PORTLAND HARBOR
Natural Resource Trustee Council

Ecological Restoration Portfolio

The Portland Harbor Natural Resource Trustee Council is engaged in restoration planning to develop a suite of restoration opportunities that may compensate for the liability of potentially responsible parties of the Portland Harbor Superfund Site. In order to develop this suite of restoration opportunities or "restoration portfolio", the Trustee Council developed criteria for identifying and evaluating potential ecological restoration sites in 2008. These criteria address habitat features and attributes for several potentially injured species, including salmon, lamprey, sturgeon, bald eagle, osprey, spotted sandpiper, and mink. These criteria are used to evaluate a site's ability to provide habitat "lift" in terms of benefits to potentially injured species in Portland Harbor by comparing existing condition to potential restored condition.

The Trustee Council has identified potential restoration sites within the Portland Harbor NRDA Study Area (RM 0.8-12.3), and outside of the Study Area. To identify potential restoration sites inside the Study Area, the Trustee Council reviewed restoration opportunities identified in the City of Portland's River Plan (2008), and the City of Portland's draft Ecosystem Restoration General Investigation Study (2005). The Trustee Council screened these opportunities against the ecological restoration criteria developed in 2008, conducted site visits, and applied institutional knowledge of the Trustees and their technical staff. A few additional sites (not identified in City documents) were also identified and screened against the criteria. As a result of this effort, 25 restoration opportunities within the Study Area have been identified by the Trustee Council as having potential to provide significant habitat improvement for potentially injured natural resources in Portland Harbor, and are included in this restoration portfolio.

In 2009, an expert panel was convened by the Trustee Council to discuss ecological restoration priorities and opportunities outside of the Study Area in the lower Willamette River system. This panel identified a "broader focus area" where restoration will be most likely to provide benefit to Portland Harbor's potentially injured species. In 2010 and 2011, the Trustee Council hosted a series of meetings with potential community partners and potentially responsible parties to help identify restoration opportunities in Portland Harbor's broader focus area. Following the meetings, community organizations and members proposed nearly forty sites in the area. From summer 2010 through fall 2011, the Council's Restoration Committee conducted site visits and evaluations of the proposed sites. The proposed sites in the Broader Focus Area were screened against the Trustee Council's ecological restoration criteria (2008) to determine whether they could produce habitat "lift" for potentially injured species in Portland Harbor. As a result, 21 potential projects in the Broader Focus Area are included in this portfolio.

This list represents an initial inventory of restoration opportunities, and is not intended to be comprehensive or exclusive of opportunities that may be identified in the future. In addition, there is no obligation on the part of landowners to allow restoration work to take place at any particular site. Attachments to this list include: an overview map showing the location of each site on the river; a brief description of each site, including conceptual restoration treatments and their anticipated benefits; and a conceptual figure for each site. Specific quantitative value or restoration credit that may be generated by any of these projects will ultimately be determined using Habitat Equivalency Analysis. Federal Trustees will complete all required consultations and other permitting under the National Environmental Policy Act, the Endangered Species Act, the Clean Water Act and other statutes before project implementation begins.

Restoration Sites in the Study Area

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Restoration Sites in the Broader Focus Area

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Ecological Restoration Portfolio Site Locations

Portland Harbor Natural Resource Trustee Council

Updated April 2012

Restoration Sites in the Study Area

ALBINA YARD

Landowner: Union Pacific Railroad, Port of Portland, Oregon Department of State Lands

Site description: The Albina Yard site is located at river mile 10.75 on the northeast bank of the Willamette River. The existing shoreline is a mix of rock, unclassified fill, natural beach, and vegetated rip rap. There is only a thin strip of associated shallow in-water habitat. The uplands are heavily developed and dominated by impervious surfaces. Vegetation on the site is limited to a narrow strip of woods and non-native shrubs along the riverbank.

Proposed restoration: Restoration at this site could include improving bank conditions by reducing bank hardening; creating an undulating shoreline; creating additional shallow in-water habitat; and increasing the amount of native vegetation and large wood along the river bank and in the floodplain.

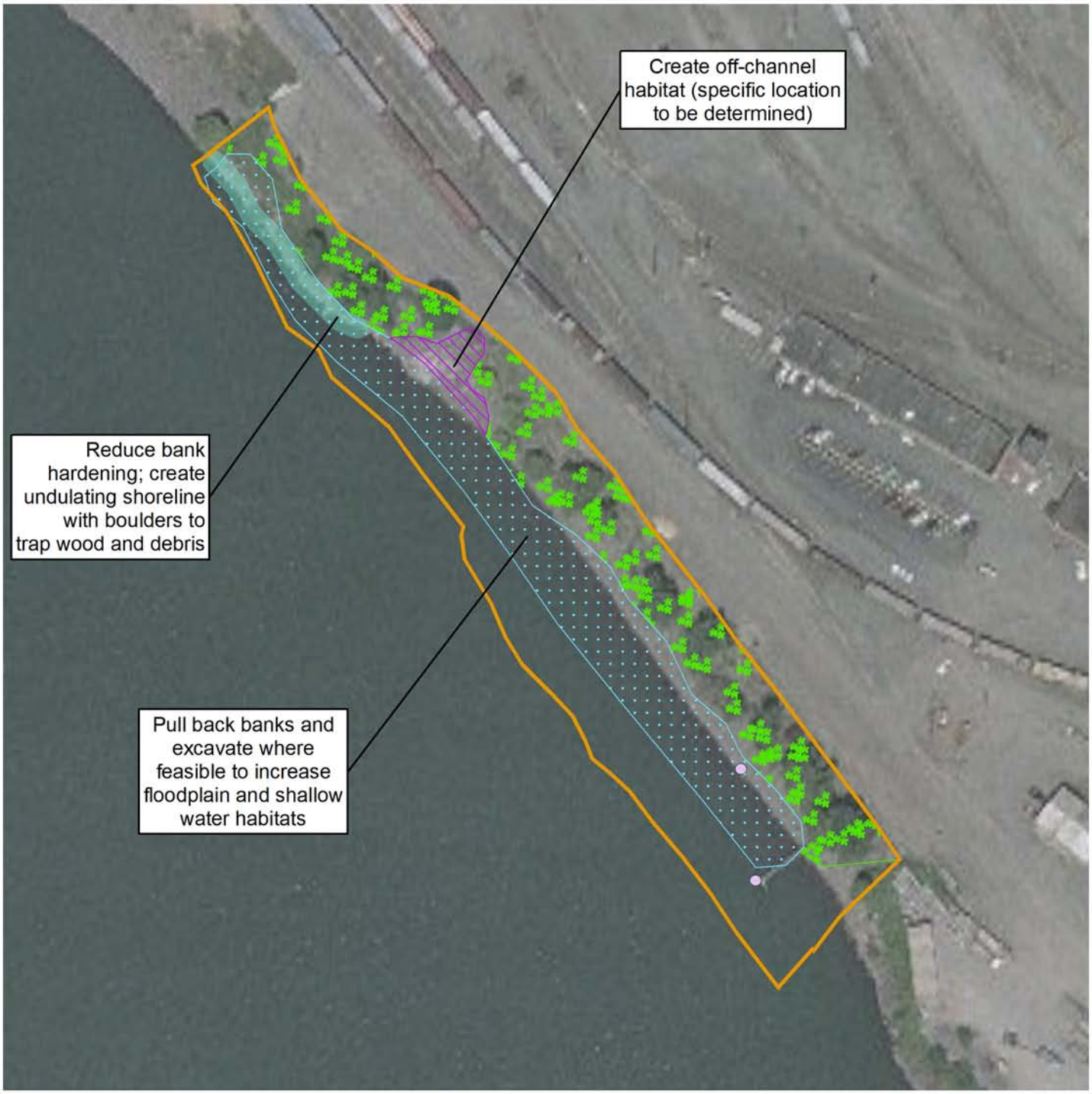
Benefits: Replacing the hardened banks with a more gently sloped and vegetated shoreline would allow for the accumulation of more wood, adding further complexity and sediment retention ability to the system. Juvenile salmon, lamprey, and sturgeon prefer complex habitats that provide cover and feeding stations. Shallow areas serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Native vegetation provides food and cover for a variety of species and makes perch sites available for native birds. Natural beaches also serve as foraging areas for mink and staging areas for spotted sandpiper and other migratory birds.

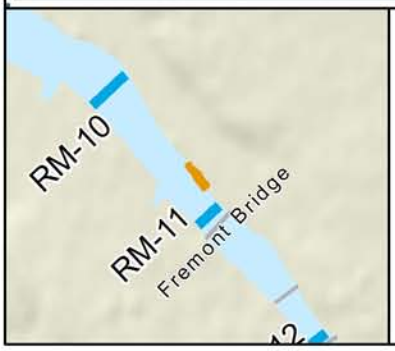
Feasibility: The land is owned by the Port of Portland. There are no known permitting issues. Once constructed, the project would be largely self-sustaining.

Other constraints/considerations: Railroad tracks are present that constrain the potential area of the restoration project. The plan for the North Portland Greenway Trail indicates that the trail will pass through the site. If the trail is constructed immediately adjacent to the river bank, the amount and quality of riparian habitat that could be restored at the site will be limited.

Albina Yard

Map prepared for Portland Harbor Natural Resource Trustees





N

0 110

Feet

Outfall

Restoration Site

Potential Bank Restoration

Off-Channel Habitat

Shallow Water Habitat

Riparian Shrubs and Trees

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale. This map was prepared using a geospatial database provided by the City of Portland's Bureau of Environmental Services.

ALDER POINT

Landowner: Alder Creek Lumber Co., Oregon Department of State Lands

Site description: The Alder Point property is a 51-acre site at the southern tip of Sauvie Island near river mile 3.0 and the confluence of the Willamette River with the Multnomah Channel. The property has been filled and partially developed for industrial uses. A levee divides the site into two sections. Some beach habitat with accumulated large wood habitat is present along the eastern end of the site riverward of the levee. A forested riparian area is present between the beach and the developed portions of the site. The remainder of the site has been cleared of vegetation and has historically been used for lumber processing and storage.

Proposed restoration: Restoration efforts at this site could include regrading the river banks to create a shallower slope, increasing interaction between the river and the floodplain. Restoration could also include adding native vegetation to floodplain and upland areas. Additional restoration options could also include removing portions of the private levee and restoring a diversity of riparian, marsh, mud flat and off-channel habitats across the site.

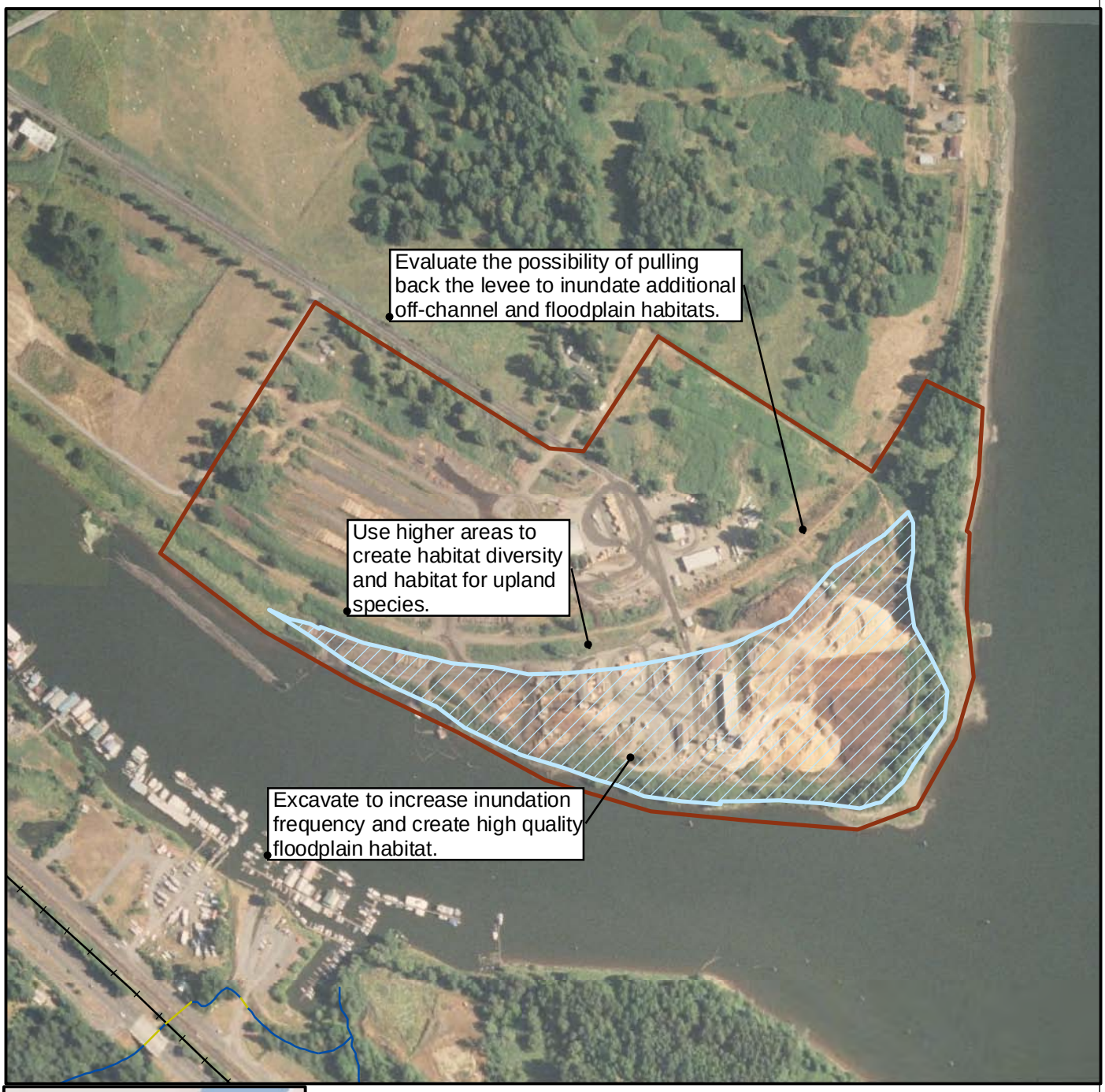
Benefits: Off-channel, shallow, slow moving waters provide refuge and productive foraging areas for lamprey and juvenile salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Natural beaches serve as foraging areas for mink and staging areas for spotted sandpiper and other migratory birds. Regrading the shoreline will reconnect this area to its historic floodplain and encourage the use of off-channel areas by fish. Adding native vegetation along the banks will improve habitat complexity, increase sediment retention, provide an invertebrate food source for fish and some wildlife, and create perching and nesting habitat for birds and other animals.

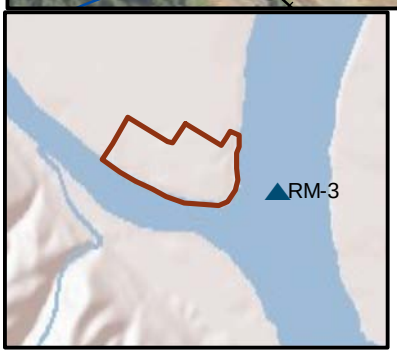
Feasibility: Although the levee bordering the site is not a U.S. Army Corps of Engineers levee, there may be concerns and issues associated with a change in flood protection caused by breaching or removal of the levee. The project will need to be coordinated with the Sauvie Island Drainage District. There are no other known permitting issues. The project would ultimately be largely self-sustaining. Although significant contamination issues have not been identified at this site, the site's history of industrial use suggests that contaminants may need to be addressed during implementation.

Other constraints/considerations: This site is unique because of its size and proximity to other good quality habitat (Miller Creek, Joslin, and PGE properties). There may be some possibility of physically connecting this project to a restoration project at the Joslin site, which could increase the amount and quality of restored habitat.

Alder Point

Map prepared for Portland Harbor Natural Resource Trustees





N

0 500
Feet

Restoration Site

Floodplain restoration

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Ash Grove Cement/Port of Portland

Landowners: Ash Grove Cement Co., Port of Portland property leased to Georgia-Pacific Consumer Product, Northwest, LLC

Site description: This site is an upland area located about 1,100 feet east of the Willamette River near river mile 3.25. The area identified for potential restoration is vacant, but appears to be cleared and filled for future industrial use. It is roughly 26 acres in size. A large building exists between the site and the river, but there is potential for wildlife connectivity to the river and east toward the Columbia Slough through the Rivergate Corridor. It is possible that portions of the property were historically wetlands and within the 100-year floodplain. An access road and railroad spurs are located in an east-to-west orientation through the site.

