Bureau of Planning and Sustainability
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Attachment D:
West Hayden Island Natural Resource Mitigation Staff Report

Updated January 8, 2013

The purpose of this memo is to provide a short explanation of the West Hayden Island mitigation proposal included in the November 21st, 2012 draft zoning code and draft IGA. A list of documents that provide the entire City's data and methodology is located on page 13.

Background

One of the guiding principles for the West Hayden Island (WHI) project is to reach a net increase in ecosystem functions, which means 1) replace all impacted natural resource features and functions; and 2) take additional actions to improve the overall ecosystem so it is healthier than today.

The draft mitigation proposal seeks to answer two key questions: How can we remove 300 acres of vegetated floodplain on an island in the Lower Columbia River and provide an overall improvement to the river ecosystem? Once we know the answer to that question, then we need to know how much will it cost?

Existing Natural Resource Features and Functions

WHI is located at the confluence of the Columbia and Willamette Rivers between the cities of Portland, OR and Vancouver, WA. Prior to the 1900's, the confluence of the Columbia and many of its tributary streams, including the Willamette River, were characterized by multiple islands that changed with seasonal flooding. The most significant human-made changes to the island began in the late 19th century. In the 1880's a railroad was constructed across the island. Dredging of the Oregon Slough was authorized by the River and Harbor Act of 1912, with work occurring between 1913 and 1916. This work resulted in placement of dredge material along the south shore of western Hayden Island, near the rail bridge. Several pile dikes were installed by the US Army Corps of Engineers in the 1920's along the northern shoreline of western Hayden Island to assist in navigation maintenance. Around this same time the island became a receiving site for dredge materials. Placement of a series of eight permanent spur dikes, or groins, during the early 1920s on the southeast shore of western Hayden Island and north shore of the Oregon Slough served to narrow the navigation channel and assist in maintaining channel depth in the southern channel in service to early industry located near the rail line.

Even with all these alterations, and in some cases because of the alterations, today WHI is one large, intact habitat made up of forests, woodlands, grasslands, wetlands and shallow water areas, all of which is in the Columbia River floodplain. Five key aspects of WHI are:

1. **Size/Scale** – There are over 800 acres of functioning habitat on WHI, plus in-water habitats. It is the third largest island in the Lower Columbia River; Sauvie Island and Government Island are the largest. Many species prefer or are dependent on these large habitats with interior areas that are not as impacted by surrounding noise, light, vibration, etc.

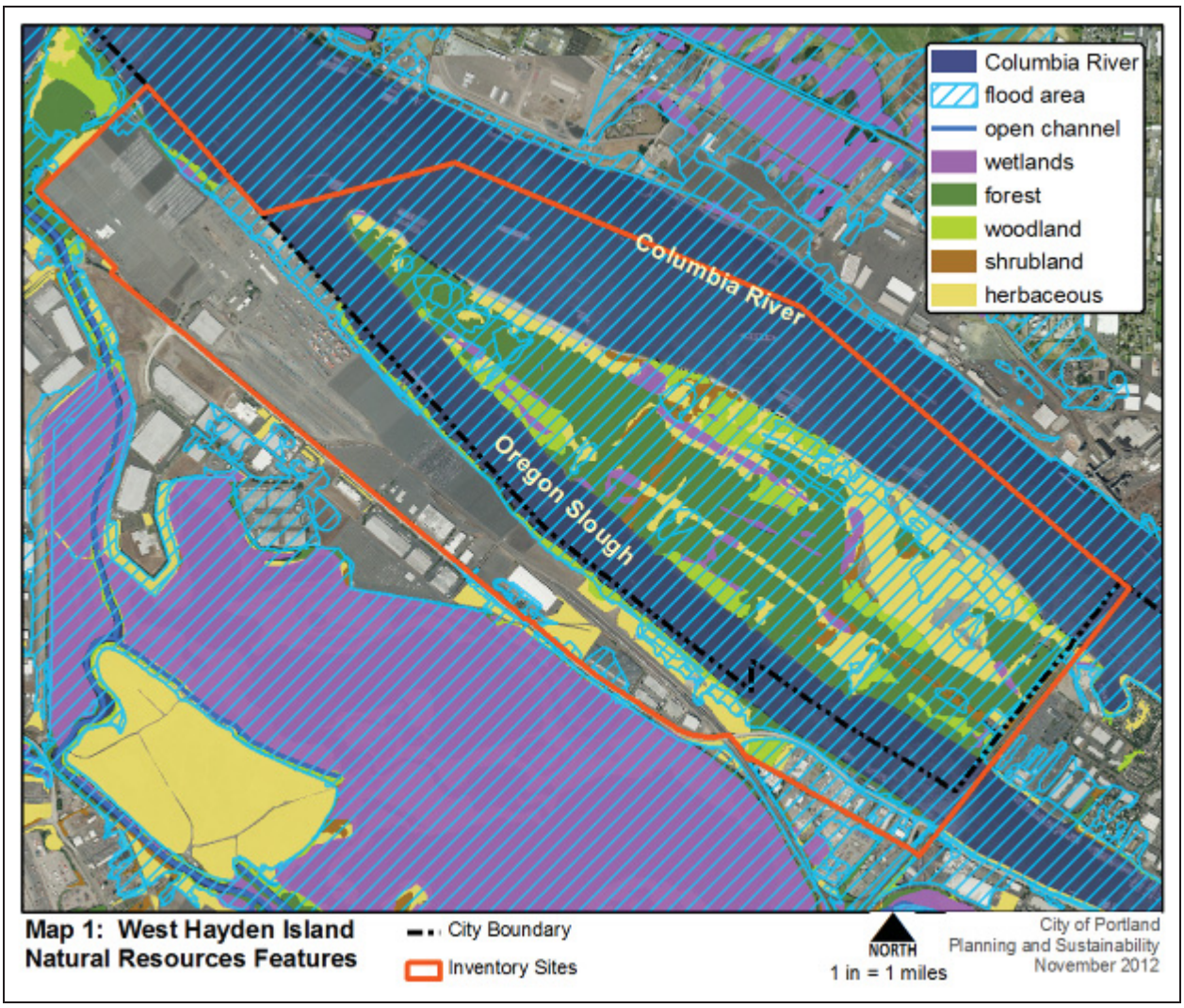
2. **Complexity** – The diverse habitats – shallow water, wetlands, forest, grassland, floodplain - have a synergistic relationship. Many species require different habitats during different parts of their life cycle. For example, red legged frogs live in the forest and breed in the interior wetlands.

