries Service (NMFS) has defined the *adjacent riparian zone* as the area “adjacent to a stream that provides the following functions: shade; sediment transport; nutrient or chemical regulation; stream bank stability; and input of large woody debris or organic matter.” The entire shoreline below the regulatory OHW elevation of +18 feet³ and adjacent riparian areas are considered critical habitat for the listed fish species in the Willamette River. Using NMFS’s definition and existing conditions, the adjacent riparian area would be considered the top of bank and below.

The entire riparian zone is highly disturbed by past land use practices. The bank is fill material (including industrial debris) generally armored with a variety of materials, including rock, ballast stones, concrete pieces, and general debris such as metal, glass, tile, and ceramic. This “rubble armor” extends to the top of bank in some areas. Areas of riverbank soils have high levels of chemical

¹ Sediment Cap Boundary Report. Maul Foster & Alongi. February 2, 2009.

² All topographic elevations are in City of Portland datum.

³ The elevation used in this report for OHW is the jurisdictional OHW (+18 feet); however, an OHW elevation based on evaluation of the Willamette River hydrograph (Morrison gage) and knowledge of vegetation patterns on the shore would be in the elevation range of +13 to +15 feet.

contaminants, including chemicals that are known to move through food webs and bioaccumulate. Old wood pilings exist in some sections of the bank. Bank slopes are steep, ranging from almost vertical to 2H:1V.

3.2.1.2. Existing Flora – Riparian Habitat

A vegetation survey⁴ conducted for the project found that non-native, invasive plant species are dominant throughout the site (Figure J1).⁵ Himalayan blackberry and butterfly bush, both invasive species, are the dominant plants, and some patches of Japanese knotweed also exist. The most abundant native woody species are black cottonwood and Scouler willow. A plant list is shown in Table J1.

There are approximately 110 stems of Scouler willow on the remedial action project site; some clusters of stems could be the same individual plant. The Scouler willow range in size from 1 to 10 inches, diameter at breast height (dbh). A total of 39 black cottonwood was identified on the project site, ranging in size from 1 to 27 inches dbh (mean 7.2 inches). There are 16 cottonwood between 6 and 10 inches, 6 trees >10 and <20 inches, and 2 trees >20 inches dbh. Two Oregon ash, 2 and 6 inches dbh, are in the project area. Nine paper birch ranging from 2 to 4 inches dbh were also identified.

The total vegetation cover for the riparian/upland habitat zone is 2.11 acres, of which 0.12 acre is native.

Table J1. Plant Species on the Zidell Remediation Project Site

COMMON NAME	STATUS	COMMON NAME	STATUS
Japanese knotweed	Invasive	English ivy	Invasive
Butterfly bush	Invasive	Black hawthorn	Native
Beaked hazelnut	Native	Scot's broom	Invasive
Western crabapple	Native	Himalayan blackberry	Invasive
Scouler willow	Native	Douglas spirea	Native
Big-leaf maple	Native	Paper birch	Native
Oregon ash	Native	Black cottonwood	Native
Pin oak	Introduced	Black locust	Introduced

⁴ Plant survey of ZRZ project area. SWCA Environmental Consultants, 2009.

⁵ The vegetation survey area included the riverbank and the area 100 feet inland from the top of bank.

3.2.1.3. Existing Fauna – Riparian Habitat

No specific information is available for existing fauna at the site. It is assumed that native and non-native birds use the existing vegetation for daily activities and as a corridor along the river; larger trees may offer suitable roosting sites. Other fauna, such as insects, herptiles and mammals are assumed to be typical of disturbed urban shorelines.