Proposed restoration: Restoration at this site could include revegetation and adding large wood and snags to restore native habitat and structure to the site. Wetland habitats could be restored or created on a portion of the site. Access road and railroad spurs on the property do not appear to pose significant risk to wildlife due to the low traffic volume and speed, although if relocation were deemed feasible that could provide some added benefit. Fences placed across the property could be removed or opened to allow for wildlife passage throughout the site and to adjacent habitats. If the use and treatment of stormwater runoff from the adjacent building and parking areas can be improved to minimize and avoid any adverse effects on the potential restoration site, stormwater-related measures should be included in the restoration plan.

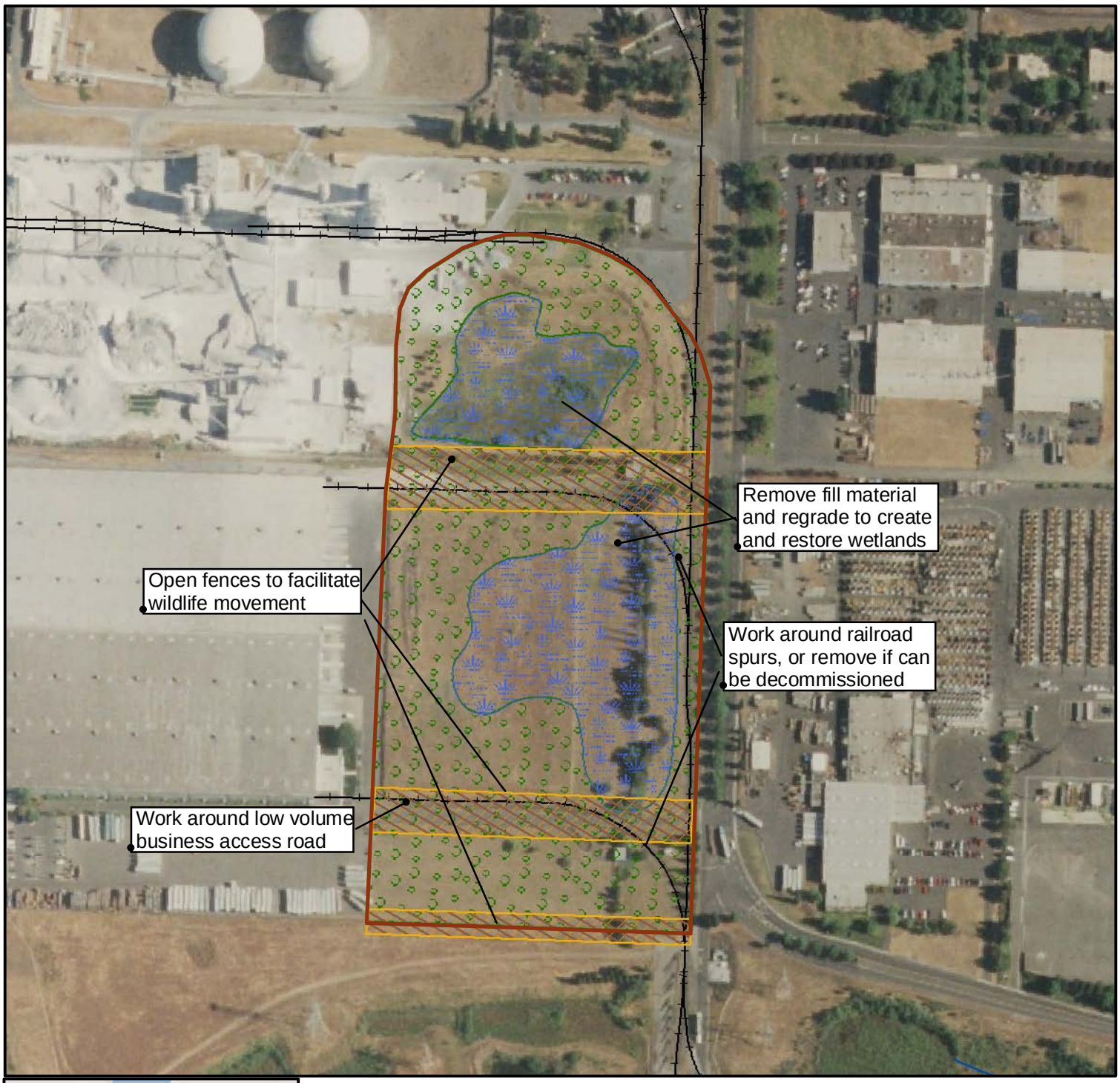
Benefits: The site could be turned from a vacant area with virtually no native vegetation and little wildlife habitat value to a patch that could expand on a larger habitat area to the south (i.e., the Rivergate Corridor), which also serves as a wildlife corridor to other important habitats. Larger, well connected habitats better support wildlife populations than smaller isolated habitats by providing more resources, supporting larger numbers of individuals, and facilitating genetic interchange. Mature trees and snags at the site could provide perching opportunities for bald eagle and osprey, and emergent wetlands could provide habitat for spotted sandpiper. Other birds, mammals, reptiles and amphibians could also use the site.

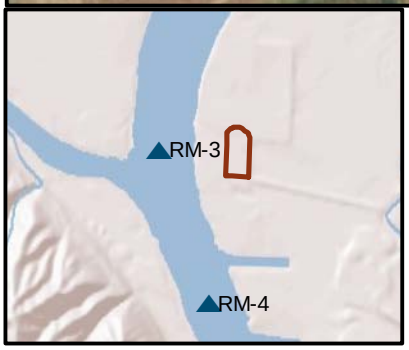
Feasibility: The land is zoned for industrial use, although it has been vacant of structures for many years. There are no known contaminant concerns at the site. There are no known permitting issues. Once constructed, the project would be largely self-sustaining.

Other constraints/considerations: It may be beneficial to incorporate wildlife crossing signage, and potentially other measures, to promote safety for wildlife that need to cross roads and railroad tracks to reach other habitats in the vicinity.

Ash Grove Cement

Map prepared for Portland Harbor Natural Resource Trustees





N

0 300
Feet

Revegetation

Wetland restoration or creation

Wildlife corridor

Restoration site

Willamette River Miles

Railroad Track

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Balch Creek Confluence

Landowner: Port of Portland, Sause Brothers, Portland Fire Bureau, Oregon Department of State Lands

Site description: The Balch Creek Confluence site is located at river mile 9.85 along the west bank of the Willamette River. Balch Creek is currently in a culvert and discharges to an alcove off the river. Part of the alcove is occasionally dredged to maintain access to a fireboat dock, which reduces shallow in-water habitat in the alcove. The northern side of the alcove has some beach and shallow water habitat. The banks of the alcove are steep with a thin strip of mostly non-native riparian vegetation and are classified by ODFW as vegetated rip rap. The site is surrounded by industrial development.

Proposed restoration: Restoration at the site could include "daylighting" Balch Creek near the alcove; separating the combined sewer overflow and industrial stormwater runoff from Balch Creek; constructing a confluence pool to create off-channel wetland habitat; vegetating the riparian areas along Balch Creek and the confluence area; adding complexity to shallow water habitat by adding large wood. The option of moving the boat dock into deeper water to eliminate the need for maintenance dredging could also be evaluated for feasibility.

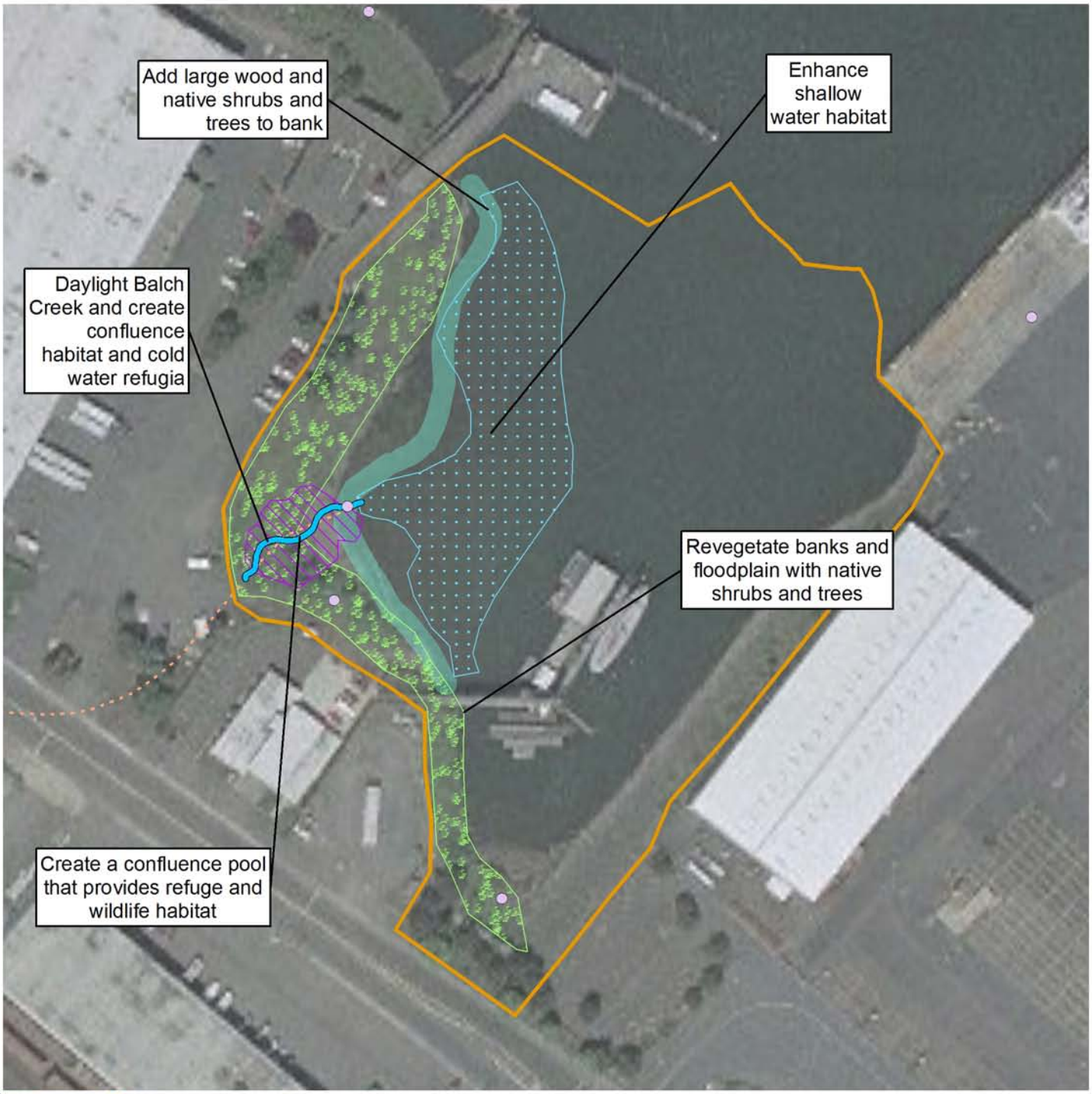
Benefits: Naturally sloped, vegetated stream banks increase floodplain connectivity and habitat diversity. Adding large wood and other habitat features would create more complex habitat, which is preferred by juvenile salmon, lamprey, and sturgeon because it provides cover and feeding stations. Off-channel, shallow, slow moving waters, like the proposed wetland and "daylit" stream, gather wood and provide refuge and productive foraging areas for lamprey and juvenile salmon. Shallow areas can also serve as important hunting areas for bald eagle, osprey, spotted sandpiper, mink and other species. Emergent and shrub wetlands provide shelter and a prey source for lamprey and salmon, as well as native birds, reptiles and amphibians. Riparian vegetation provides trees for bald eagle and osprey perching opportunities, and cover and foraging areas for mink and other species. The diversion of stormwater from the creek would directly benefit water quality.

Feasibility: Remediation of sediment would be necessary prior to restoration. The site is owned by private and public entities. There are no known permitting issues. Minor ongoing maintenance of plants and hydrology may be required.

Other constraints/considerations: Balch Creek Confluence site offers a rare opportunity to restore the mouth of a tributary on the mainstem Willamette. This project would be even more effective if the Portland Fire boat were moved into deeper water closer to the main channel of the river. The upstream portion of Balch Creek would remain in a culvert, limiting connectivity.

Balch Creek Confluence

Map prepared for Portland Harbor Natural Resource Trustees



N

0 100

Feet

Outfall

Piped Stream Segment

Restoration Site

Potential Bank Restoration

Potential Channel Restoration

Off-Channel Habitat

Shallow Water Habitat

Revegetation

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CATHEDRAL PARK

Landowner: City of Portland Parks and Recreation, Oregon Department of State Lands

Site description: The site is located at river mile 5.75. Cathedral Park's shore is classified as beach and some driftwood is present. The uplands are largely dominated by a grass field and a large parking lot. There is also a significant strip of woodland habitat containing large cottonwood trees and managed herbaceous vegetation. A boat ramp extends from the parking lot into the open water and that portion of the shoreline is composed of non-vegetated rip rap. Near the center of the shoreline there appears to be a section of shallow in-water habitat.

Proposed restoration: Restoration will likely include increasing vegetation and wood to restore riparian areas and upland habitat and creating off-channel wetlands at the mouth of the swale.

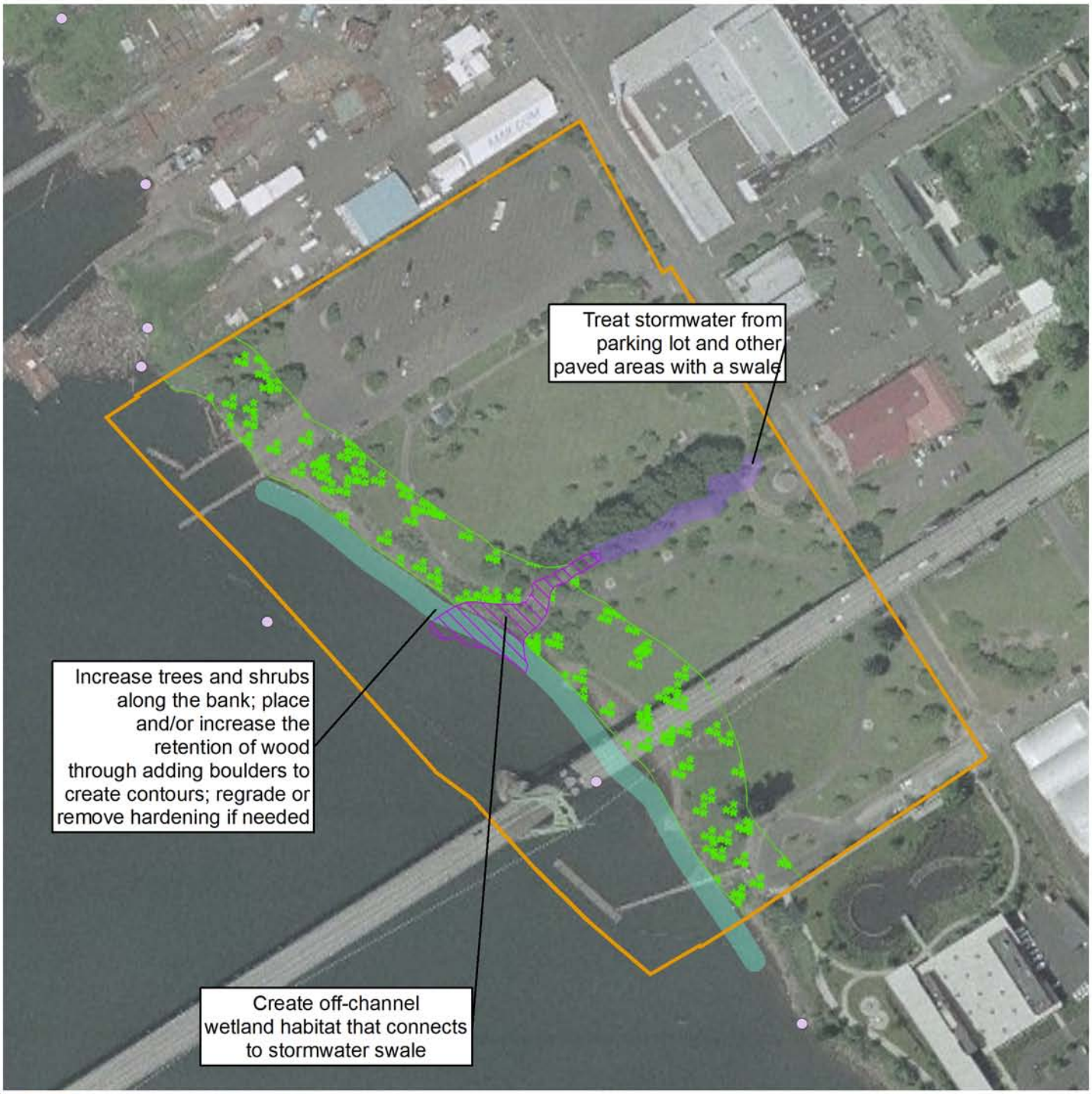
Benefits: Beach habitats sustain rich invertebrate populations; consequently they are important foraging areas for spotted sandpiper, mink, and a variety of other organisms. Naturally sloped, vegetated stream banks increase floodplain connectivity and habitat diversity. Adding large wood and other habitat features would create more complex habitat, which is preferred by juvenile salmon, lamprey, and sturgeon because it provides cover and feeding stations. Off-channel, shallow, slow moving waters gather wood and provide refuge and productive foraging areas for lamprey and juvenile salmon. Restoring native vegetation to the site would improve wildlife habitat.