A wetland isolated from forest habitat, even if it is in good condition, doesn't provide red-legged frog habitat.

3. **Location** – The Columbia River is the *only* migration route to the ocean for 13 ESA-listed fish species. WHI is uniquely located at the confluence of the Columbia and Willamette Rivers and is also used by Willamette River fish species. WHI is also part of the Pacific Fly route for migratory birds. Being located in the middle of an urban area further enhances its value, providing a habitat oasis for species moving through the development area.

4. **Rarity** – Intact floodplain habitats are increasing rare in the Lower Columbia and around the world. Floodplain forests, shallow water, grasslands and wetlands are all rare habitats that are in decline. Large, functioning examples such as WHI are very limited in the landscape. Some floodplain forest stands on WHI are in excess of 100 years old; these stands are considered "reference condition" by experienced ecologists for this.

5. **Health** – Like the rest of the Lower Columbia River, WHI hydrology is altered from historic condition by upstream dams and it is home to some invasive vegetation. Both of these factors are ubiquitous in the Lower Columbia River Ecosystem. Given these caveats, within the context of the Lower Columbia River ecosystem WHI is in very good ecological health.



Other agencies have recognized the ecological significance of WHI:

a. Metro designed as a Class 1 Riparian/Wildlife Habitat
b. Metro identified as a Habitat of Concern
c. NOAA designated shallow water as Critical Habitat for endangered fish
d. Oregon Department of Fish and Wildlife identified as a Conservation Opportunity Area
e. Oregon Department of Fish and Wildlife designated the forests as Category 2 habitat: "essential and limited"

The individual habitat types that make up WHI are described below (also see Map 1):

Shallow water

The **170 acres** of shallow water located all around WHI provides habitat for Columbia River and Willamette River salmon and other aquatic organisms. This is some of the only intact, contiguous shallow water habitat left in the metropolitan area. Eleven ESA-listed Columbia River salmon use this habitat. Willamette River salmon also use WHI due to its location at the confluence of the two major rivers. As both juvenile and adult salmon migrate downstream and upstream along the shoreline, they seek shallow water habitat that provides opportunities to feed, rest, recharge, and find refuge from predators. Some juvenile salmon species may spend weeks or months in this area before making the last move out to the ocean.

In addition to fish, birds and mammals rely on shallow water areas. Western grebes and river otters are examples of the many other species found around WHI. Species such as bald eagles forage in shallow water and nest in trees on the island highlighting the important relationship between the two habitats.

Wetlands

To date, there are **48 acres of wetlands** mapped on WHI (note – no wetland delineations have been performed). The wetlands vary in size from approximately 300 square feet to 15+ acres and the size changes throughout the season. Some wetlands are inundated by the Columbia River during high flows and flood events. The wetlands that have a surface connection to the river provide flood attenuation, complex critical habitat for fish, including many species of ESA-listed salmon and trout, and foraging habitat for waterfowl, wading birds, and diving birds.

At least three of the interior wetlands (typically no surface connection to the river; only during very high flow events) provide habitat for *at-risk* red-legged frogs. These frogs breed in the interior wetlands and then move to the adjacent floodplain forests. Red-legged frogs generally will not breed in shoreline wetlands due to variable flows and water levels.

Some wetlands are impacted by invasive plants including reed canary grass, which can decrease functionality. These wetlands would benefit from enhancement actions.

Forests

WHI and the south banks of the Oregon Slough contain one of the largest remnant stands of historically abundant cottonwood-ash floodplain forests in the Lower Columbia River Basin, **548 acres** in total. WHI represents 4% of the remaining cottonwood-ash forest habitat between the Bonneville Dam and the Pacific Ocean.