3.2.1.4. Existing Ecological Functions – Riparian Habitat

The following ecological functions, and the level to which they are provided, are associated with the riparian zone on the Zidell site:

- Thermoregulation (micro-habitat) – the narrow riparian habitat on the Zidell project riverbank provides minimal thermoregulation on a micro-habitat scale due to the low density of vegetation and minimal canopy coverage
- primary production – primary production in the riparian habitat zone is moderate, and primarily provided by introduced species (Himalayan blackberry and butterfly bush); products of primary production available to site fauna is in the form of leaves, flowers and fruits
- fish habitat support (resident and anadromous) – fish habitat support provided by the existing riparian habitat is minimal due to several factors: vegetation is generally close to the top of bank and therefore has minimal influence or connection with aquatic habitat (e.g. over- and in-water structure); there are few large trees, thus large wood recruitment is minimal; distance between plants and water during most of the year reduces inputs of organic material to aquatic habitat
- wildlife habitat support (terrestrial and aquatic) – existing riparian vegetation is mostly non-native, deciduous and shrubby, minimizing habitat diversity for wildlife support; distance (elevation) between vegetation and typical water levels, and steepness of banks minimizes availability of vegetation to aquatic wildlife
- support of native, characteristic vegetation – native, characteristic riparian vegetation on the site is minimal, and site conditions (poor soil, rubble armor) are not conducive to native plant establishment and growth
- bank stabilization and control of sediment, nutrients and pollutants – bank stabilization at the Zidell site is generally provided by the existing bank armor; although soils on the upland part of the property have areas of contamination, stormwater runoff from the upland areas over the bank and to the river has not been observed, so the opportunity for riparian vegetation to provide this function is minimal
- streamflow moderation (micro-scale) – riparian vegetation on the riverbank is generally near the top of bank; therefore the opportunity for riparian vegetation to provide micro-scale streamflow moderation (e.g. water velocity moderation) is minimal

- wildlife habitat connectivity – existing riparian vegetation on the site provides a narrow corridor for wildlife movement along the river; the small patch size of this riparian zone provides minimal connectivity function for larger patches such as the west hills, Ross Island and Oaks Bottom.

3.2.1.5. Potential Environmental Impacts – Riparian Habitat Zone

The physical conditions of the riparian habitat zone on the Zidell site will be modified for the remedial action project in the following ways:

- South slipway reach: existing rubble armor retained and repaired as needed; bank above rock armor regraded to 3H:1V, a soil cap of minimum 2 feet of clean topsoil added, turf reinforcement mat (TRM) installed on top of soil cap, native shrubs and ground cover planted;
- existing rubble armor and debris in the north slipway reach and south bridge reach will be removed, the riverbank will be excavated to a 2H:1V slope, and new Type E rock armor⁶ will be placed between approximately +3 feet and +15 feet;
- North slipway reach: bank above elevation +12 feet regraded to 3H:1V, Type D rock armor between elevation +12 feet and +15 feet, a soil cap of minimum 2 feet of clean topsoil above elevation +15 feet, turf reinforcement mat (TRM) installed on top of soil cap, native shrubs and ground cover will be planted
- South bridge reach: bank above rock armor regraded to 2H:1V, a soil cap of minimum 2 feet of clean topsoil added, TRM installed on top of soil cap, native shrubs and ground cover planted;
- North bridge reach: existing rubble armor retained and repaired as needed, with armor above elevation +15 feet removed; bank above rock armor regraded to 2H:1V, a soil cap of minimum 2 feet of clean topsoil added, TRM installed on top of soil cap, native shrubs and ground cover planted;
- Downstream reach: clean fill placed over existing rubble armor starting at top of bank at 3H:1V slope riverward; slope changes to 5H:1V at elevation +10 feet; fill cap covered with Type A armor up to elevation +18 feet; native emergent, groundcover and woody vegetation planted throughout from approximately elevation +8 feet to top of bank; existing old pilings on the bank will be cut and covered by clean fill.

⁶ Rock armor descriptions for Zidell remediation project provided in Table A5 of the Project Description (JPA Attachment A)

The environmental impacts of the physical changes to the riparian habitat zone are considered beneficial compared to the existing conditions in the following ways: removal or covering of industrial debris; reduction of riverbank slope angle for most of the site; reduction of elevation of the top of bank armor; establishment of clean growing medium at a lower slope angle and lower elevations along the shore.

The net environmental impacts to riparian habitat flora are considered beneficial. All of the existing riparian/upland vegetation (vegetation cover of 2.11 acres, with 0.12 acre cover by native species) below the proposed top of bank will be removed to implement the remedial action.⁷ However, native vegetation, including ground cover, shrubs and trees, covering 4.05 acres will be planted as part of the remedial action. The estimated numbers of native shrubs and trees to be planted on the project site are 15,110 shrubs and 212 trees. A planting list is included in the JPA plan drawings as Sheet L1.0.1; the landscaping plan is shown on Sheets L1.1.1 through L1.1.9.