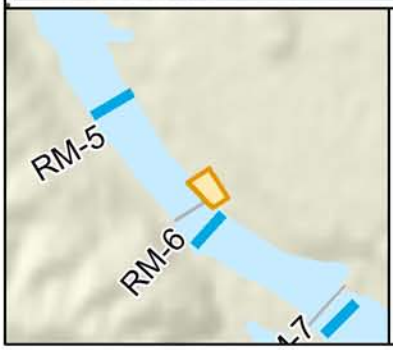
Feasibility: The land is publicly owned. Portland Parks and Recreation is willing to build and maintain the project, though there would be a significant amount of human access and potential disturbance. There are no known permitting obstacles at this time. Minor ongoing maintenance of the stormwater facility will be required.

Other constraints/considerations: The Portland Parks and Recreation Department's preference that the park be focused on recreation rather than habitat as illustrated in the Cathedral Park Master Plan will likely limit opportunities to fully implement potential restoration actions at the site.

Cathedral Park

Map prepared for Portland Harbor Natural Resource Trustees





N

0 175

Feet

Outfall

Restoration Site

Potential Bank Restoration

Stormwater Swales

Off-Channel Habitat

Riparian Shrubs and Trees

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CENTENNIAL MILLS

Landowner: City of Portland, Portland Development Commission, Oregon Department of State Lands

Site description: The Centennial Mills site is located at river mile 11.4 on the west bank of the Willamette River. The riverbank is steeply sloped and classified as pilings, vegetated rip rap and unclassified fill. There appears to be some shallow in-water habitat along the shore. Tanner Creek is piped throughout most of the Northwest Industrial Area and meets the Willamette River at a stormwater outfall in the center of this site. The site itself is mostly impervious (81.4%) with a small strip of shrubs along the river bank on the southeastern half.

Proposed restoration: Potential restoration activities at this site could involve rerouting and "daylighting" the end of Tanner Creek; creating off-channel and confluence habitat; treating stormwater discharge from the Tanner outfall in a stormwater wetland; regrading and revegetating the river banks and floodplain; and removing buildings and other infrastructure from the property.

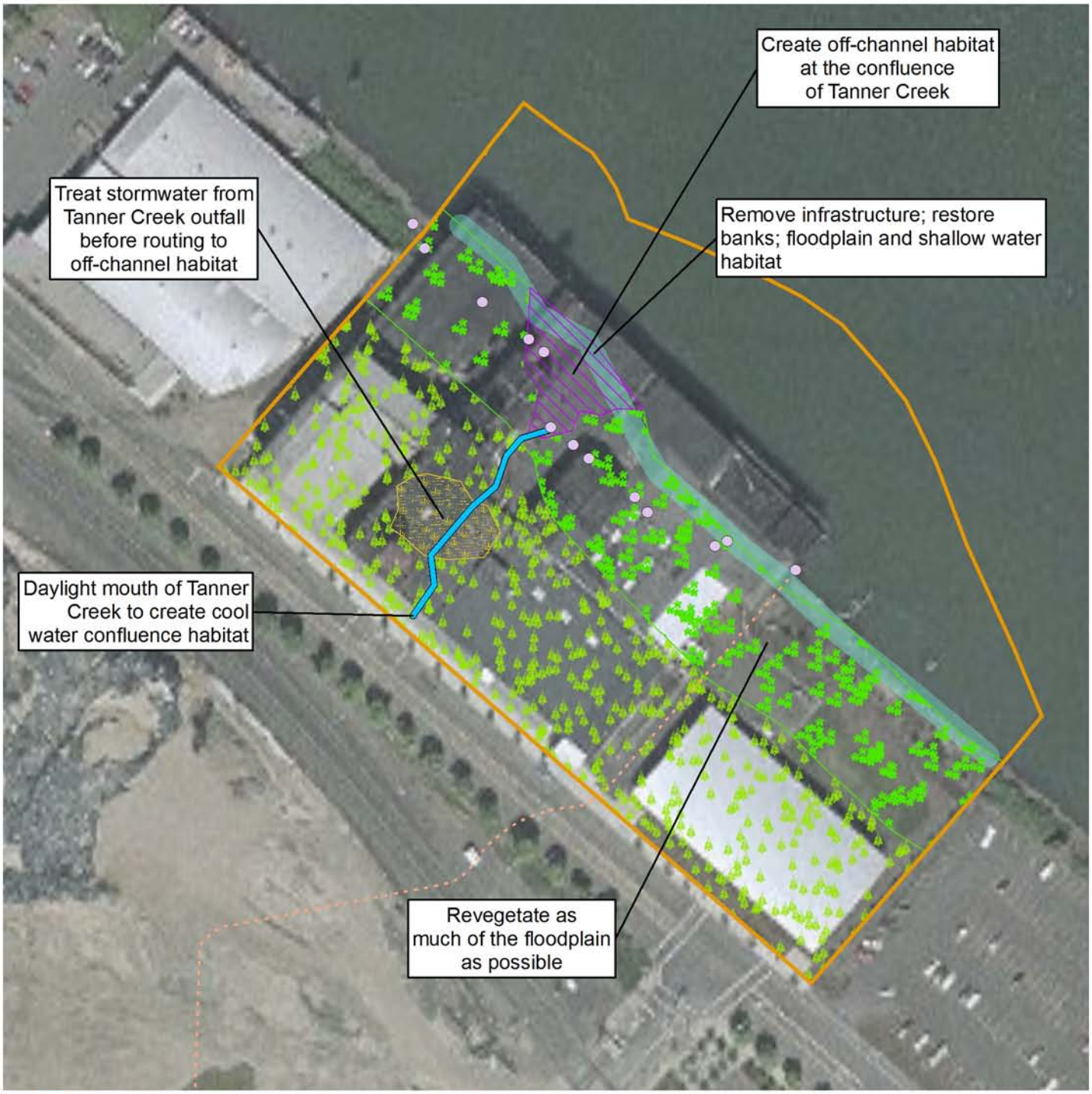
Benefits: Rerouting and "daylighting" the creek will improve habitat complexity, enhancing the habitat for salmon, lamprey, sturgeon, and terrestrial species. Creating additional tributary and wetland habitat will increase off-channel areas used by lamprey and juvenile salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Native vegetation provides an invertebrate food source, cover, perching, and nesting habitat for birds and other animals. Natural beaches and shallow wetlands also serve as foraging areas for mink and staging areas for spotted sandpiper and other migratory birds. Restoring the stream and wetland will reconnect this area to its historic floodplain and also enhance habitat complexity by encouraging the use of off-channel areas by fish. Treatment of the stormwater in a swale will directly improve water quality.

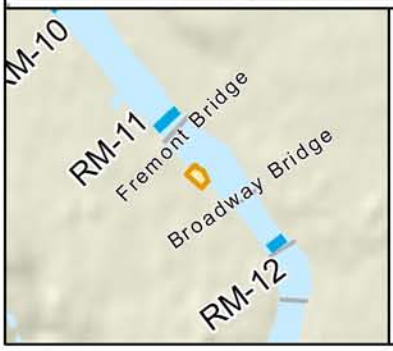
Feasibility: The land is publicly owned. The site has been declared a historical site. After restoration is completed, minor ongoing maintenance of the stormwater treatment features will be required.

Other constraints/considerations: This site is rare and significant because of the potential to restore the mouth of a tributary on the mainstem Willamette River. Development options for the property are currently being considered and the site's designation as a historical property may limit the restoration options at the site.

Centennial Mills

Map prepared for Portland Harbor Natural Resource Trustees





N

0 100

Feet

- Outfall
- Piped Stream Segment
- Restoration Site
- Potential Bank Restoration
- Potential Channel Restoration
- Off-Channel Habitat
- Stormwater Wetland
- Riparian Shrubs and Trees
- Upland Vegetation

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DOANE CREEK / RAILROAD CORRIDOR

Landowner: Siltronics, Burlington Northern Santa Fe Railway, Atofina Chemicals Inc., Oregon Department of State Lands

Site description: The Doane Creek site is located at river mile 7, extending from the shoreline just upstream of the Burlington Northern Railroad Bridge to the uplands along Highway 30, and includes a 7 acre wetland known as North Doane Lake. A riparian forest borders Doane Lake. Doane Creek is a stream that originates in Forest Park. The stream is piped under HWY 30, in an open channel for about 1600 ft., and then piped again until it connects to the river through an outfall. The shoreline is natural beach south of the bridge and rip rap to the north. There are some areas of shallow in-water habitat along the beach. Heavy contamination upstream of the site has resulted in contamination of Doane Lake.

Proposed restoration: Restoration at the Doane Creek site could include several components: creating high quality habitat at the confluence; "daylighting" the piped sections of Doane Creek; restoring connectivity for fish and wildlife between the site and Forest Park; enhancing shoreline and riparian habitat by removing rip rap, regrading, and replanting with native vegetation; replanting upland areas of the site with native vegetation; and creating more shallow in-water habitat.

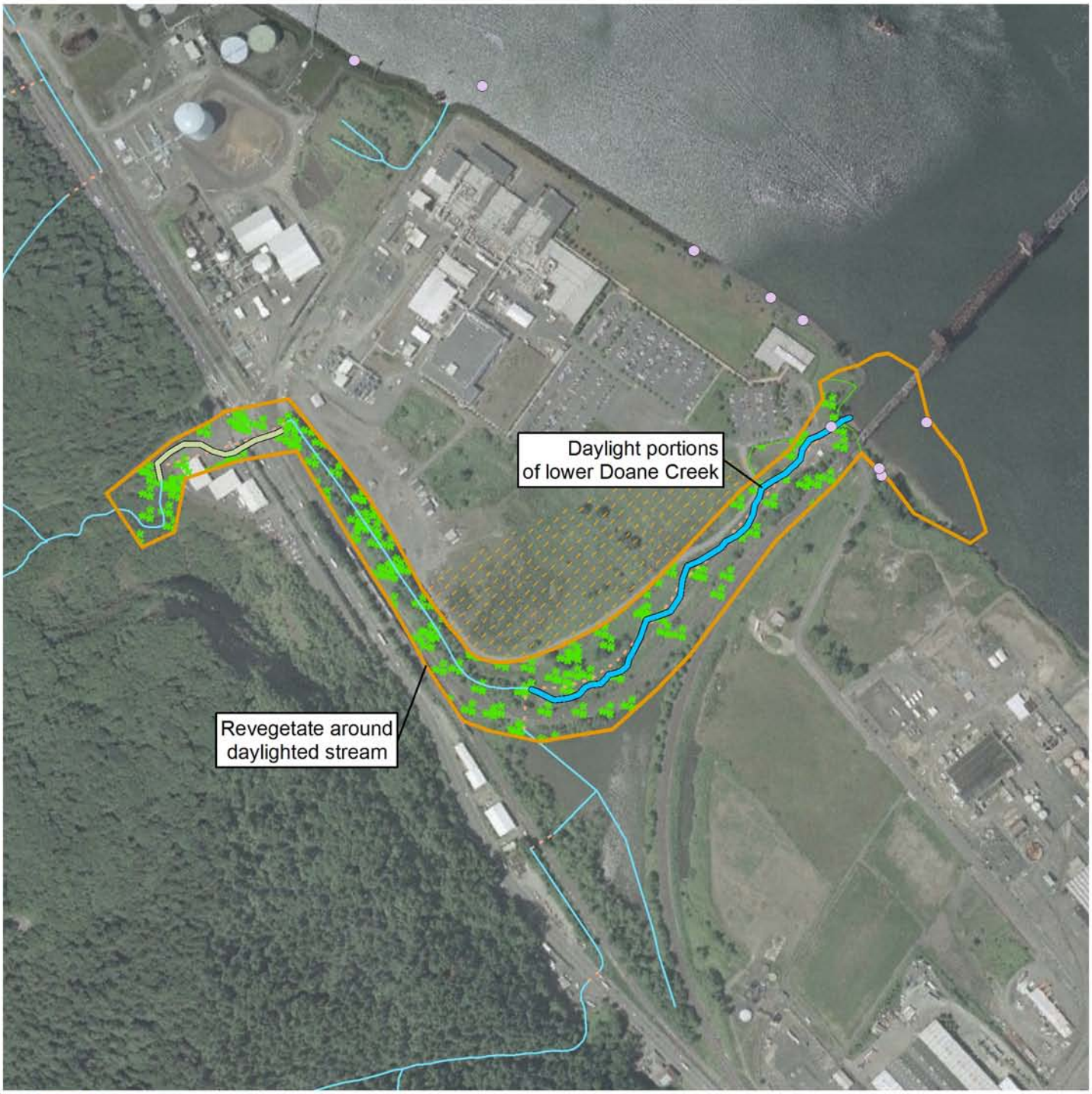
Benefits: Realigning and "daylighting" the creek and addressing fish passage barriers will improve habitat complexity and connectivity, enhancing the habitat for salmon, lamprey, sturgeon, and terrestrial species. Creating additional tributary and wetland habitat will increase off-channel areas for use by lamprey and salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Native vegetation would provide food, cover, and nesting habitat for birds and other animals. Natural beaches and shallow wetlands serve as foraging areas for mink and staging areas for spotted sandpiper and other migratory birds. Restoring the stream will reconnect this area to its historic floodplain and provide off-channel habitat.

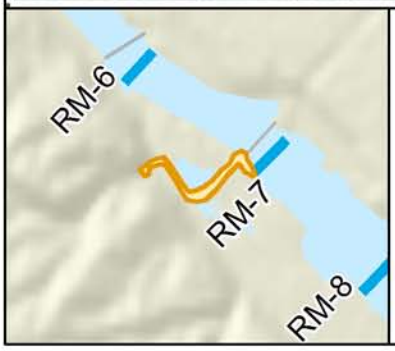
Feasibility: The timeline for sediment/creek remediation is unknown; remediation must be completed before restoration begins. Opportunities to restore passage for fish and wildlife between the site and Forest Park need to be evaluated. The land is privately owned and it is not known if the owner is willing to allow restoration at the site. There may be permitting issues, especially associated with the railroad. A significant amount of effort would be necessary to monitor and maintain the modified hydrology and plantings.

Other constraints/considerations: The site already provides a connection between Forest Park and the Willamette River and good quality beach habitat. It is somewhat unique in its potential to provide benefits to a wide range of species.

Doane Creek-Railroad Corridor

Map prepared for Portland Harbor Natural Resource Trustees





N

0 510

Feet

Outfall

Stream

Piped Stream Segment

Restoration Site

Potential Revegetation Area

Potential Channel Restoration

Alternate Channel Routing

Revegetation

Riparian Shrubs and Trees

Wetland Creation

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JOSLIN PROPERTY

Landowner: Private - Jeff Joslin; Oregon Department of State Lands

Site description: The Joslin property is located at river mile 2.5 near the confluence of the Willamette River with the Multnomah Channel. The property is 118 acres. Some shallow in- water habitat is present at the site adjacent to the leveed river bank. Some large wood has accumulated along the beach.