Six attributes combine to make WHI forests highly unique and significant: size, location, old age, habitat rarity, health, and complexity. The cottonwood/ash forests found on WHI are rare, essential and limited in the Lower Columbia River (OR Department of Fish and Wildlife Category 2 habitat). A patch this old and this large provides valuable ecological services including increased interior habitat area.

The canopy is almost entirely completely native trees. There are impacts from invasive species including Armenian blackberry, primarily along roads, trails and power line corridors; however, the interior of the forest is comprised of native vegetation layers, varied age classes, vegetation regeneration, deep leaf litter, and standing/downed wood.

The health of the floodplain forest is reflected by the presence of 13 at-risk wildlife species that are in decline (birds, bats, and an amphibian).

The riverine cottonwood-ash floodplain forest type found on WHI has been identified as a conservation priority by the following entities:

- PSU Oregon Biodiversity Information Center: High Priority Plant Association/Ecological Element
- Partners in Flight: Priority Habitat
- Oregon Department of Fish and Wildlife: Strategy Habitat and Keystone Habitat

Grasslands and sparsely vegetated areas
There are **230 acres** of beach, sparsely vegetated and grassy areas on WHI.

Historically, open habitats with low structure vegetation were present in the Columbia River and were maintained by natural events like flooding. These wet prairies and early successional habitats were part of a much larger grassland ecosystem. Flooding regimes and development have dramatically altered the river and the habitats supported by flood events. Across the Pacific Northwest the extent of natural grasslands have decreased by 98%; only 2% of the historic coverage remains. The wildlife species that rely on these habitat types have also greatly diminished.

The Dredge Deposit Management Area (DDMA), which is actively used for placement of dredge materials, offers an expansive area with low structure vegetation and areas of bare sand. The placement and management of dredge materials here prevents trees and shrubs from growing and maintains an expansive, open landscape. The DDMA is a habitat type preferred by many grassland associated species. *At-risk* Western meadowlarks are found in the DDMA, as well as American kestrels and Northern harriers (all three species are in decline).

Floodplain
Nearly all of WHI is within the 100-year floodplain, as mapped by FEMA.

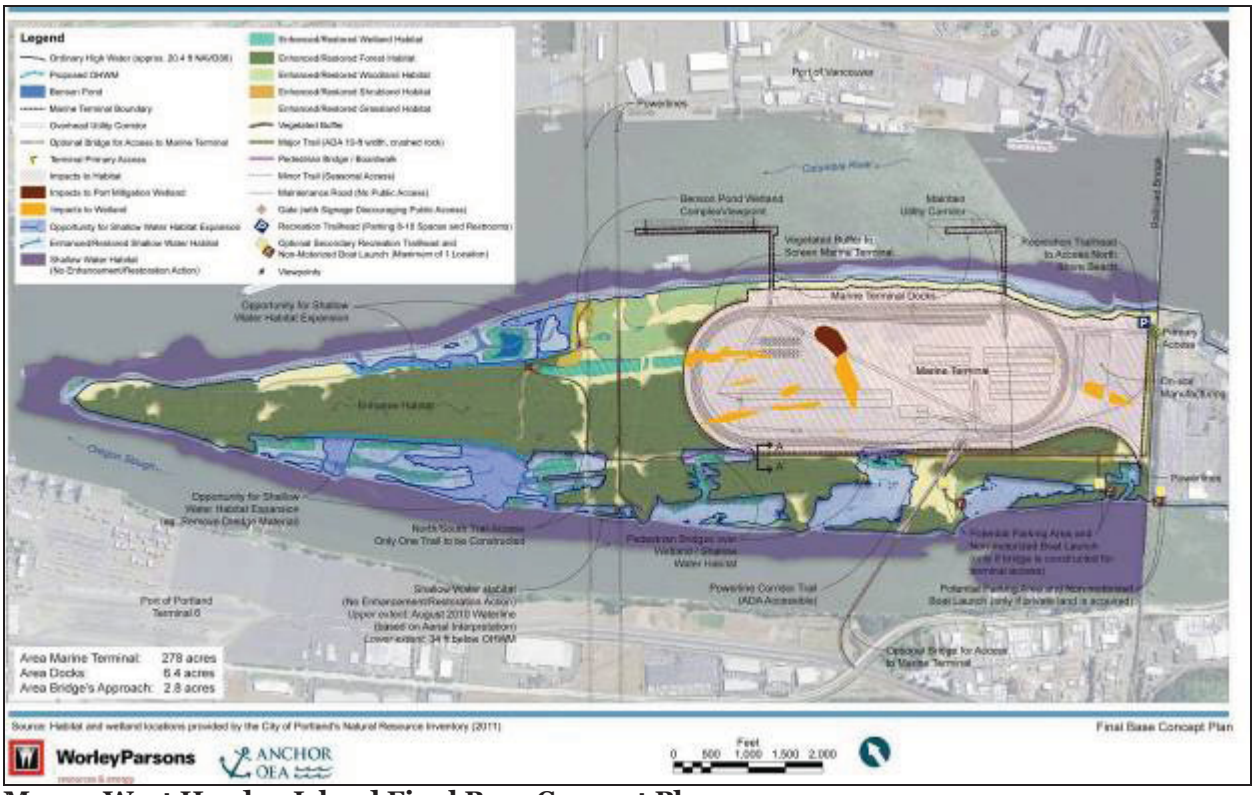
The most obvious function of the floodplain is to hold and convey water during flood events. This reduces flood velocities and peaks, which in turn reduces the impact of floods to properties up and down stream from the site. The floodplain provides a number of other important natural resource functions that are based on the exchange of groundwater and surface water between the active channel and the floodplain:

1. Flooding in undeveloped areas cycles nutrients (food web) – picking up nutrients on land and bringing them to the river and depositing nutrients from the river on land
2. Floodplains improve water quality by trapping, filtering and cycling toxics and pollutants.
3. Natural floodplains provide erosion control though wave attenuation, sediment capture, and sediment release (balancing "sediment budgets").
4. Flooding in woodlands introduces large wood and leaves to the river – these structures and nutrients is critical to aquatic species.
5. Floodplains allow for groundwater recharge and discharge, this decreases flows during floods and allows for release of cold, clear groundwater to the river during dry periods.
6. Channel migration is a natural function of rivers and streams and is aided by flooding that carves out areas in the floodplain and deposits sand in other areas
7. Floods help maintain habitats – floods deposit seeds from upstream - cottonwood/ash forests benefit from periodic flooding
8. Active floodplains create microclimates by regulating humidity, air temperature, and water temperature.
9. Adaptation – current climate change models show that flooding the Columbia River could increase in frequency and/or volume due to warmer, wetter winters – existing, undeveloped floodplains will help society respond to those changes.

Natural Resource Impacts

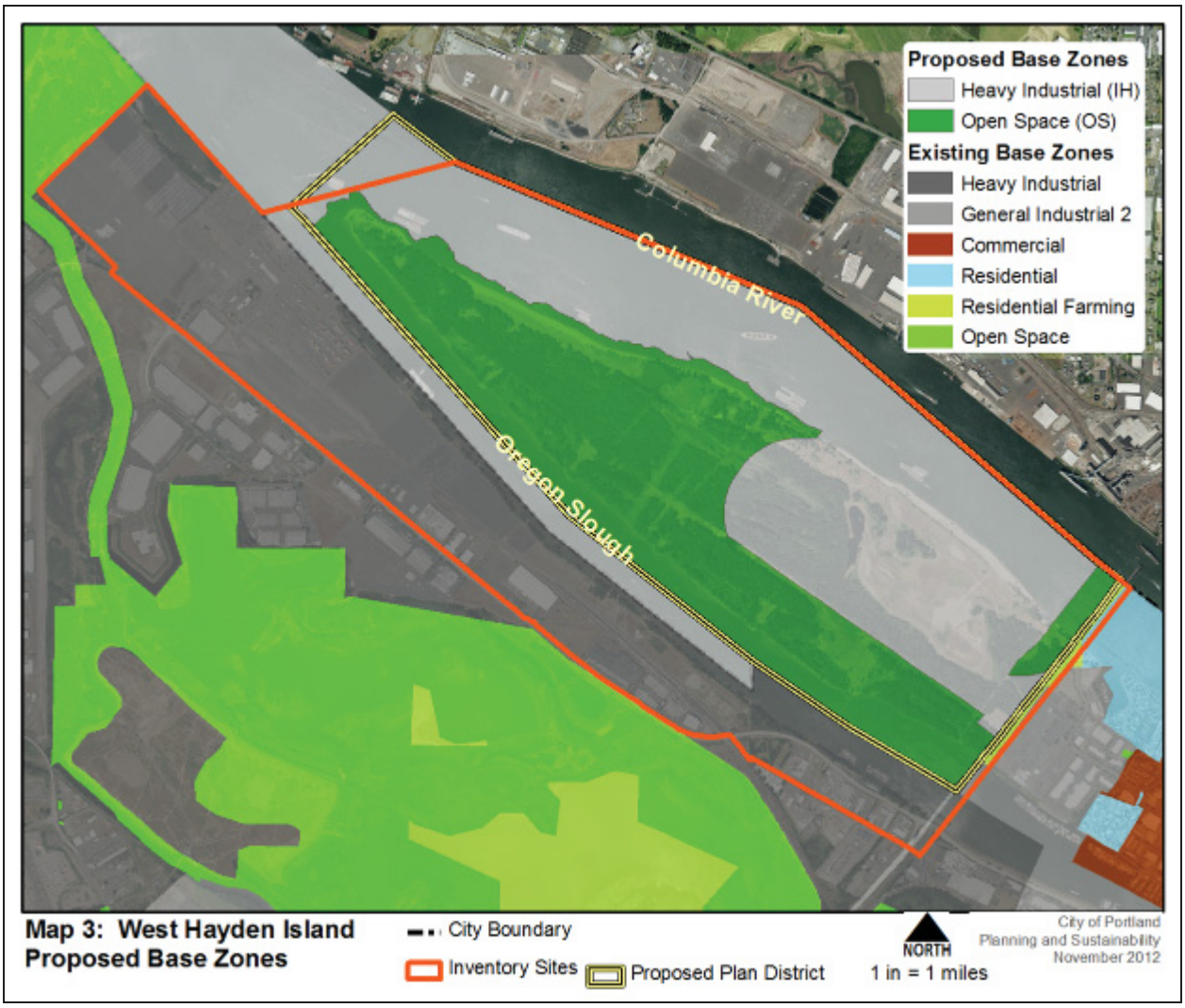
WHI is a high functioning, very unique natural resource in the Portland metro area and in many respects it is irreplaceable. However, negative impacts to individual habitat types and the life species they serve can be mitigated.