Impacts to riparian habitat fauna are considered to be beneficial. Total cover and diversity of native plants will be increased compared to existing conditions; cover will almost double and species diversity will increase by a factor of 4 (16 plant species are found on the project site now; 65 native plant species will be planted as part of the remedial action). This change will provide more habitat of better quality for terrestrial and aquatic dependent wildlife species.

Impacts to riparian ecological functions at the project site are considered to be beneficial. This is discussed by function, below.

- Thermoregulation (micro-habitat) – the proposed larger area of vegetative cover and greater plant density will provide a greater amount of thermoregulation on a micro-habitat scale, compared to the existing condition
- Primary production – primary production in the riparian habitat zone will be greatly increased as a result of the larger number of plants compared to the existing condition. The higher plant species diversity will result in a greater diversity of products of primary production available to site fauna.
- Fish habitat support (resident and anadromous) – more fish habitat support will be provided by the proposed riparian habitat compared to the existing condition. Vegetation will be closer to the water during more of the year, and the downstream reach, representing more than one-half the length of the site, will have vegetation inundated by normal winter and spring flows when the peak densities of juvenile salmon are in the river. There will be more over- and in-water vegetation structure providing

⁷ An effort will be made during project implementation to identify specific larger trees, mostly cottonwoods, that could potentially be retained. The final decision will be made by the Project Engineer and Contractor based on equipment access, final site contours, and other factors.

increased aquatic habitat diversity; organic inputs to the aquatic system should also be higher than existing. Over time there will be an increase in large wood recruitment potential from the riparian habitat to the river.

- Wildlife habitat support (terrestrial and aquatic) – contaminated soils will be either removed (hot spots) or capped with clean soil, eliminating contaminant pathways to terrestrial receptors; the greater density and diversity of riparian vegetation will provide increased wildlife habitat support compared to the existing condition.
- Support of native, characteristic vegetation – native, characteristic riparian vegetation on the site will be greatly increased, compared to the existing condition. Site conditions (slope angle, soil quality) will be more conducive to native plant establishment and growth compared to the existing condition.
- Bank stabilization and control of sediment, nutrients and pollutants – bank stabilization at the Zidell site will be provided by bank armor in the slipway and bridge reaches; however, the slopes above armor and the entire riverbank in the downstream reach will be stabilized by native vegetation. Contaminants will be isolated by the soil cap. The proposed vegetation will provide control functions for sediment, nutrients and pollutants in runoff from future site development.⁸
- Streamflow moderation (micro-scale) – The more extensive riparian vegetation on the riverbank will provide more streamflow moderation on a micro scale at various river levels. There will be a greater provision of this function at lower water levels in the downstream reach.
- Wildlife habitat connectivity – the larger patch size of riparian habitat will provide a greater connectivity function for wildlife using other habitat patches in the area.

3.2.2. Shallow Water Habitat Zone

3.2.2.1. Existing Physical Conditions – Shallow Water Habitat

Shallow water habitat (SWH) is considered an important zone of aquatic habitat for juvenile salmonids and other aquatic species, and also provides specific habitat values for some aquatic and aquatic-dependent wildlife species. SWH is defined for the Zidell Remedial Action Project as the area between the regulatory OHW (+18 feet) and 20 feet below ordinary low water (OLW = +3 feet), or elevation -17 feet. However, it should be recognized that the actual zone of SWH moves up and down the shore with the rise and fall of river levels, both seasonally and as a result of daily tides. Portions of shore are therefore often out of water, and this habitat zone is most often found in the lower elevation portion of the shore and nearshore area.

⁸ Future development will comply with City of Portland stormwater and erosion regulations, thus avoiding or minimizing sediment and pollutants in stormwater runoff.