Proposed restoration: Restoration at this site could involve removing the existing dikes and constructing set back dikes along the property line; regrading the river banks to make a shallower slope; and adding native vegetation and large wood to the shoreline to supply more habitat structure. If moving the levee is not feasible, the site provides the opportunity for enhancement of a large wetland upland of the levee.

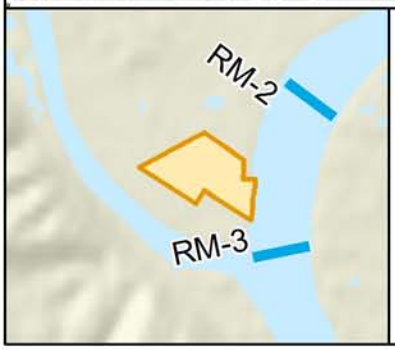
Benefits: Off-channel, shallow, slow moving waters provide refuge and productive foraging areas for lamprey and juvenile salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Native vegetation provides an invertebrate food source, cover, perching, and nesting habitat for birds and other animals. Natural beaches serve as foraging areas for mink and staging areas for spotted sandpiper and other migratory birds. Moving the dike and regrading the shoreline will reconnect this area to its historic floodplain and encourage the use of off-channel areas by fish. Adding large wood and native vegetation along the banks will improve habitat complexity, increase sediment retention, and provide an invertebrate food source for fish and some wildlife.

Feasibility: Moving the levee involves significant feasibility issues that would have to be thoroughly investigated during the planning and engineering of the site. The private landowner is willing to have the property restored. There are no known permitting issues. The project would be largely self-sustaining.

Other constraints/considerations: This site is unique because of its size and proximity to other good quality habitat (Miller Creek and PGE properties). There is no known imminent threat of development.

Joslin Property

Map prepared for Portland Harbor Natural Resource Trustees



N

0 520

Feet

Outfall

Stream

Restoration Site

Potential Bank Restoration

Wetland Creation

Wetland Enhancement

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LINNTON NEIGHBORHOOD

Landowner: Linnton Plywood Association, Babcock Land Co LLC, RK Storage & Warehouse Inc., Oregon Department of State Lands

Site description: The Linnton Neighborhood site is located at river mile 4.6. It is an industrial property that contains an inactive plywood company. There is shallow water habitat along the shoreline in two inlets. The shoreline is mostly classified as beach and is generally in good condition. The center of the site has a particularly high bank consisting of native rock. One section at the north end is rip rap. There is a strip of trees between the shoreline and the developed upland. Several seasonal streams that once crossed the property currently run through pipes and culverts.

Proposed restoration: Restoration at this site could include several components: regrading and revegetating the shoreline to improve the quantity and quality of beach habitat; regrading and adding wood to increase the quantity and quality of shallow water habitat; "daylighting" the streams that cross the property to create new tributary habitat; restoring fish and wildlife passage from the site to Forest Park; excavating nearshore areas to create off-channel riparian habitat; removing overwater structures and remnants of industrial buildings; and restoring native vegetation to the site.

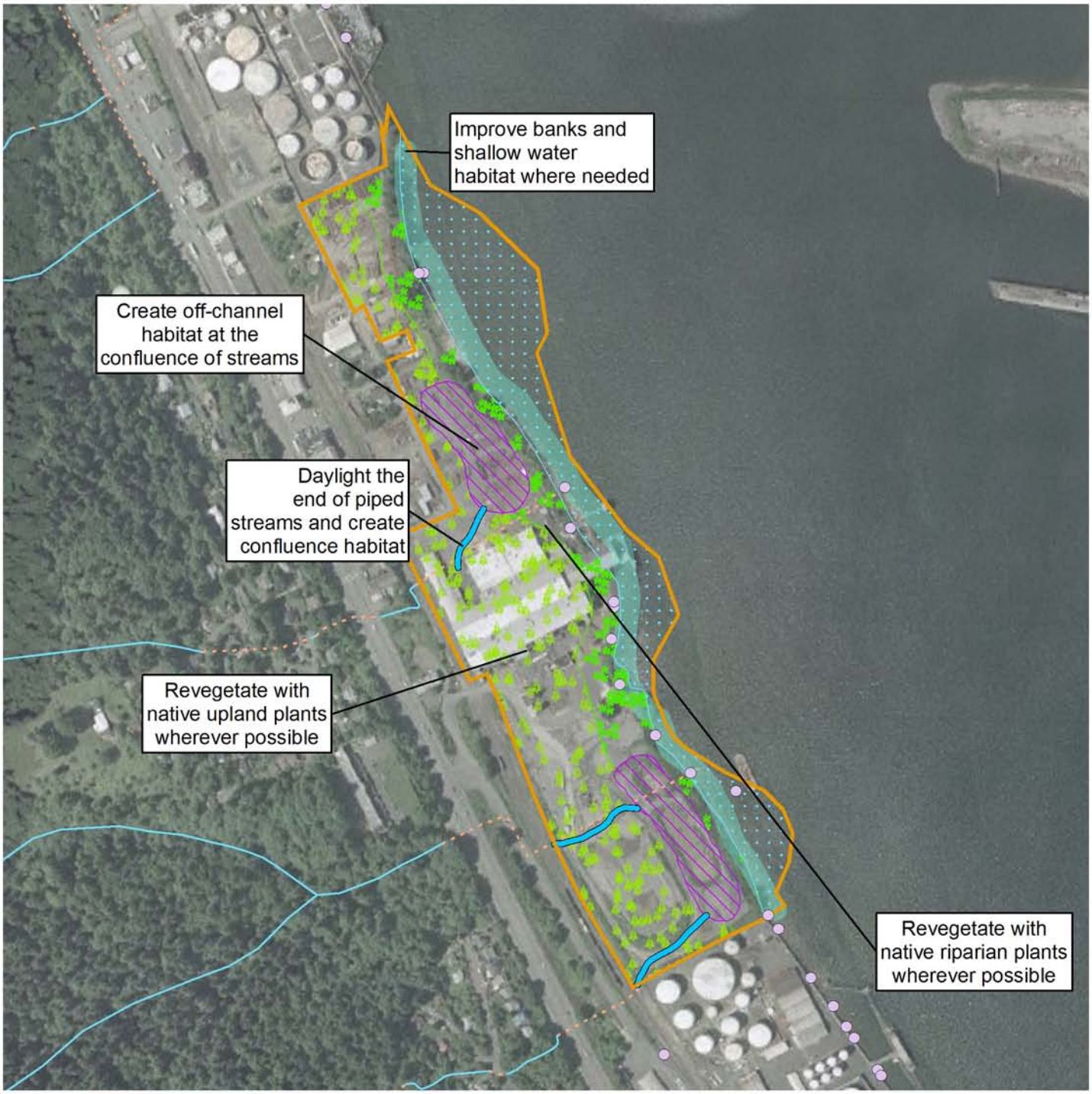
Benefits: "Daylighting" the piped streams on this site and restoring passage will provide fish and wildlife access to shallow, complex habitat, and return floodplain function to this mostly impervious site. Increased floodplain connectivity also enhances habitat complexity and encourages the use of off-channel areas by salmon and lamprey. Shallow areas also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Vegetation and wood provide cover and feeding stations for various species while contributing to improved water quality. Beach habitats sustain rich invertebrate populations; consequently they are important foraging areas for spotted sandpiper, mink, salmon and a variety of other organisms.

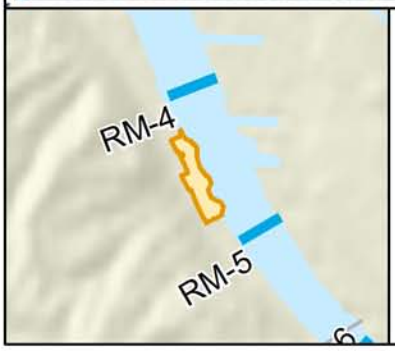
Feasibility: The land is in private ownership and is currently for sale. There is significant development pressure, as it is currently zoned for river-industrial use. Many members of the Linnton community are strongly supportive of restoration at the site. If off-channel habitat is developed, it will require a minor amount of ongoing maintenance.

Other constraints/considerations: The north and south parts of the site are owned by different entities. It is possible that only half of the site would be restored, though it would be preferable to restore the whole site. This is a unique site because of the presence of beach habitat and because of the opportunity to connect to clear, cold water from Forest Park streams.

Linnton Neighborhood

Map prepared for Portland Harbor Natural Resource Trustees





N

0 410

Feet

Outfall
Stream
Piped Stream Segment
Restoration Site
Potential Bank Restoration
Potential Channel Restoration
Off-Channel Habitat
Shallow Water Habitat
Riparian Shrubs and Trees
Upland Vegetation

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MarCom

Landowner: Langley St Johns LLC, Port of Portland, Oregon Department of State Lands

Site description: The MarCom site is located at river mile 5.5 on the east bank of the Willamette River. The riverbank is classified as beach and accumulates large wood. The north end of the site has been paved. There is currently good quality beach habitat present at the site. There is limited shallow in-water habitat along the shore. The banks and upland area are vegetated sparsely. A boat launch, slag, and other remains of industry are currently present at the site. Cathedral Park is located just south of the MarCom site, providing for potential habitat connectivity.

Proposed restoration: Restoration at this site would likely include several components: construction of a bioswale; creation of off-channel wetland habitat; revegetation of the entire site with native species; and removal of infrastructure. Stormwater runoff from upland areas, which currently enters the river through an outfall, would be treated by the bioswale and the constructed wetlands.

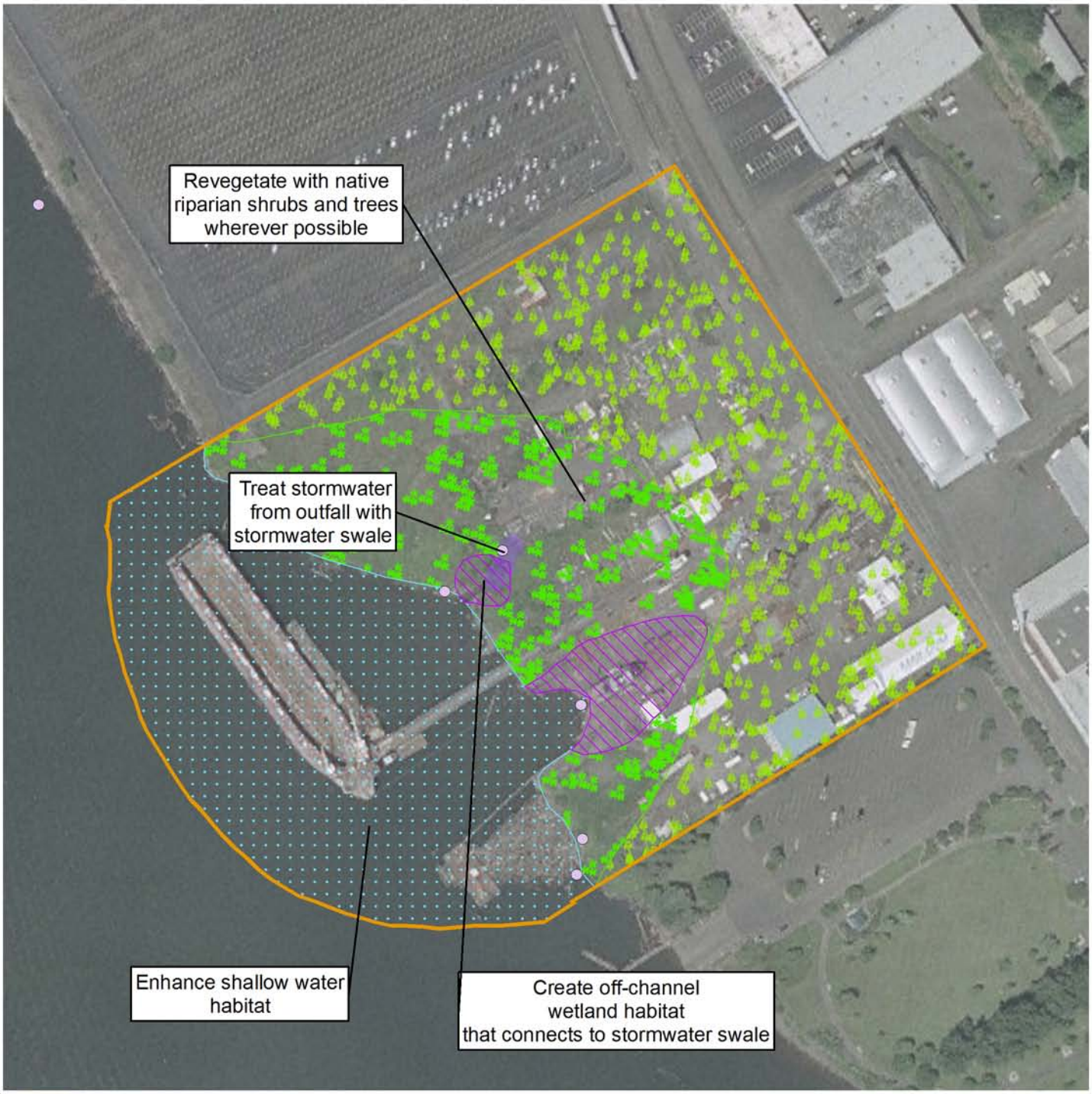
Benefits: Wetlands provide off-channel, shallow water refuge habitat for salmon and lamprey. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Native vegetation will provide food and cover for a variety of species of fish and wildlife, and perching and nesting opportunities for bald eagle, osprey, and other birds. Treating the stormwater runoff in the swale and wetland will directly improve water quality.

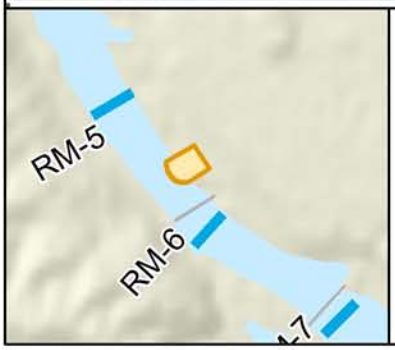
Feasibility: Department of Environmental Quality-led remedial actions were scheduled to begin summer 2008; restoration cannot begin until after the remediation is completed. The property is privately owned and it is unknown if the owner is willing to allow the property to be restored. Minor long-term maintenance would be required to manage the stormwater facilities.

Other constraints/considerations: There is already significant wood accumulation and floodplain habitat at the site. The threat of the site being developed is significant. The north portion of the site has been purchased by the Port of Portland and the south portion is going through source control with DEQ. The southern portion of the property is currently for sale.

MarCom

Map prepared for Portland Harbor Natural Resource Trustees





N

0 190

Feet

Outfall

Restoration Site

Potential Bank Restoration

Stormwater Swales

Off-Channel Habitat

Shallow Water Habitat

Riparian Shrubs and Trees

Upland Vegetation

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MILLER CREEK CONFLUENCE

Landowner: Frevach Land Co., Lucky Landing LLC, Oregon Department of State Lands, others

Site description: The Miller Creek site is located at river mile 3.2 along the Multnomah Channel. Miller Creek itself is routed under a railroad bridge, and then through a series of baffles before becoming a narrow steep-sided channel and draining to a marina, which is in an alcove off of Multnomah Channel. Another creek also flows from the upstream property to the marina. The remainder of the site includes riparian habitat with vegetation and an area that has been filled. There is also a small stretch of unclassified shoreline and there appears to be shallow in-water habitat along the Multnomah Channel. There is no apparent development in most of the site, except for a portion of the site that extends across the highway and railroad, and a section of road that leads to the marina.

Proposed restoration: Restoration efforts at this site would likely involve several components: fish and wildlife passage enhancement in Miller Creek under the railroad tracks; relocation of Miller Creek so that it flows directly into Multnomah Channel; and addition of large wood and native vegetation along Miller Creek and throughout all open areas on the site.