WorleyParsons was hired by the city to create a concept plan for WHI that met the City Council resolution requirements for no more than 300 acres of industrial development and at least 500 acres of open space. Working with the WHI Advisory Committee, WorelyParsons create the Final Base Concept Plan that accommodates a 10,000ft rail loop, three terminals (grain, bulk and auto) and two docks with associated infrastructure; total of 278 on-land acres impacted (see Map 2). The development footprint is located as close to the existing main rail line as possible and north of the PGE power line corridor. It is also set back 100 feet from the ordinary high water mark along the north shore (except where the two access ramps to the docks cross).



Map 2: West Hayden Island Final Base Concept Plan

City staff used the Concept Plan, and other information, to derive base zone and the zoning are what staff used to calculate the impacts of marine terminal development on the natural resources (see Map 3). Staff created a heavy industrial base zone (IH) that included all of the Concept Plan development footprint except the upper right corner. The upper corner was zoned open space (OS) to allow for a future public parking lot, trail head and trail access to the beach. The IH zone on land is 302 acres and includes two setbacks. One setback is from the OS on the west and buffers the remaining natural resources and recreational uses. The other setback is from the ordinary high water mark on the northern shore.



For the purposes of determining impacts to natural resources it was assumed that all resources within the IH zone on land will be fully removed. Second, it was assumed that impacts below the ordinary high water mark would be limited to two docks with access ramps and conveyors. Third, it was assumed that the impacts of development would have an indirect impact on the remaining natural resource areas (light, noise, vibration, etc.) Finally, WorleyParson's calculated the acres of fill required to bring the site up to 30ft elevation and out of the floodplain.

Using these assumptions, the result of marine terminal development is that WHI would go from 800+ acres of habitat to about 500 acres of habitat – a 38% reduction in total acres of habitat. Impacts to specific natural resource features would be:

- shallow water habitat – 0.34 acres
- wetlands – 10 acres - 22% reduction in overall wetland coverage
- forests – 149 acres (131 direct; 9 indirect) - 31% reduction in overall forest coverage
- grassland/sparsely vegetated areas – 123 acres (Dredge Deposit Management Area) - 54% reduction in overall grassland coverage
- floodplain – 302 acres (1.3M cubic yards of fill)

Notwithstanding the ESA-listed species, another 19 at-risk species use the habitats in the development footprint: Bats (California myotis, hoary bat, long-legged myotis, silver-haired bat and Yuma myotis),

bald eagle, pileated woodpecker, western meadowlark, band-tailed pigeon, bufflehead, merlin, olive-sided flycatcher, peregrine falcon, purple martin, red-necked grebe, white-breasted nuthatch, willow flycatcher and yellow-breasted chat, red-legged frog and hairy water-fern. All of these would be impacted by marine terminal development.

Natural Resource Mitigation

A guiding principle of the WHI project is to reach a net increase in ecosystem functions. Practically speaking, the City's approach is to try to replace each habitat type impacted. Mitigation on WHI is prioritized over off-site mitigation in the City's proposal (see Map 4). Off-site mitigation should occur at one or two large areas where the complexity and relationships between habitat types can be mimicked. And the outer extent of where mitigation is acceptable is the Columbia River floodplain from the Sandy River Delta to the east, to the East Fork of the Lewis River to the west, and to the Multnomah Channel confluence with the Wilamette River (including Sauvie Island).

Shallow Water Habitat

Mitigation associated with impacts to shallow water habitat would be addressed entirely through the Plan District zoning code. The IGA contains general language regarding City/Port coordination.

Impacts to shallow water habitat are not fully understood at this time. Staff are unsure exactly how many or where the docks and access ramps would be located. It will be necessary, at the time of design, to evaluate the specific impacts and determine appropriate mitigation. There will also be state and federal permitting process required at the same time; thus, determining mitigation upfront could result in incompatibility with mitigation required at the time of development.

The City is proposing to apply environmental regulations through the zoning code to the shallow water habitat. Impacts and mitigation would be evaluated through a future land use review. There is an existing process, *Streamlining*, that could be used at the time of review to coordinate local, state and federal permitting requirements.

Staff assume that through local land use review full mitigation of impacts to shallow water habitat features and functions will occur.