The total SWH area on the project site is 10.2 acres (includes the bank below OHW and much of the in-water sediment cap). Existing substrates in the SWH zone are shown in Figure J2 and areal extents listed in Table J2. Most of the length of the project shore is armored with a variety of fill materials and debris (see riparian section, above). The middle portion of the slipway in the barge building area is covered with steel plate for operational purposes (barge launching). River bottom substrates, generally below ordinary low water (OLW), consist of: fines (clay, silt and silty sand); sands (sand with $\leq 15\%$ fines and $< 15\%$ gravel); gravelly sands (sands with $> 15\%$ gravel); gravels; and gravels with cobbles (gravel with trace to 40% cobbles). The distribution of substrates below OLW is a reflection of river hydraulics. The upstream portion of the project area has the river channel, higher flow velocities, and vessel traffic close to shore; this area has more coarse substrates (gravel and cobble). The main river channel (thalweg) is across the river (east side) in the downstream portion of the project area, and this inner river bend is generally a depositional area with finer substrates. Fines cover 55 percent of the SWH area on the project site.

Table J2. Existing Shallow Water Habitat Substrates

SUBSTRATE	EXISTING (acres [percent])
Rubble armor	1.31 [12.8]
Steel plate	0.33 [3.2]
Soil	0.27 [2.6]
Fines	5.6 [54.9]
Sands	1.58 [15.5]
Gravelly sands	0.72 [7.1]
Gravels	0.36 [3.5]
Gravels with cobbles	0.03 [0.3]
Total	10.2

The downstream reach of the project area contains the remnants of a large dock built in phases between 1900 and 1943. There are approximately 2,160 treated wood pilings (most were cut shorter after a dock fire) and attached horizontal stringers from this dock remaining in the SWH area (see Figure J1).⁹ There is a large amount of industrial and urban debris on the shoreline, and two old metal and concrete ship bow sections are in the lower bank just south of the barge slipway. A floating dock and crane barge are next to the shore between the Ross Island Bridge and the barge slipway; these are used for the barge building operation on the site.

A few stormwater outfalls exist in the riverbank portion of SWH. Two private Zidell outfalls, 18 and 6 inch diameter, are in the area between the barge slipway

⁹ The large platforms shown on the remnant pilings in Figure J1 have been removed.

and the Ross Island Bridge. A 60 inch diameter City of Portland outfall (CoP Outfall 06), built in 1892, discharges into a depression in the riverbank just south of the Ross Island Bridge, and the outflow goes through a narrow ravine to the river at about +14 feet elevation (a steel extension added a few decades ago is mostly rusted out and filled with soil). This outfall historically drained a large area west of the Zidell site; however, the flow from west of Moody Avenue now goes to the City stormwater interceptor, and limited inflows from the Zidell property, an adjacent property, and a small area of Moody Avenue now go to this outfall. Two former outfalls (abandoned in 2007) are in the lower bank of the downstream reach; these are a 66 inch diameter City of Portland and a 42 inch diameter ODOT outfall. Flows from these abandoned outfalls, and possibly other inflows, now go to a new 96 inch City/ODOT outfall (CoP Outfall 7b) in the lower bank just north of the Zidell property line, but within the Zidell sediment cap footprint.

3.2.2.2. Existing Flora – Shallow Water Habitat

Vegetation on the riverbank portion of the SWH zone was described above in the riparian habitat section. One small area of emergent wetland vegetation is located below OHW in the barge slipway; dominant vegetation is non-native, including dodder, birdsfoot trefoil, purple loosestrife, pennyroyal, prostate knotweed, and tansy ragwort.¹⁰ Small amounts of native leafy beggars-tick and soft rush are also found in that area. No submersed aquatic vegetation has been observed in the Zidell project area.

3.2.2.3. Existing Fauna – Shallow Water Habitat

No wildlife data are available for the Zidell project area shallow water habitat. The piles and stringers of the remnant dock are known to be used for roosting and foraging by sometimes large numbers of great blue heron and cormorants. It is likely that other birds, herptiles and mammals use the shore and nearshore areas.

The Biological Assessment (BA) prepared for the Zidell Remedial Action Project addresses ESA-listed species that may be present in the action area, as well as their associated critical habitat: Lower Columbia River coho salmon (*Oncorhynchus kisutch*), Chinook salmon (*O. tshawytscha*, Lower Columbia River and Upper Willamette River), and steelhead (*O. mykiss*, Lower Columbia River and Upper Willamette River). Table J3 summarizes use of the project area by these ESA-listed fish species.