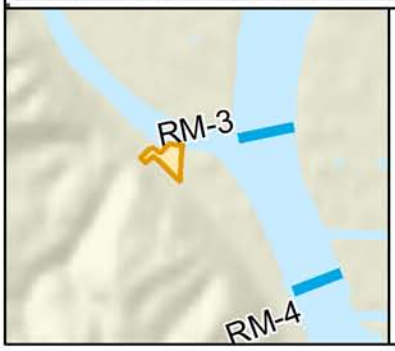
Benefits: Realigning the creek, improving passage, and adding native vegetation and large wood will improve habitat connectivity and quality, enhancing the habitat for salmon, lamprey, sturgeon, and terrestrial species. Forested areas would provide large trees for perching and nesting opportunities for bald eagle, osprey and other birds. Creating additional tributary and wetland habitat will increase off-channel areas with shallow in-water habitat used by lamprey and salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Restoring the stream and wetland will reconnect this area to its historic floodplain and also enhance habitat complexity by encouraging the use of off-channel areas by fish and wildlife.

Feasibility: The land is privately owned and one of the landowners has expressed unwillingness to allow restoration on the property. There are no known permitting issues. Because of hydrologic changes, minor on-going maintenance would be required.

Other constraints/considerations: Miller Creek is unique because the entire upper watershed is well-forested, it is one of the least impacted watersheds within the City of Portland, and because it is the only location where coho salmon are believed to spawn in the Portland Harbor study area.

Miller Creek Confluence

Map prepared for Portland Harbor Natural Resource Trustees



N

0 190

Feet

- Outfall
- Stream
- Piped Stream Segment
- Restoration Site
- Potential Channel Restoration
- Off-Channel Habitat
- Passage Improvement and Channel Restoration
- Riparian Shrubs and Trees
- Upland Vegetation

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OWENS-CORNING FLOODPLAIN

Landowner: Owens-Corning, GATX Storage Terminals, Oregon Department of State Lands

Site description: The Owens Corning site is located at river mile 4 on the west side of the Willamette River. The northern half of the shoreline is classified as vegetated riprap while the southern half is beach. There appears to be some shallow in-water habitat. A strip of vegetation borders the shoreline and there is a larger patch of sparse vegetation present in the south end of the site. Though the southern vegetated area is sparse, it provides some habitat connectivity between the river and Forest Park. According to the Willamette River Natural Resource Inventory Report, bobcat have been sighted foraging on the beach in this area. No streams currently run through the site. Drainages that once crossed the site are diverted to the north and south of the site through pipes.

Proposed restoration: Restoration at this site could involve several components: reconnecting a seasonal stream to the river and potentially the uplands; removing rip rap from the shoreline away from the facility; regrading and revegetating the shoreline and floodplain; and creating additional off-channel habitat.

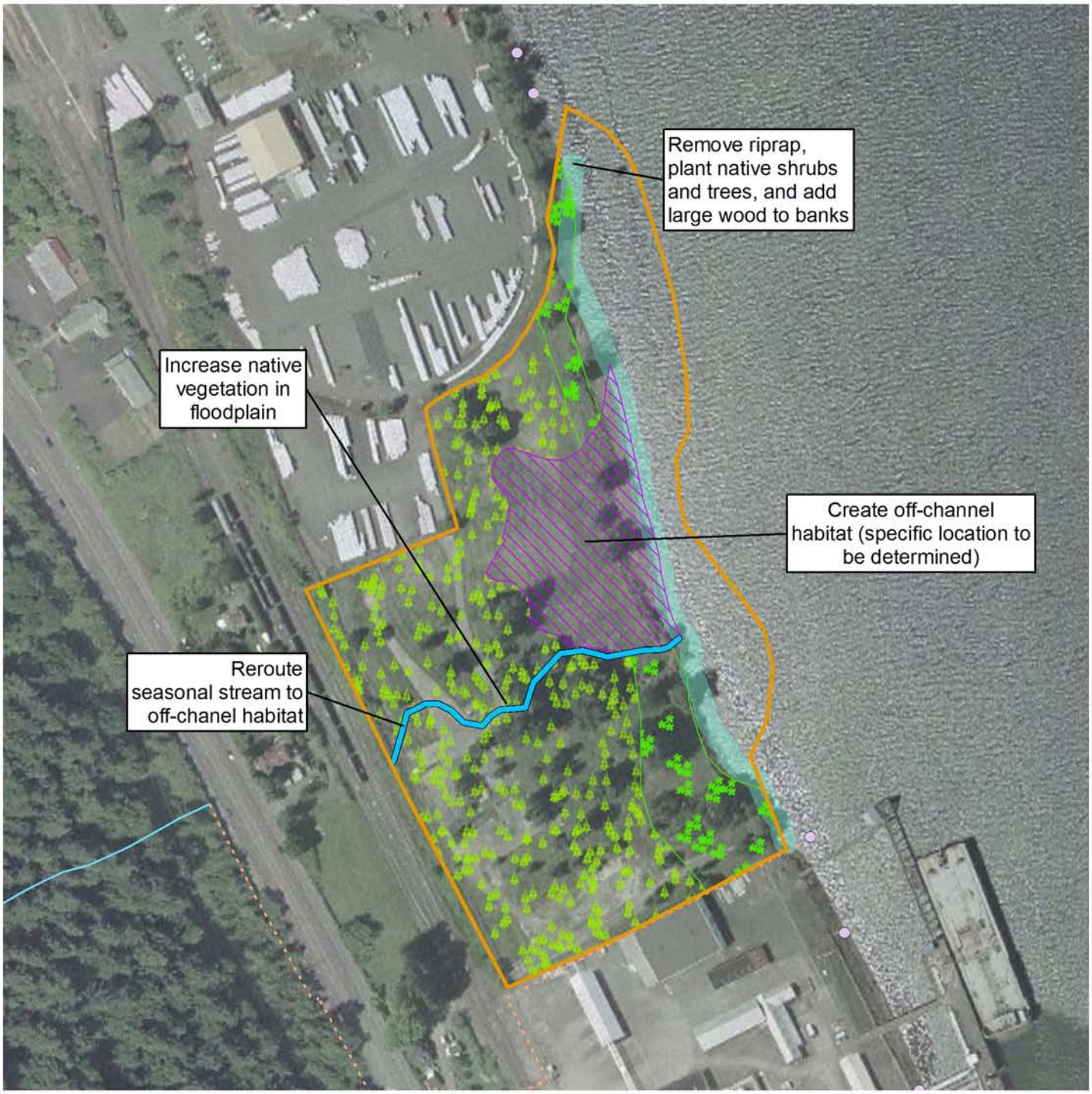
Benefits: Naturally sloped, vegetated stream banks increase floodplain connectivity and habitat diversity. Replacing the rip rap with a sloped shoreline will allow for the accumulation of wood, trapping sediment and adding further complexity to the system. Juvenile salmon, lamprey, and sturgeon prefer complex habitats that provide cover and feeding stations. Low gradient tributaries provide suitable spawning and rearing habitat for salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Native vegetation will provide food and cover for a variety of species. Mature forested areas provide large trees that can serve as perch and nesting sites for bald eagle, osprey, and other birds.

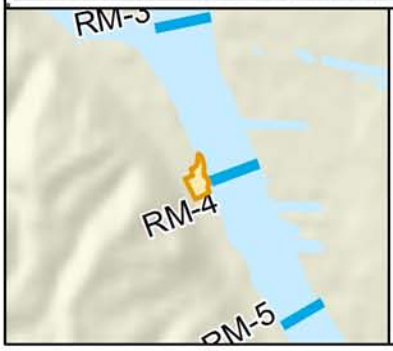
Feasibility: The land is privately owned and the owner has expressed willingness to restore part of the site. The site is zoned industrial, so there may be some minor permitting issues. The plantings and modified hydrology will require minor maintenance. Homeland Security prevents planting along the bank riverward of the facility because petroleum tanks are present.

Other constraints/considerations: The site provides one of the few opportunities to enhance floodplain and off-channel areas in the industrial reach. The property owner has indicated that they are not likely to develop the vacant portion of the site.

Owens-Corning Floodplain

Map prepared for Portland Harbor Natural Resource Trustees





N

0 200

Feet

Outfall

Stream

Piped Stream Segment

Restoration Site

Potential Bank Restoration

Potential Channel Restoration

Off-Channel Habitat

Riparian Shrubs and Trees

Upland Vegetation

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PGE

Landowner: Portland General Electric, Oregon Department of State Lands

Site description: The PGE site is located at river mile 3.2, at the confluence of the Willamette River and Multnomah Channel. The site contains the Harborton Wetlands, a remnant black cottonwood and ash floodplain forest wetland area that provides good quality off-channel habitat, floodplain function, and habitat connectivity between the river and Forest Park. The banks of these wetlands are natural beach with some vegetation on the edges. The shoreline appears to transition to shallow in-water habitat along the site. The site also contains a small piece of terrestrial habitat that is covered by invasive vegetation, pavement and structures.

Proposed restoration: Restoration at this site could include several components: excavating from the river to the middle of the site to connect the wetlands to the river; redirecting the stream running through the southwest corner of the site to connect with the newly created wetlands; improving the river bank at the south end of the site; removing invasive plants and replanting native vegetation in the forested wetland, floodplain, and upland areas; and remove pavement, fill and structures wherever possible.

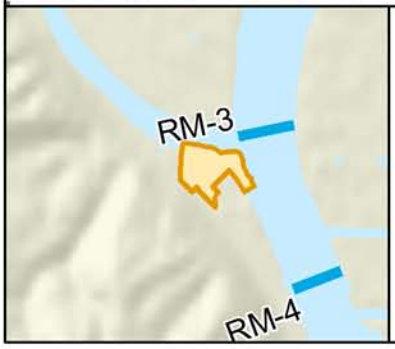
Benefits: Off-channel and tributary waters are some of the most productive rearing sites for salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Natural beaches and shallow wetlands also serve as foraging areas for mink and staging areas for spotted sandpiper and other migratory birds. Native vegetation will provide food and cover for a variety of species while reducing erosion and enhancing water quality. The structural diversity, snags, and large wood that may be enhanced in the forested portion of the site provide valuable habitat complexity for terrestrial species. Revegetation would provide large trees for perching and nesting opportunities for bald eagle, osprey and other birds.

Feasibility: The land is privately owned and it is anticipated that the owner may be willing to allow restoration on the property. There are no known permitting issues. The plantings and wetlands would require minor ongoing maintenance.

Other constraints/considerations: The PGE site is rare because it is an undeveloped site in good condition. Its location at the confluence of the Willamette River and Multnomah Channel is unique. There is no known imminent threat of the property being developed. Restoration at this site would need to be coordinated closely with restoration plans at the adjacent Miller Creek site.

PGE

Map prepared for Portland Harbor Natural Resource Trustees



N

0 330

Feet

Outfall

Stream

Piped Stream Segment

Restoration Site

Potential Bank Restoration

Potential Channel Restoration

Off-Channel Habitat

Riparian Shrubs and Trees

Upland Vegetation

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POWERLINE CORRIDOR

Landowner: Portland General Electric, US Government powerline easement, Oregon Department of State Lands

Site description: The Powerline Corridor site is located at river mile 3.4 on the west side of the Willamette River, just south of Multnomah Channel. An intermittent stream flows down from Forest Park and through the site. Most of the stream is natural, open channel, except where it flows through culverts below HWY 30, the railroad, and a service drive close to its confluence with the river. The stream then flows into a small forested wetland area, which contains trees, shrubs, and herbaceous vegetation. The wetland is separated from the Willamette River by a raised berm. The shoreline is vegetated beach, with some apparent shallow in-water habitat at the north end.

Proposed restoration: Restoration of the site could include removing the berm where the last segment of the creek is piped; lowering the grade in the bermed area; adding large wood to the stream and beach; revegetating the floodplain areas with native plant species and removing invasive plants; planting native trees and shrubs in upland areas; and planting native plants, including wapato, in the wetlands.

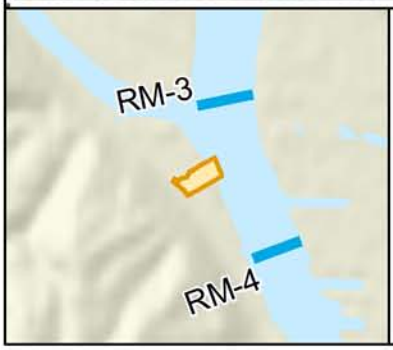
Benefits: Off-channel and tributary waters are some of the most productive rearing sites for salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Natural beaches and shallow wetlands also serve as foraging areas for mink and staging areas for spotted sandpiper and other migratory birds. Large wood creates habitat complexity for juvenile salmon, lamprey, and sturgeon that use them for cover and feeding stations. Native vegetation will provide food and cover for a variety of species while reducing erosion and enhancing water quality. Mature trees will provide perching and nesting opportunities for bald eagle, osprey, and other birds.

Feasibility: The land is privately owned. There are no known permitting issues. The plantings and created wetlands would require minor ongoing maintenance.

Other constraints/considerations: The habitat provides a rare opportunity to connect an existing forested wetland to the Willamette River. The existing beach, wetland, and forest patches already provide good quality habitat in this heavily developed area; it is important that any restoration plan includes protection of these functioning habitats. When planting vegetation in the southwest corner of the site, special consideration must be taken because an engineered cap is in place.

Powerline Corridor

Map prepared for Portland Harbor Natural Resource Trustees



N

0 220

Feet

- Outfall
- Stream
- Piped Stream Segment
- Restoration Site
- Potential Bank Restoration
- Off-Channel Habitat
- Revegetation
- Riparian Shrubs and Trees
- Upland Vegetation

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POWERLINE CORRIDOR CROSSING

Landowners: Portland General Electric, US Government powerline easement, Metro, City of Portland

Site description: The Powerline Corridor Crossing site is contiguous with the Powerline Corridor site, which is located at river mile 3.4 on the west side of the Willamette River, just south of Multnomah Channel. An intermittent stream flows from Forest Park and through the site. Most of the stream is mapped as natural, open channel, except where it flows through culverts under HWY 30, the railroad, and a service drive close to its confluence with the river. This project area could potentially be used to improve connectivity for wildlife by creating a movement corridor between Forest Park and the Willamette River through the Powerline Corridor site.

Proposed restoration: Wildlife passage could potentially be improved from Forest Park to the Powerline Corridor site by installing wildlife crossing signs along Marina Way (a road with low traffic volume) and installing a crossing under HWY 30 to allow safe wildlife movement between Forest Park and the Willamette River. The crossing could follow the location of the stream corridor, and could potentially improve the quality and availability of aquatic habitat for fish that use the downstream reach in the Powerline Corridor site.