In order to understand, generally, the costs associated with mitigating for impacts to shallow water habitat, staff applied a mitigation ratio of 5:1 to the Concept Plan direct impacts. This ratio is based on professional judgment by experts working in field of fisheries and mitigation; it represents the upper amount of mitigation that may be required for this habitat feature. The resulting amount mitigation needed is 1.5 acres of created shallow water habitat.

Using the results of River Plan/North Reach Willamette River Mitigation In-Lieu Fees Technical Report (prepared for the City by Tetra Tech, October 2008), and additional information obtained through the Lower Columbia Estuary Project, the estimated cost of perform 1.5 acres of shallow water habitat creation, including planning, project management and long-term maintenance, is approximately $5M.

Wetlands

Mitigation associated with impacts to wetland habitat would be addressed entirely through the IGA and would rely heavily on state permitting requirements.

It is assumed that all 10 acres of wetlands located within the IH zone on land would be filled. This will require Clean Water Act 404 permitting and will trigger the NEPA process. State and federal wetland requirements are fairly robust and well understood. Staff feel these processes will result in adequate mitigation of wetland impacts with the following caveats:

1. Wetlands on WHI have not been delineated; there could be more or less wetlands present and impacted than are known today.
2. State or federal agencies could decide not to take jurisdiction over some of the wetlands. This would result in a net loss of wetland habitat. The proposed IGA includes a requirement that all wetland impacts be mitigate.
3. The City wants to ensure wetland restoration/creation occurs; not just enhancement of existing wetlands. Therefore the proposed IGA requires a minimum of 30 acres (3:1) of wetland restoration or creation.
4. Frequently, monitoring is only required for 5 years, which is too short a timeframe to ensure success. The proposed IGA requires 10 years of monitoring and names the Bureau of Environmental Services to receive monitoring reports.

As for shallow water habitat, staff used the Tetra Tech report to estimate the costs of wetland mitigation. The minimum 30 acres of wetland restoration would cost approximately $3.5M, including planning, project management and long-term maintenance.

Floodplain Forests

Mitigation for impacts to floodplain forests are addressed entirely within the proposed IGA.

It is assumed that 149 acres of floodplain forests would be removed, or significantly degraded (indirect impacts) within the IH zone on land. There is no established floodplain forest mitigation methodology that can be applied to WHI. Therefore, the City looked to other mitigation methodologies to evaluate impacts and determine necessary mitigation.

The City's Floodplain Forest Mitigation Framework (Framework) is based on well-established wetland mitigation methodologies. The Framework takes into account the type of mitigation action, the time to replace lost functions (including advanced credit), the distance from the impact site, and the rarity of impacted habitat. The mitigation ratios are reduced if the project is on-site or very close to the site; creates habitat rather than improving existing habitat; and is performed in advance of the impacts.

The Framework assumes that the goal of mitigation is to return the floodplain forest ecosystem back to baseline conditions. This means mitigation is complete when all of the conditions, features, and functions present today on WHI are fully replaced. Those conditions are:

- complex forest with multiple vegetation layers (shrubs, ground cover),
- mature trees, dying trees, snags and tree regeneration,
- flooding and wetlands within the forest, and
- a thick duff layer.

The Framework was reviewed and generally endorsed by the Oregon Department of Fish and Wildlife as scientifically sound and appropriate to use to determine WHI mitigation.

The forest mitigation proposal, as contained in the November 21st, 2012 draft IGA, is:

> On WHI, protect the remaining forest 201 acres of that forest area on WHI and 124 acres of forest enhancement and re-establish 22 acres of forest starting at the time of annexation (see Map 4). Based on the Framework, these on-site actions will achieve 40% of the forest mitigation obligation.
>
> On Government Island, re-establish 174 acres of floodplain forest and enhance 296 acres of existing floodplain forest starting at the time of annexation (see Map 5). Based on the Framework, these Government Island actions will achieve 49% of the mitigation obligation.

To cover the gap of 11% to reach full mitigation and to achieve a net increase in forest functions, an additional 120 acres of forest re-establishment is needed. No site has been identified at this time.

The Framework is a calculator and the inputs can be changed. If any actions cannot start at the time of annexation, the total acres of mitigation will increase. If less or more enhancement or re-establishment is undertaken the total acres of mitigation will increase or decrease accordingly. This allows for flexibility.