Table J3. Seasonal Use of the Action Area by ESA-Listed Fish Species (from Zidell Project BA Table 7)

¹⁰ JPA Attachment F. Wetland and Waters Determination Report. (Wetland Determination Data Form, Sampling Point 1)

Species Common Name (<i>Scientific Name</i>)	ESU or DPS ¹	Adult Presence in Lower Willamette River (Use)	Juvenile Presence in Lower Willamette River (Use)
Coho salmon (<i>Oncorhynchus kisutch</i>)	Lower Columbia River	August–December (migration)	January–December (rearing and migration)
Steelhead trout (<i>Oncorhynchus mykiss</i>)	Lower Columbia River	February–June (migration for Clackamas River subpopulation)	January–December (rearing and migration)
	Upper Willamette River	March–April (migration)	January–December (rearing and migration)
Chinook salmon (<i>Oncorhynchus tshawytscha</i>)	Lower Columbia River (spring-run)	May–September (migration)	January–December (rearing and migration)
	Lower Columbia River (fall-run)	September–November (migration)	Year-round (rearing and migration)
	Upper Willamette River (spring-run)	February–May (migration)	January–December (rearing and migration)

¹ ESU = evolutionarily significant unit; DPS = distinct population segment

Fish sampling by boat-mounted electrofisher was conducted along the Zidell shoreline during the months of March through June, 2000 (FES 2002). Thirteen fish species were collected, including 5 non-native species. The more abundant fish were largescale sucker (41%), prickly sculpin (16%), common carp (15%), smallmouth bass (6%) and unmarked juvenile chinook salmon (6%).

Six benthic invertebrate samples collected close to shore in the Zidell project area downstream (north) of the Ross Island Bridge in silty substrates were dominated by oligochaete worms, with small numbers of chironomid fly larvae, *Corophium* amphipods, clams, nematodes, and fly pupae (FES 2002). These results are typical of other benthic invertebrate studies in the lower Willamette River.

3.2.2.4. Existing Ecological Functions – Shallow Water Habitat

The discussion about ecological functions provided in the riparian zone are applicable here for the portion of the SWH zone between OHW and elevation + 10 feet. Additional factors are discussed below for ecological functions below 10 feet.

- Thermoregulation (micro-habitat) – not applicable
- primary production – this function is limited in the SWH area below OLW to production by phytoplankton and algae. Because the downstream reach has lower water velocities during low flow (summer), including periods of slack water, phytoplankton production could be higher than in mid-channel areas; however, there are no data to support this. The predominance of fine-grained substrates in the downstream reach could limit the abundance of attached algae.

- fish habitat support (resident and anadromous) – fish habitat support provided by the existing SWH is influenced by high levels of contaminants found throughout the site; these potentially pose risks to food web and fish health. Benthic invertebrate populations are typical of the lower Willamette River; however, invertebrates potentially accumulate toxins from the contaminated sediments. The remnant dock pilings provide in-water structure; however, it is not complex structure and does not afford hiding or refuge opportunities for small fishes.
- wildlife habitat support (terrestrial and aquatic) – the existing remnant pilings and stringers provide roosting and forage opportunities for wading and diving birds; however, site contamination potentially bioaccumulates in benthic invertebrates and resident fishes on the site that are part of the prey base for these wildlife species. The position of native vegetation higher on the bank, and the steepness and nature of bank armor likely make it difficult for aquatic mammals, such as beaver, to easily utilize riparian plants.
- support of native, characteristic vegetation – there is only one small area of emergent wetland plants on the site (the barge slipway), and this is dominated by non-native species.
 - bank stabilization and control of sediment, nutrients and pollutants – the existing areas of unstable and poorly or unarmored bank have the potential for erosion to route existing contaminants into the SWH area
 - streamflow moderation (micro-scale) – the existing remnant pilings provide some measure of water velocity moderation.
- wildlife habitat connectivity – the existing remnant pilings provide some connectivity function for certain wildlife species, such as herons.

3.2.2.5. Potential Environmental Impacts – Shallow Water Habitat

The physical characteristics of the SWH area will be modified by the remediation project. Modifications to the area between OHW and elevation +10 feet were described above in the riparian habitat section; modifications to the SWH area below elevation +10 feet are described in this section.