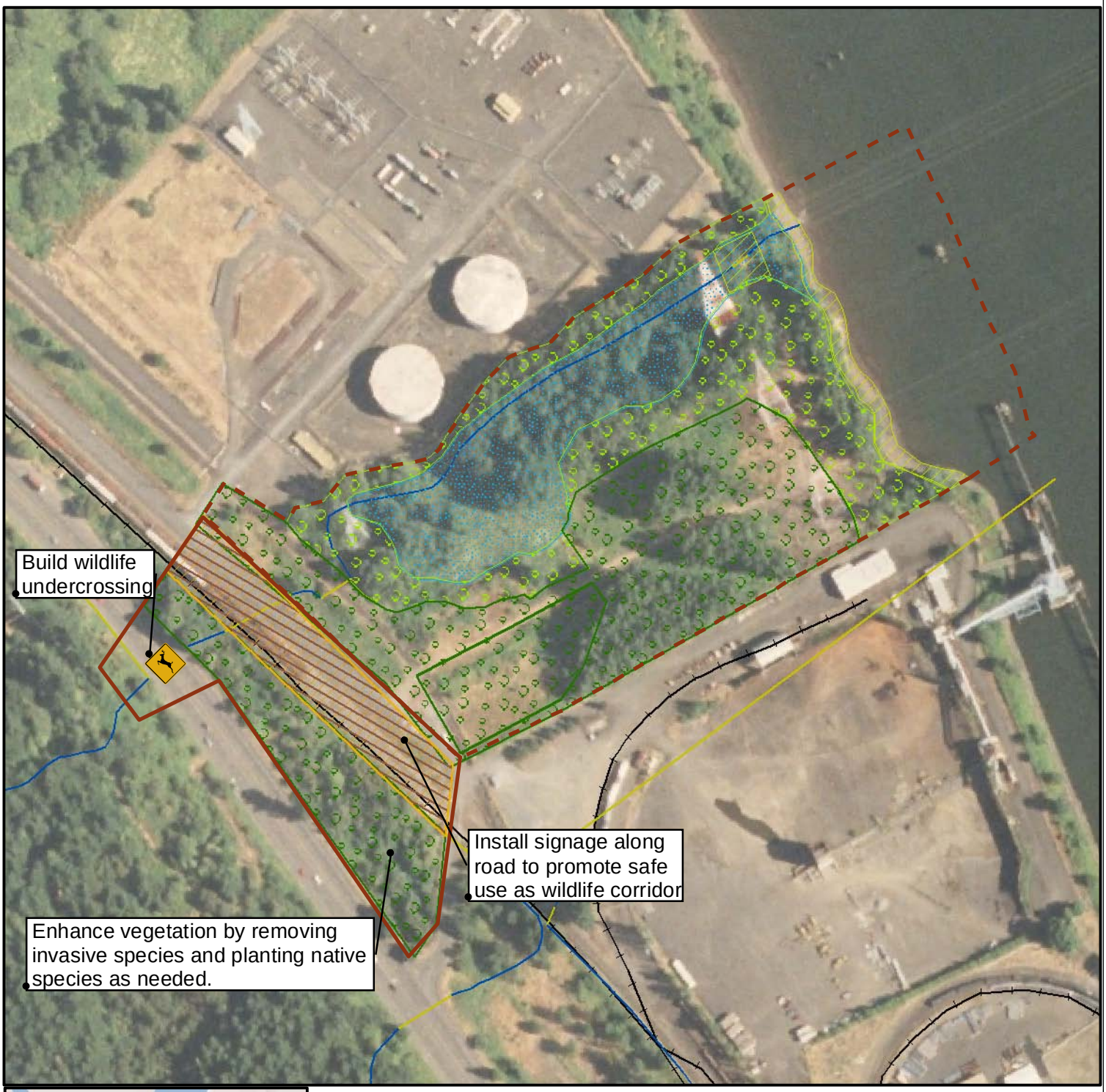
Benefits: The site may offer a rare opportunity to facilitate wildlife movement between Forest Park and the Willamette River in an area where the distance between the two is relatively short. Small mammals such as mink may be able to use the corridor to locate resources such as food, cover and den sites that would not otherwise be accessible. Upstream areas that are currently inaccessible to salmonids could potentially become available and provide some refugia during the wet season.

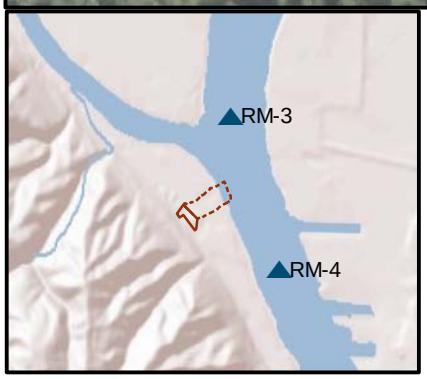
Feasibility: Building a crossing under HWY 30 and establishing a corridor that includes several parcels, another road and a railroad track will require the involvement and support of multiple landowners and stakeholders. The feasibility of constructing a crossing under HWY 30 and the potential benefits for fish and wildlife likely to result from possible design alternatives will need to be more fully evaluated. Permitting related to work involving HWY 30 is likely to be challenging, although there are no known fatal flaws.

Other constraints/considerations: The site provides a rare opportunity to provide a potential connection between Forest Park and the Willamette River for fish and wildlife.

Powerline Corridor Crossing

Map prepared for Portland Harbor Natural Resource Trustees





N

0 250
Feet

- Powerline Corridor Crossing
- Powerline Corridor (adjacent site)
- Wildlife crossing
- Open Channel
- Stormwater Pipe or Culvert
- Willamette River Miles
- Upland revegetation
- Riparian revegetation
- Bank enhancement
- Off-channel wetland habitat
- Wildlife corridor
- Railroad Track

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SALTZMAN CREEK

Landowner: Genstar Roofing, Kinder-Morgan, GATX Terminals, Atofina Chemicals, Oregon Department of State Lands

Site description: The Saltzman Creek site is located at river mile 7.5 on the edge of Willbridge Cove. Saltzman Creek itself runs in culverts through most of the site. There is a small amount of riparian vegetation currently on site, and 55.5% of the site is currently impervious. The shoreline contains beach and mudflat habitat and is in good condition. There appears to be very little shallow in-water habitat currently. The site contains some contaminated sediment, which is being at least partially remediated.

Proposed restoration: Restoration at this site could include several components: excavating and regrading the shoreline to a shallower slope; revegetating the shoreline and river banks with native riparian vegetation; and adding large wood to the shoreline and river banks.

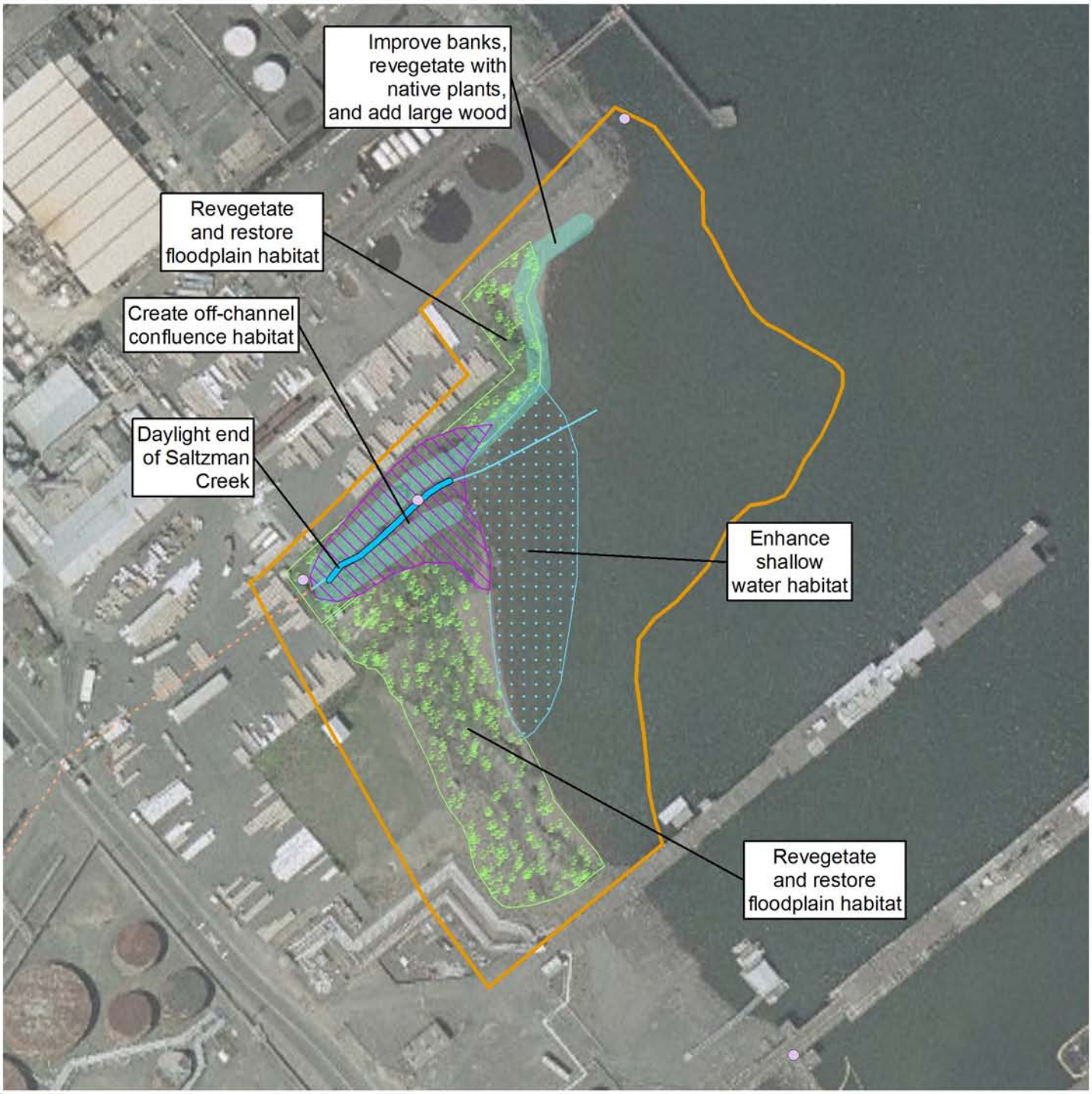
Benefits: Shallow, low velocity, complex shoreline habitat is crucial for salmon rearing. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. The habitat structures created by vegetation and wood provide cover and feeding stations for a variety of species while contributing to improved sediment retention and water quality. Beach habitats sustain rich invertebrate populations; consequently they are important foraging areas for spotted sandpiper, mink, and a variety of other organisms.

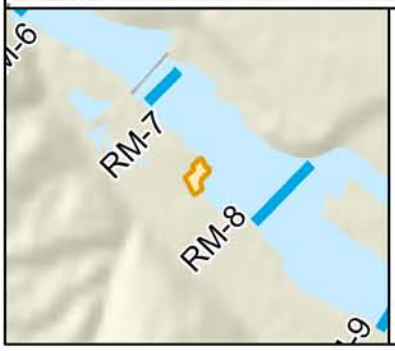
Feasibility: The extensive storage and transport of petroleum products has the potential to impact habitat functions, and should be carefully evaluated for potential impacts on restoration and water quality within Saltzman Creek. There are no known permitting issues. Minor ongoing maintenance would be required to stabilize new vegetation and modified hydrology.

Other constraints/considerations: The existing confluence area is unique because it provides a cool water confluence and off-channel habitat. There is threat of the site of being developed for commercial or industrial use.

Saltzman Creek

Map prepared for Portland Harbor Natural Resource Trustees





N

0 160

Feet

- Outfall
- Stream
- Piped Stream Segment
- Restoration Site
- Potential Bank Restoration
- Potential Channel Restoration
- Off-Channel Habitat
- Shallow Water Habitat
- Revegetation

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SOUTH RIVERGATE CORRIDOR

Landowner: Oregon-Washington Railroad, Port of Portland, City of Portland, Portland General Electric, Time Oil Co., Oregon Department of State Lands

Site description: The South Rivergate Corridor site is located near river mile 3.3. It provides a vegetated corridor connecting the Willamette River, Multnomah Channel, Forest Park, the Lower Columbia Slough, and Smith and Bybee Lakes. The shoreline is designated as beach and accumulates large wood. Active dredging of the Willamette River causes a steep drop off from the shore, with little adjacent shallow in-water habitat. There is evidence of erosion and scour along the riverbank. In the upland portion of the site there are multiple seasonal and year- round wetlands and associated vegetation. The Portland General Electric (PGE) power line corridor runs along the site.

Proposed restoration: Restoration options at the site are restricted to wildlife uses and would be focused on preserving existing habitat features. Restoration at this site is likely to include planting native vegetation to enhance the wetlands and to support wildlife habitat connectivity within the corridor, as well as planting native vegetation along the banks and uplands.

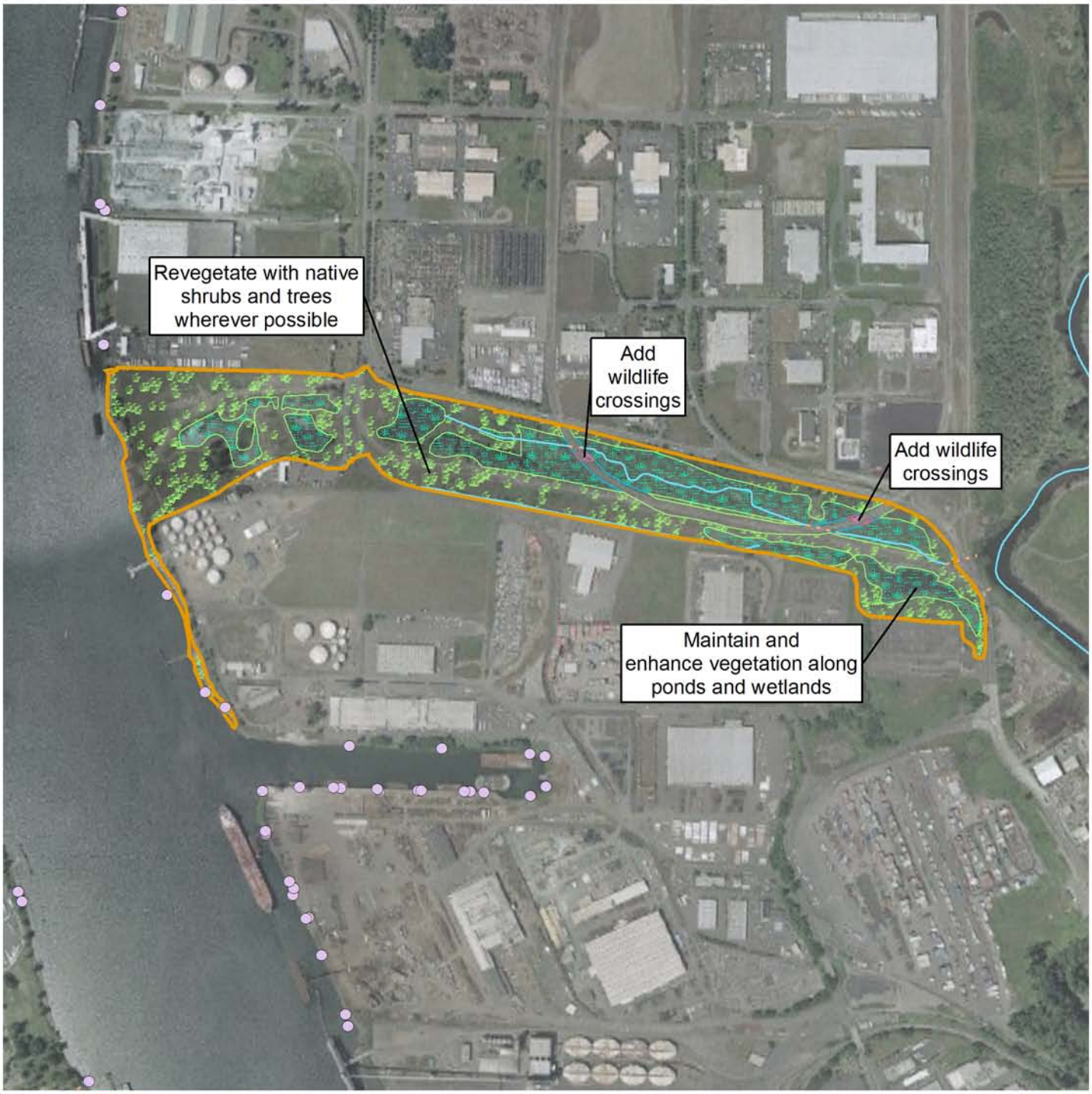
Benefits: Revegetation of the corridor would provide a wildlife movement corridor to the Rivergate wetlands. Enhancement of wetlands will provide foraging habitat for spotted sandpiper, mink and other wildlife species.

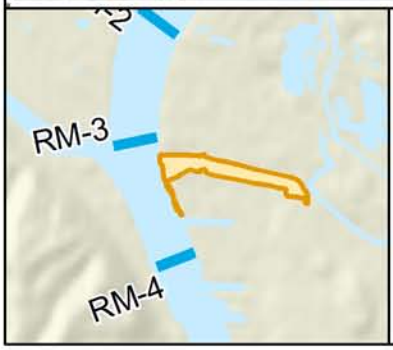
Feasibility: The site is currently zoned as industrial. The project would be largely self-sustaining.

Other constraints/considerations: The Rivergate Corridor supports a variety of wildlife, in addition to providing habitat connectivity between multiple significant habitats on both sides of the Willamette. Planting of large trees at the site will be restricted due to the presence of power lines on the site. Part of this area has been used for past mitigation under section 404 of the Clean Water Act. Protection and restoration activities should occur outside of past mitigation project footprints whenever possible.