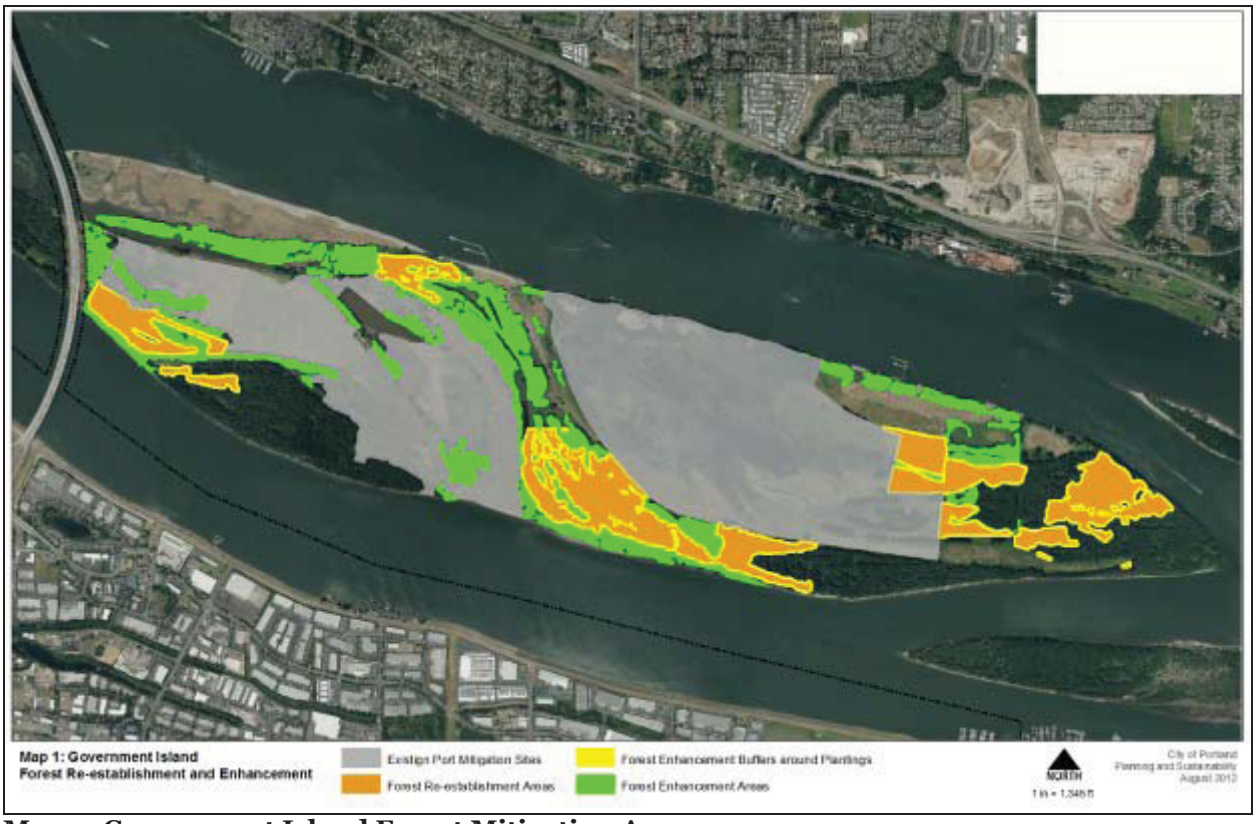
To determine costs, the City Bureau of Environmental Services Watershed Revegetation Program provided a budget to plan, undertake and manage the WHI or Government Island projects. This budge was provided to EcoNorthwest who determined the net-present-value of these projects assuming 100 years of management and monitoring. The resulting discounted costs are[1]:

WHI – $2M
Government Island – $7.3M
Third Site – $2.6M

The IGA specifies that a grant be provided to the City to perform the "third site" mitigation actions.

Map 4: West Hayden Island Forest, Wetlands and Shallow Water Mitigation Areas

[1] January 10, 2013 update – These costs are the net present value not the full costs represented as a lump sum. If a lump sum were to be used to fund the mitigation over time, more money than is shown here would be need to ensure long-term management and success.



Map 5: Government Island Forest Mitigation Areas

Grassy/Sparsely Vegetated Areas

Mitigation for impacts to grassy and sparsely vegetation areas on WHI is addressed entirely within the proposed IGA.

Like forests, there is no established grassland mitigation methodology that can be applied to WHI. Staff decided to use the grassland mitigation ratios applied in the recent Airport Futures project as a proxy for WHI. The result is 150 acres of grassland enhancement would be necessary to mitigate for loss of this habitat type.

During the Airport Future project, the City Bureau of Environmental Services Watershed Revegetation Program created a budget to plan, undertake and monitor the grassland mitigation project. Using that budget, staff determined the cost of a 150-acre grassland enhancement project, including long-term maintenance is approximately $1.5M. The IGA specifies that $1.5M will be provided as a grant toward conservation of western meadowlark habitats.

Floodplain

Mitigation for fill within the floodplain is partially addressed within the zoning code and the IGA.

There are three regulatory systems in Portland that address floodplain impacts and protect some functions. First, the federal FEMA flood insurance program requires Cities to regulate fill in the floodplain. Second, through Title 3, Metro requires Cities to implement balanced cut and fill; however, WHI is exempt from Title 3 and no balance cut and fill would be required. Finally, the City has adopted environmental overlays to protect forests and other habitats in the floodplain.

The City implements the FEMA flood insurance requirements through Title 24, by requiring an engineering evaluation at the time of development (at the time of the fill). This includes a "no net rise" evaluation, requiring that fill does not cause more than a 1 inch rise in flooding, and prohibiting fill in locations where there is typically active flowing water (the FEMA floodway). Habitable buildings must also have finished floor elevations at least 1 foot above the base flood elevation.