A sediment cap will be placed over the existing sediment throughout the project area (see Figure J3). Modifications from the existing condition for each design reach are discussed below:

- Slipway reach – The sediment cap will be a low-profile reactive core mat (RCM) with Type E armor in the steeper areas (Figure J3). Type C armor will be used over the RCM in the lower portion of the barge slipway ramp. In flatter areas, the sediment cap will consist of 2 feet of clean sand with Type D armor. Rounded gravel will be placed over the larger rock armor to fill the voids and provide enhanced habitat for benthic invertebrates and fish. There is also one area of armored thin sand cap consisting of 10 inches of clean sand covered with Type D rock armor and gravel..

- South bridge reach – the bank in this reach will be graded to 2H:1V, new Type E armor will be placed between approximately +3 and +15 feet, and a vegetated soil cap placed above the armor. Below the armor, a clean sand fill will be placed at 5H:1V, and a Type B armor layer placed over the sand fill.
- North bridge reach – the existing bank armor will be retained and repaired as needed in this reach; below the bank armor a 5H:1V sand fill will be placed and covered with Type B armor.
- Downstream reach – a general fill will be placed over the existing bank armor at 3H:1V from top of bank to elevation +10 feet, where clean sand will be used to extend the fill riverward at 5H:1V until it meets existing grade. The sediment cap will have a minimum thickness of 2 feet of clean sand; the entire cap from the eastern edge to OHW will have Type A armor placed over the sand and general fill. The bank will be planted from top of bank to elevation +8 feet with trees, shrubs, groundcover and, at the lowest elevations, emergent plants. There are also 2 areas of unarmored thin sand cap riverward of the armored cap (see Figure J3).

Changes in the coverage of substrates in the SWH area from existing to proposed are listed in Table J4. There is a reduction of fine sediment by 5.6 acres, primarily in the downstream reach; however, it is expected that fines will deposit over the Type A armor in the downstream reach and portions of the Type B armor in the north bridge reach within a few years (see Figures J2 and J3). The extent of sand sediment will be reduced by 0.35 acres. Gravel and gravel/cobble sediment will increase by 5.66 acres (Type A and Type B armor minus existing gravel and gravel/cobble). The extent of larger size armor will increase by 0.02 acres (Types C, D and E armor, and proposed (retained) rubble armor compared to existing rubble armor).

The existing floating dock and moored crane barge will be removed from the site for project implementation and will not be returned. Zidell and City of Portland are coordinating on decommissioning and abandoning City stormwater outfall 6; flows from this outfall will not continue. The DEQ is working with the City and ODOT to quantify the outflow from the newer stormwater outfall (Outfall 7b) that discharges to the Zidell cap area north of the Zidell property, and to develop plans that will prevent this outflow from recontaminating the Zidell cap. Zidell has been actively improving stormwater source control facilities and practices at the barge building area to reduce contaminant discharges from the two small Zidell outfalls.

Table J4. Existing and Proposed Substrates at the Zidell Remediation Project Site

SUBSTRATE	EXISTING (acres)	PROPOSED (acres)
Rubble armor	1.31	0.23
Steel plate	0.33	0.33

Soil	0.27	0
Fines	5.6	0
Sands	1.58	1.23
Gravelly sands	0.72	0
Gravels	0.36	0**
Gravels with cobbles	0.03*	(same as Type A armor)
Bank cut with vegetated soil cap		0.18
Type A armor, not planted		3.47*
Type A armor planted		1.31
Type B armor		2.58
Type C armor		0.19
Type D armor		0.22
Type E armor		0.69
Totals (SWH area)	10.2	10.41

* Type A armor and gravels with cobbles are similar substrates

The proposed changes to project site substrates are considered to provide a net benefit to shallow water habitat. Contaminated substrates in an area of 10.2 acres will be capped, thereby eliminating the potential for toxins associated with this material to affect human health and the environment. There is a net increase (creation) of 0.21 acres of SWH due to sediment cap fill that provides more shallow area in the slipway and bridge reaches (see Figures J2 and J3). In the downstream reach, 1.31 acres of Type A armor will be densely planted with native trees, shrubs, groundcover and emergent plants between the top of bank and elevation +8 feet. The shrub and groundcover vegetated soil cap above elevation +15 feet in the slipway and bridge reaches will cover 0.18 acres.