South Rivergate Corridor

Map prepared for Portland Harbor Natural Resource Trustees





N

0 830

Feet

Outfall

Stream

Piped Stream Segment

Restoration Site

Potential Bank Restoration

Potential Channel Restoration

Revegetation

Wetland Enhancement

Wildlife Corridor

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale. This map was prepared using a geospatial database provided by the City of Portland's Bureau of Environmental Services.

STEEL HAMMER

Landowner: Steel Hammer Properties, LLC, Oregon Department of State Lands (note: could expand to parcel across street)

Site description: This site includes two parcels that are 9.23 and 1.25 acres in size, totaling 10.48 acres. It is located between the Portland Water Pollution Lab by Cathedral Park and Willamette Cove. The site appears to be filled and graded. The majority of the site has been paved and is used as an outside storage area for steel products. There are no buildings or other structures on the site. Beach habitat with large woody debris and vegetation on the shoreline looks fairly natural from aerial photos, although large rock and boulders have been used to armor the bank, which is steeply sloped. About a quarter of the area is in the 100-year floodplain according to MetroMap.

Proposed restoration: Riparian, upland, and potentially shoreline and floodplain habitats at the site could be restored by removing pavement and fill material, regrading or benching the banks, improving soils and revegetating with native species. Snags and additional large wood could be installed to provide structure that would further enhance the value of native habitat.

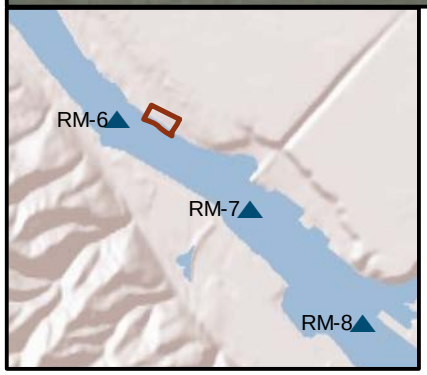
Benefits: Habitat at the site is currently limited to the beach and narrow riparian corridor along the shoreline. Vegetation could be restored to provide a more functional riparian zone and associated upland habitat. The banks could be sloped back or benched to increase the flood capacity and frequency of flooding on the site, and to facilitate growth of riparian vegetation. The site is in a prime location to improve connectivity between publicly-protected greenspaces (i.e., Cathedral Park and Willamette Cove) and provide additional habitat where there are very few remnants. Larger, well-connected habitats better support wildlife populations than smaller isolated habitats by providing more resources, supporting larger numbers of individuals, and facilitating genetic interchange. Mature trees and snags at the site could provide perching opportunities for bald eagle and osprey. The beach and shallow water habitats at this site could be used by spotted sandpiper and salmonids. Other birds, mammals, reptiles and amphibians are also likely to use the site.

Feasibility: Sandblasting grit and PCBs may occur on the site, and are contaminant concerns that should be further evaluated and addressed as needed.

Other constraints/considerations: The Clean Water Act, Section 404 permit history could be researched to see if there is a wetland restoration opportunity at the site. Portland Parks and Recreation has expressed interest in potential bank work adjacent to the Greenway Trail, but the site has not been identified for its restoration potential in the City's draft River Plan (as of 11/09). The site is adjacent to the Portland Water Pollution Lab; there may be interest in expanding public use into this site if and when restoration or a land use change occurs.

Steel Hammer

Map prepared for Portland Harbor Natural Resource Trustees



N

0 150
Feet

Restoration site
Railroad Track
Willamette River Miles
Upland revegetation
Riparian revegetation
Bank benching

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SWAN ISLAND BEACH NORTH

Landowner: Port of Portland, Oregon Department of State Lands

Site description: The Swan Island Beach North site is located at river mile 9.5. Swan Island is a heavily developed and active industrial area. There are two segments of the site's shoreline classified as beach with adjacent shallow water habitat. These vegetated beaches appear to be in good condition and are known to accumulate large wood, an uncommon occurrence within Portland Harbor. These beach areas are interspersed among banks treated with vegetated rip rap. There is a strip of shrubs and trees separating the shoreline from the developed upland.

Proposed restoration: Restoration at this site would likely involve several components: removing rip rap from the river bank; replanting the river bank where possible with native vegetation; and regrading the stream bank and shoreline to create shallow in-water habitat.

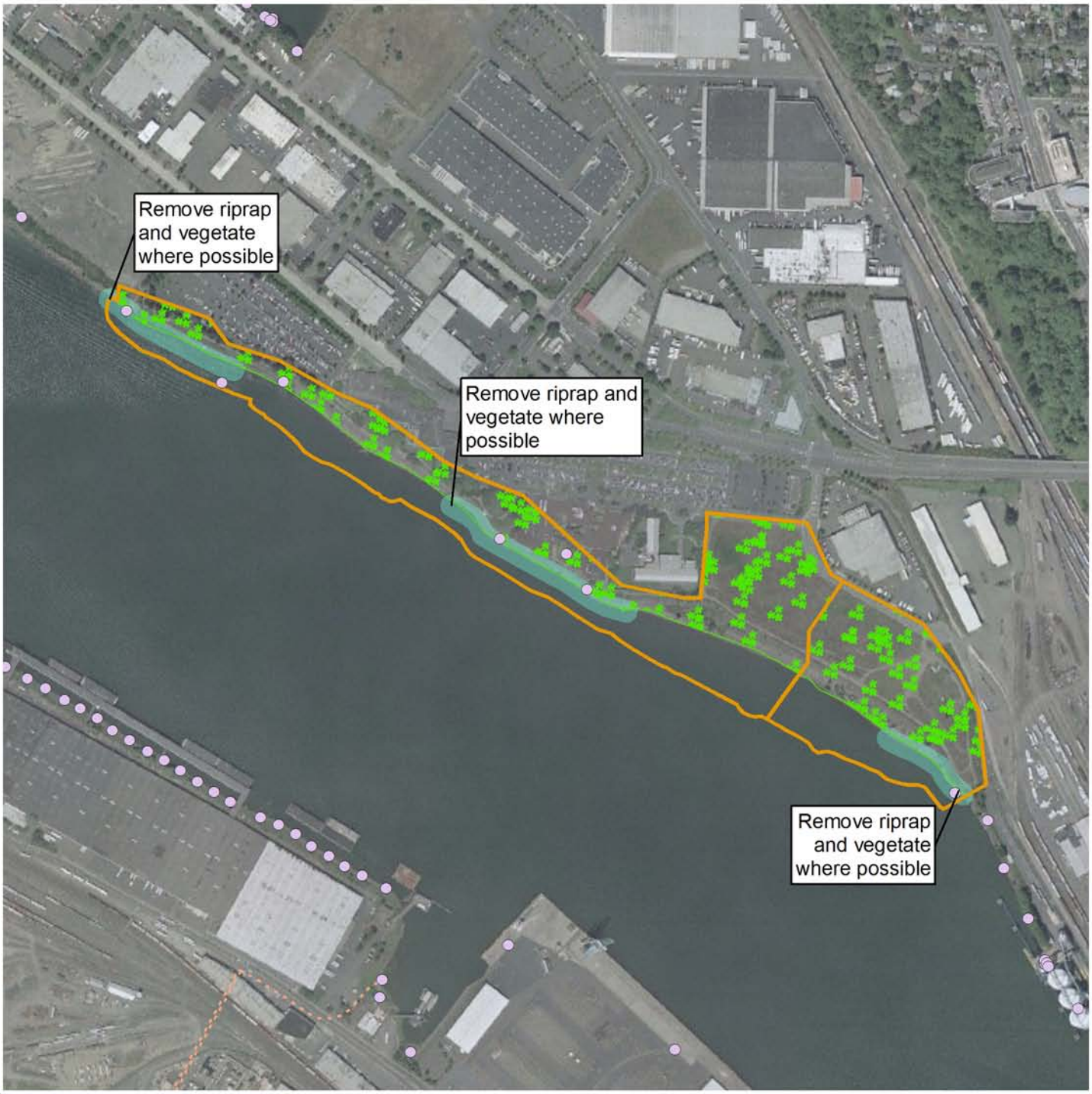
Benefits: Beach habitats sustain rich invertebrate populations; consequently they are important foraging areas for spotted sandpiper, mink, and a variety of other organisms. Naturally sloped, vegetated stream banks increase floodplain connectivity and habitat diversity. Replacing the rip rap with a sloped shoreline will allow for the additional accumulation of wood, adding further complexity to the system. Juvenile salmon, lamprey, and sturgeon prefer complex habitats that provide cover and feeding stations. Shallow areas serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Native vegetation will provide food and cover for a variety of species and could include the addition of perch and nesting sites for bald eagle, osprey and other native birds.

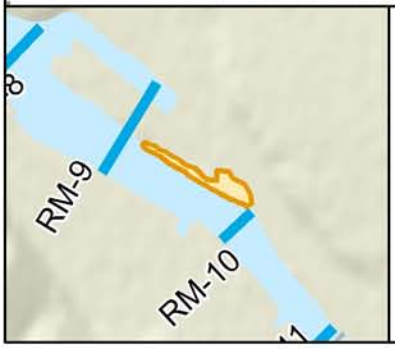
Feasibility: There are no known permitting issues. The project itself would be largely self-sustaining and require little maintenance.

Other constraints/considerations: Restoration potential at this site is highly constrained by developed uplands.

Swan Island Beach

Map prepared for Portland Harbor Natural Resource Trustees





N

0 550

Feet

Outfall

Piped Stream Segment

Restoration Site

Potential Bank Restoration

Potential Channel Restoration

Riparian Shrubs and Trees

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SWAN ISLAND BEACH SOUTH

Landowner: City of Portland, Oregon Department of State Lands

Site description: The Swan Island Beach South site is located at river mile 9.75 on the east side of the Willamette River. Swan Island is a heavily developed and active industrial area. Half of the shoreline is classified as beach with adjacent shallow water habitat. This vegetated beach appears to be in good condition and is known to accumulate large wood. The other half of the shoreline is treated with vegetated rip rap or unclassified fill. The riverbank slopes are extremely steep. There is a strip of shrubs and trees separating the riverbank from the developed upland.

Proposed restoration: Restoration at this site could involve removing rip rap from the river bank; replanting the river bank and floodplain with native vegetation; and excavating and regrading the shoreline to increase the amount of floodplain, flood storage, and shallow water habitat.

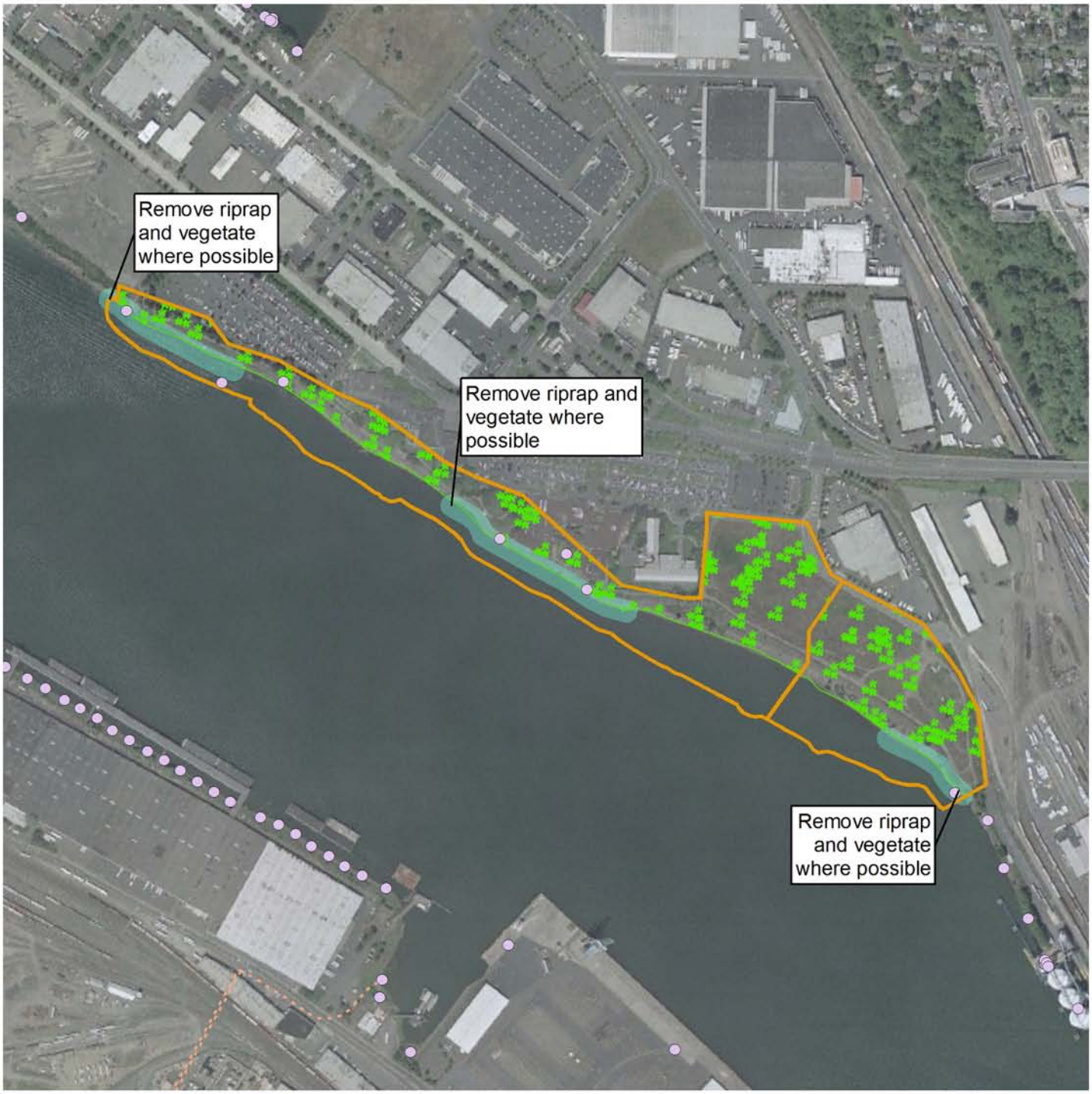
Benefits: Beach habitats sustain rich invertebrate populations; consequently they are important foraging areas for spotted sandpiper, mink, and a variety of other organisms. Naturally sloped, vegetated stream banks increase floodplain connectivity and habitat diversity. Replacing the rip rap with a sloped shoreline will allow for the accumulation of wood, adding further complexity and sediment retention to the system. Juvenile salmon, lamprey, and sturgeon prefer complex habitats that provide cover and feeding stations. Shallow areas serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Native vegetation will provide food and cover for a variety of species and could include the addition of perch and nesting sites for bald eagle, osprey and other native birds.

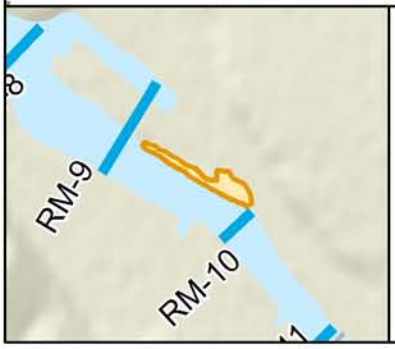
Feasibility: The site is in public ownership. There are no known permitting issues. The project itself would be largely self-sustaining and require little maintenance.

Other constraints/considerations: The site currently accumulates wood. Altering the bank slopes would require moving the greenway trail.

Swan Island Beach

Map prepared for Portland Harbor Natural Resource Trustees





N

0 550

Feet

Outfall

Piped Stream Segment

Restoration Site

Potential Bank Restoration

Potential Channel Restoration

Riparian Shrubs and Trees

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SWAN ISLAND LAGOON

Landowner: City of Portland, Port of Portland, Anchor Park LLC, ATC Leasing Co., Becker Land LLC, North Basin Watumull LLC, Oregon Department of State Lands

Site description: The Swan Island Lagoon site begins at river mile 9 and is a heavily developed, active industrial area. Riparian cover along the banks is fragmented by active river industrial uses (including boat ramps and docks), and some rip rap. Some areas of the bank support a well-established stand of black cottonwoods. A beach area at the end of the lagoon is associated with a wetland that potentially contains wapato vegetation. Invasive vegetation dominates much of the shoreline, particularly in a vacant parcel at the southeast end. There is shallow water habitat along the shores and at the end of the lagoon.