Metro's Title 3 requirement is also implemented through Title 24. In most areas of the city, fill in the floodplain must be balanced by an equivalent cut, creating new floodable volume to replace the filled volume. This is in addition to the "no-net rise" rule described above. There are properties that Metro exempted from the balanced cut and fill requirements. A development footprint on WHI was exempted; as was the South Waterfront District and several Port properties along the Willamette North Reach. The exemptions were provided because development of these sites are important elements of the regional growth management strategy, and important to the City's economic development strategy. Ports are, by their nature, located in the floodplain and require fill or other structures that impact floodplain functions. While on balance the region practices balanced cut and fill, there was an economic concern that a strict application of that requirement to all sites may present a significant barrier to our ability to remain a port city.

Through its application of State Goal 5, the City also typically regulates impacts to forests, wetlands and other habitats located in the floodplain. This is done via the Environmental Overlay regulations (for example, along Johnson Creek), or via the Greenway regulations (along the Willamette). In the case of the WHI open space (OS), the City has proposed standards through the Plan District that are substantially similar to the environmental overlays. For purposes of State Goal 5, staff are recommending that marine terminal development be allowed within a 300 acre area on WHI (above the ordinary high water mark). This *allow* decision means that impacts to habitat in the floodplain and to the floodplain itself will not be regulated through the zoning code. However, within the development footprint staff have proposed an agreement with the Port to carry out mitigation of impacts to wetlands, forests and grasslands.

Recently in Washington and Oregon, lawsuits were filed making it necessary for FEMA to consult with NOAA on any changes to the mapped 100-year floodplain. The requirement is to ensure no harm to ESA-listed species (salmon in this case) due to floodplain filling. This recognizes the important relationship between the floodplain and in-water aquatic habitat. The current IGA proposal includes provisions that address ESA-listed species:

1. No fill can be placed outside the dredge area until the NEPA process is completed and CWA 404 permits are obtained; and
2. The Port will get ESA authorization prior to requesting any FEMA floodplain map modifications.

These two provisions will ensure the floodplain impacts beyond the dredge area will not occur until development is eminent and that filling in the floodplain will not harm ESA-listed species. There may be required cuts to compensate for fill, but that would be determined through the federal and state processes not a local process.

Table 1: Summary of Habitat Impacts and Proposed Mitigation Actions				
Habitat	**Existing Acres**	**Impacted Acres**	**Mitigation Actions**	
shallow water	170	0.3	Determined through future review	
Wetlands	45	10	Minimum 30 acres wetland restoration/creation	
forests	480	149	WHI	201 acres protected
				124 acres enhancement
				22 acres re-establishment
			Government Island	296 acres enhancement
				174 acres re-establishment
			Off-site Grant	$2.6M
Grasslands	230	125	$1.5M grant	
Floodplain	800+	302	Determined through future reviews related to no-net-rise and ESA consultation; no balanced cut and fill	

Achieving a Net Increase in Ecosystem Function

The proposed draft WHI Plan District and IGA will not achieve an overall net increase in ecosystem function. The individual habitat types – shallow water, wetlands, forest and grasslands – are fully addressed and there will be a net increase in forest functions as a result of the project. However, floodplain functions are not fully addressed. While some impacted functions would be compensated for, including ensuring no harm to ESA-listed species, there would be lost functions as a result of filling in the floodplain. It is not possible at this time to determine what functions or the scale of functions that could be lost.

Habitat	**Where it's Addressed**	**Full Mitigation**
shallow water habitat	Plan District – future local review	Yes – 100%
wetlands	IGA – state/federal permits	Yes – 100%
forests	IGA – local	Net Increase – 110%
grasslands	IGA – grant	Yes – 100%
floodplain	existing code and IGA	Loss - <100%

West Hayden Island Mitigation Documents

November 21, 2012Draft IGA and Zoning Code
http://www.portlandoregon.gov/bps/article/422338

Hayden Island Natural Resources Inventory
www.portlandoregon.gov/bps/article/407699

Mitigation Subcommittee Packet #1:
- Figure: Net Increase
- Parametrix Ecosystem Services Restoration Concept Plan
- WHI Regulatory Requirements Memo
- Airport Futures Planning Advisory Group final Report – Natural Resources Section

www.portlandoregon.gov/bps/article/380236

Mitigation Subcommittee Packet #2: Completed Worksheet
www.portlandoregon.gov/bps/article/384359

Mitigation Subcommittee Packet #3: Natural Resource Mitigation Costs memo
www.portlandoregon.gov/bps/article/384359

Draft Habitat Impacts and Mitigation Table (Feb 2012)
www.portlandoregon.gov/bps/article/390088

Initial Draft City of Portland WHI Forest Mitigation Framework (March 2012)
www.portlandoregon.gov/bps/article/395884

Initial Draft City Mitigation Term Sheet (May 2012)
www.portlandoregon.gov/bps/article/398440

Subcommittee Meeting Minutes
www.portlandoregon.gov/bps/53717