The net potential impacts to SWH flora are considered beneficial compared to existing conditions due to the increased area, numbers, and diversity of native vegetation below OHW, and the removal of non-native and noxious plants.

The net potential impacts to SWH fauna are considered beneficial compared to existing conditions due to the elimination of contamination pathways from urban and industrial toxins within 10.4 acres, the placement of clean substrates that are appropriate habitat for aquatic organisms, including fish, and the increase in native vegetation below OHW that will provide habitat for wildlife as well as ecological functions for aquatic species.

The use of larger armor rock (Types C, D and E) in the upstream portions of the project site will provide a different substrate type for aquatic species compared to existing substrates; however, there will be an overall reduction in the extent of larger bank armor, the top of bank armor will be at a lower elevation, and there will be a larger area of native plants below OHW when compared to the existing

condition. In addition, rounded gravel will be added on top of the in-water larger armor to enhance habitat value for aquatic fauna.

Existing substrates are larger in the upstream reach due to its proximity to the thalweg and other hydrodynamic forces such as barge launches, boat waves, and propeller wash. Because of these hydrodynamic qualities, the reach requires larger armor rock to keep the cap in place during barge launches and flood events. Given the high water velocities in this reach, aquatic species such as juvenile salmonids and predator fish species are less likely to use this area than areas further downstream where water velocities are lower.

Impacts to shallow water habitat ecological functions at the project site are considered to be beneficial. This is discussed by function, below.

- Thermoregulation (micro-habitat) – the proposed larger area of vegetative cover and greater plant density will provide a greater amount of thermoregulation on a micro-habitat scale, compared to the existing condition
- Primary production – primary production in the SWH area will be greatly increased as a result of the larger number of plants compared to the existing condition. The higher plant species diversity will result in a greater diversity of products of primary production available to site fauna.
- Fish habitat support (resident and anadromous) – A greater level of fish habitat support will be provided by the proposed SWH compared to the existing condition. The potential effects of existing soil and sediment toxins on aquatic species will be eliminated. Vegetation will be closer to the water during more of the year, and the downstream reach, representing more than one-half the length of the site, will have vegetation inundated by normal winter and spring flows when the peak densities of juvenile salmon are in the river. There will be more over- and in-water vegetation structure providing increased aquatic habitat diversity; organic inputs to the aquatic system should also be higher than existing. Over time there will be an increase in large wood recruitment potential from the riparian habitat to the river. Removal of the existing floating dock and barge-mounted crane barge will reduce the area of over-water structure by 0.30 acres.
- Wildlife habitat support (terrestrial and aquatic) – the greater density and diversity of riparian vegetation will provide increased wildlife habitat support compared to the existing condition. The bioavailability of existing industrial and urban toxins will be eliminated.
- Support of native, characteristic vegetation – native, characteristic riparian vegetation on the site will be greatly increased, compared to the existing condition. Site conditions (slope angle, soil quality) will be more conducive to native plant establishment and growth compared to the existing condition.
- Bank stabilization and control of sediment, nutrients and pollutants – bank stabilization at the Zidell site will be provided by bank armor in the slipway

and bridge reaches; however, the slopes above armor and the entire riverbank in the downstream reach will be stabilized by native vegetation. Direct contact with, and erosion of contaminated materials into lower areas will be eliminated. The proposed vegetation will provide control functions for sediment, nutrients and pollutants in runoff from future site development.¹¹

- Streamflow moderation (micro-scale) – The more extensive riparian vegetation on the riverbank within the SWH area will provide streamflow moderation on a micro scale at various river levels. There will be a greater provision of this function at lower water levels in the downstream reach.
- Wildlife habitat connectivity – the larger patch size of riparian vegetation within the SWH area will provide a greater connectivity function for wildlife using other habitat patches in the area.

3.2.3. Deep Water Habitat Zone

This section summarizes the existing and proposed conditions of the deep water habitat area and potential environmental impacts resulting from the proposed Zidell remediation project. A detailed discussion similar to those above for riparian and shallow water habitat areas is not included.

The Zidell remediation project area includes 3.79 acres of deep water habitat (river below elevation -17 feet), all of which is in the slipway and bridge reaches (see Figure J2). Sediments in the deep water habitat area are primarily gravelly sands, gravels, and gravels with cobbles; there is a small amount of sand substrate. This area is more dynamic hydraulically with higher flow velocities than the project area downstream. The deepest portion of the deep water habitat area is approximately elevation -40 feet.

No plants exist in this habitat zone. Fauna using this zone include benthic and epibenthic invertebrates typical of the lower Willamette River, and a variety of fish species, particularly those that utilize river sediments.

All of the deep water habitat area within the Zidell remediation project area will be capped with standard sand cap and either Type B or Type D armor. Rounded gravel will be added on top of the Type D armor to fill voids and provide enhanced habitat for aquatic fauna.

4. Mitigation Summary

The Zidell remediation project design team has evaluated numerous design alternatives that would avoid and minimize potential environmental effects associated with the project, as well as enhance habitat values for fish and

¹¹ Future development will comply with City of Portland stormwater and erosion regulations, thus avoiding or minimizing sediment and pollutants in stormwater runoff.

wildlife. This design process is described in the project Alternatives Analysis (Attachment D to the JPA).

The potential effects of the remediation project on ESA-listed fish species is discussed in the BA (Attachment B to the JPA). Short- and long-term effects are discussed in that document. The BA also lists conservation measures that will be implemented for the project.

This Mitigation Statement identifies the potential adverse and beneficial effects of the project on waters of the United States, including riparian, shallow water and deep water habitat areas and their associated flora, fauna and ecological functions. These effects are summarized below:

- Protection of human health and the environment from existing toxins
 - 16.28 acres of deep water, shallow water, and riparian habitat will be capped to isolate contaminated soil and sediment from the environment
- Site flora
 - 2.11 acres of riparian vegetation will be removed, including 0.12 acres of native vegetation (trees and shrubs)
 - 4.05 acres of native trees and shrubs will be planted in the riparian habitat area
 - A total of 59 trees, including 52 native (mostly black cottonwood) and 117 shrubs, including 116 native (mostly Scouler willow) will be removed
 - An estimated total of 212 native trees and 15,110 native shrubs will be planted
 - 2.14 acres of Himalayan blackberry, 1.05 acres of butterfly bush, and 0.03 acres of Japanese knotweed will be removed; these are listed as B-list noxious weeds by the Oregon Department of Agriculture
- Site fauna - wildlife
 - wildlife habitat will be improved in the riparian and shallow water habitat areas
- Ecological functions - numerous ecological functions will be improved in the riparian and shallow water habitat areas, including:
 - thermoregulation (micro-habitat)
 - primary production
 - fish habitat support
 - wildlife habitat support
 - support of native, characteristic vegetation

- bank stabilization and control of sediment, nutrients and pollutants
- streamflow moderation (micro-scale)
- wildlife habitat connectivity
- Shallow water habitat
 - habitat for ESA-listed fish species will be improved as a result of isolation of toxins, placement of clean aquatic substrates, and extensive planting of native riparian vegetation
 - the total area of sediments ranging from fines to sands will be reduced by 5.95 acres
 - gravel and gravel/cobble substrates will increase by 5.66 acres
 - fine sediments are expected to deposit over a large portion of the middle and downstream areas of the site within a few years
 - 1.31 acres of new gravel/cobble substrate above elevation +10 feet will be densely vegetated with native trees, shrubs, groundcover and emergent plants
 - larger size rock armor (>8 inch diameter) will increase by 0.02 acres (total for sediment cap and bank within SWH area)
 - the area of shallow water habitat will increase by 0.21 acres
- Others
 - large amounts of industrial and urban debris on the shore will be removed or covered with clean substrates
 - 2,160 old treated wood pilings will be cut and/or buried under clean fill
 - an existing floating dock and moored crane barge will be removed from the site
 - stormwater outflows from an old City outfall will likely be eliminated; outflows from 2 private outfalls will be in compliance with state standards

Based on the information in this Mitigation Statement and in the Biological Assessment, the net beneficial impacts to waters of the United States of the proposed remediation outweigh the net adverse impacts of the proposed remediation. Compensatory mitigation should not be required for the proposed project.