Proposed restoration: Restoration at the lagoon site would be focused on the vacant lot at the end of the lagoon and could include improving the bank by removing rip rap and invasive plants; protecting and enhancing native vegetation; improving shallow water habitat by adding large wood; excavating the floodplain to create a seasonal wetland; and treating stormwater runoff from the parking lots and boat ramp before it enters the lagoon. Protecting the existing stand of cottonwood trees along the side of the lagoon could also be a priority.

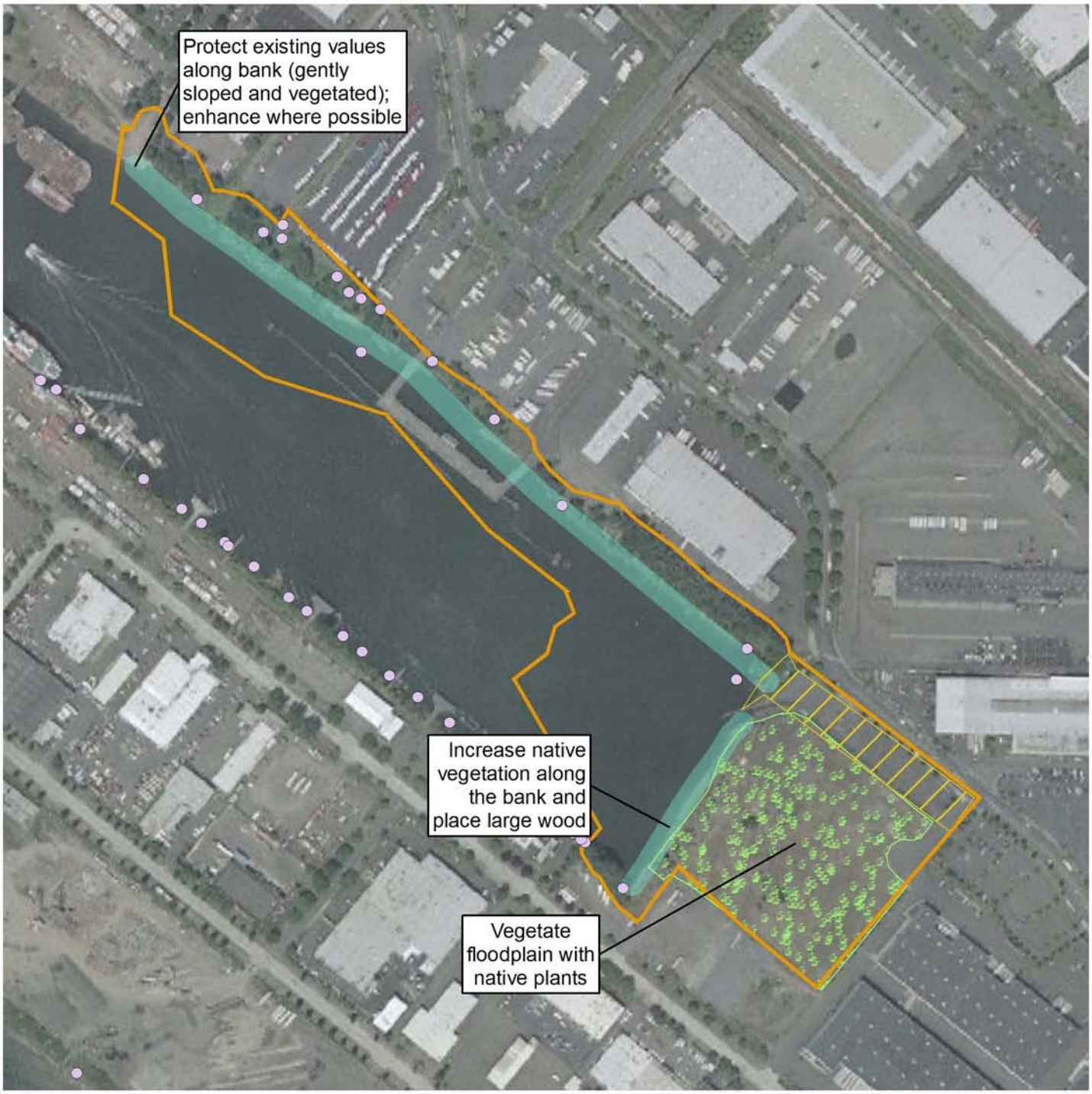
Benefits: Beach habitats sustain rich invertebrate populations; consequently they are important foraging areas for spotted sandpiper, mink, and a variety of other organisms. Naturally sloped, vegetated stream banks increase floodplain connectivity and habitat diversity. Juvenile salmon, lamprey, and sturgeon prefer complex habitats that provide cover and feeding stations. Off-channel, shallow, slow moving waters like lagoons gather wood and provide refuge and productive foraging areas for lamprey and juvenile salmon. The seasonal wetland would also provide shelter and a prey source for lamprey and salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Native vegetation will provide food and cover for a variety of species. Treating the stormwater runoff will directly improve water quality in the lagoon.

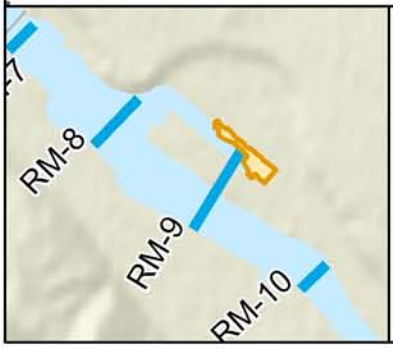
Feasibility: Some contamination cleanup will be necessary before restoration begins. The property is owned by a variety of entities, both public and private. There are no known permitting issues. Restoration efforts would require minor maintenance for plantings and hydrology.

Other constraints/considerations: The Swan Island Lagoon is the largest off-channel area in the industrial reach. The existing beach habitat is a unique feature in the area. Boat launches create a challenge for maintaining habitat values. The opportunity to restore the floodplain portion of this site may be lost if the City sells its land.

Swan Island Lagoon

Map prepared for Portland Harbor Natural Resource Trustees





N

0 350

Feet

Outfall

Restoration Site

Potential Bank Restoration

Impervious Surface Attenuation

Revegetation

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TERMINAL 5

Landowner: Port of Portland, Oregon Steel Mills Inc., Oregon Department of State Lands

Site description: The Terminal 5 site is located between river miles 2 and 3. The site is currently owned and used by the Port of Portland for industrial purposes. Most of the bank is comprised of beaches, along which the Port has planted some native trees and shrubs. Very limited shallow in-water habitat is present along the shoreline, but the channel and port are periodically dredged to maintain passage. Between the bank and the industrial uplands, remnant bottomland forest is present. A 6-acre forested wetland is located at the southern end of the site. The wetland is separated from the river by a berm and lies outside the flood area. A security fence running north-south through the forested property limits access to these habitats for some animals.

Proposed restoration: Preserving the existing habitat features would be a focus of efforts at this site. Restoration activities could include excavating in the south end of the site to expand the wetland; planting native vegetation; removing invasive plant species; and adding large wood to the site.

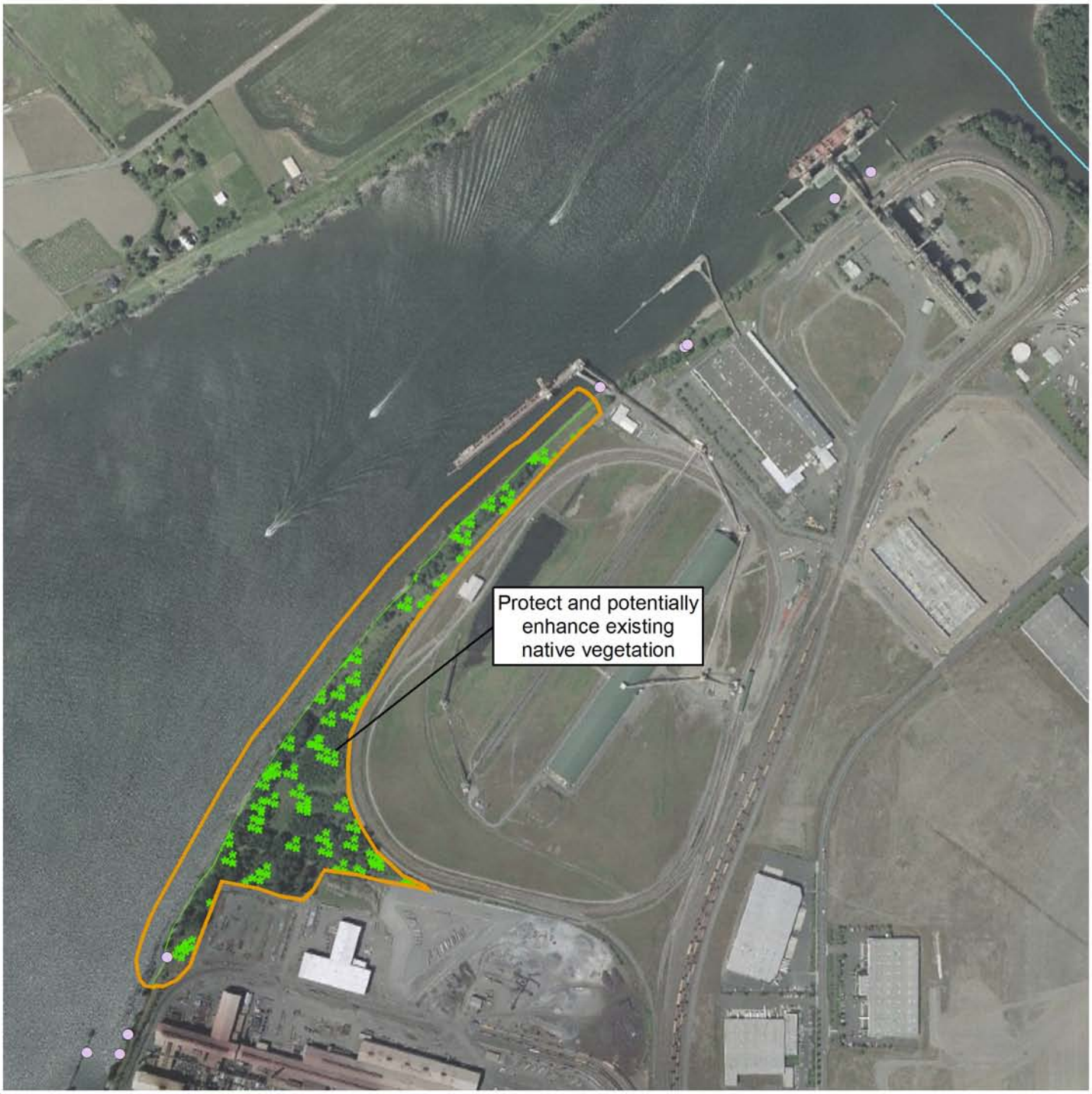
Benefits: Naturally sloped, vegetated stream banks increase floodplain connectivity and habitat diversity. Juvenile salmon, lamprey, and sturgeon prefer complex habitats that provide cover and feeding stations. Emergent and shrub wetlands provide shelter and a prey source for lamprey and salmon, as well as spotted sandpiper, mink and other wildlife species. Native vegetation and wood provide cover and feeding stations for various species while contributing to improved water quality.

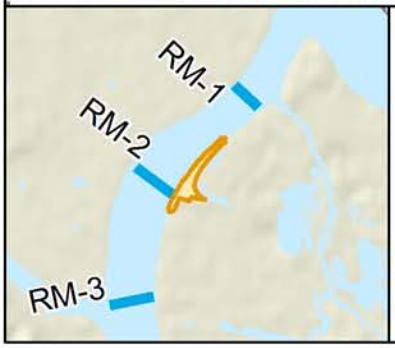
Feasibility: There may be limitations on amount and type of vegetation that can be planted at the site because the site is an active terminal. There are no known permitting issues. The invasive plant removal portion of the restoration plan would require minor ongoing maintenance.

Other constraints/considerations: Forest, wetland, and beach habitats are rare in the Portland Harbor study site. Protecting these areas from further development and enhancing them with restoration will ensure they continue to provide valuable habitat. The Terminal 5 site contains a variety of valuable habitat features uncommon in industrial reaches of the Willamette River.

Terminal 5

Map prepared for Portland Harbor
Natural Resource Trustees





N

0 610
Feet

Outfall
Stream
Restoration Site
Riparian Shrubs and Trees

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TIME OIL-SCHNITZER

Landowner: Time Oil Co., Schnitzer Investment Corp., Oregon Department of State Lands

Site description: The potential project area includes about 50 acres of vacant land near river mile 3.5 on the east bank of the Willamette River. Relatively natural beach occurs along the shoreline, although some armoring and sloping occurred to limit erosion and prepare the site for industrial uses which began in the 1940s. Dredged fill occurs on portions of the area.

Proposed restoration: Upland, riparian and potentially wetland and shallow-water riverine habitats could be restored at this site. The site could also be used to improve connectivity between the Willamette River and natural areas to the north and east. Restoration activities could involve removing fill, pavement, remnant building structures and invasive species and restoring soils and native vegetation to the shoreline, riparian areas and uplands. Fences could be removed or opened in various locations to allow for wildlife movement across the site and to nearby habitats. Installing signage to facilitate safe wildlife crossings across Time Oil Road could reduce risks associated with vehicular traffic. Opportunities to restore or create wetlands could be evaluated. River banks appear to be somewhat natural from aerial photos, but they have been hardened and steepened and could likely be restored to a more natural condition. Opportunities to add a fish component to the project could be evaluated.

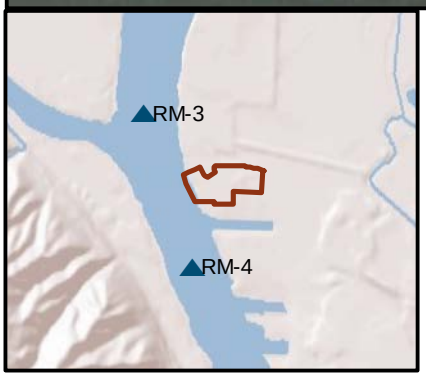
Benefits: This is a relatively large site within a highly developed industrial area, offering a unique opportunity to turn vacant lands that provide very little habitat value into a mosaic of significant habitats. It could also help reconnect the Willamette River with Smith and Bybee Lakes and the Columbia Slough by expanding on and linking to the South Rivergate Corridor.

Feasibility: Contaminants occur on the site. Portions of the properties are high and medium Oregon Department of Environmental Quality (DEQ) priorities for source control; the eastern portion of the Time Oil property has reached a “No Further Action” designation. Over thirty tanks were removed in 2009. Source control and clean-up efforts are occurring to address remaining contaminant concerns for future industrial use. Contaminant levels will need to be further evaluated for ecological risks in order to develop an appropriate habitat restoration plan, since fish and wildlife habitat has not been considered as a future use on these properties. While the types and locations of suitable restoration activities may be limited and needs further exploration, the site holds potential to make significant habitat improvements.

Other constraints/considerations: City of Portland “Greenway” zoning occurs along the river. The site has not been identified by the City of Portland for its restoration potential in the City’s draft River Plan (as of 11/09) or related efforts. Existing wharfs offer river-dependent industrial uses on these properties.

Time Oil - Schnitzer

Map prepared for Portland Harbor Natural Resource Trustees



N

0 300
Feet

- Upland revegetation
- Riparian revegetation
- Wetland restoration or creation
- wildlife corridor
- Restoration site
- Wildlife crossing
- Railroad Track
- Willamette River Miles

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TRIANGLE PROPERTY

Landowner: University of Portland, Oregon Department of State Lands

Site description: The Triangle Property site is located at river mile 7.5 on the northeast side of the Willamette River. The shoreline is classified as fill and rock bank and has a steep slope. There is very little shallow in-water habitat at the site, except in the slip area. There is a strip of trees and shrubs lining the shore throughout the site. The adjacent McCormick and Baxter property was formerly a highly contaminated creosote plant and is currently being remediated.

Proposed restoration: Restoration at the site could involve several components: regrading the banks and shoreline to reduce slopes and create shallow in-water habitat; excavating upland areas to increase inundation frequency and create shallow, off-channel habitat during high flows; replanting river bank and uplands with native vegetation; enhancing and expanding shallow water habitat; and adding large wood and boulders along the river bank.

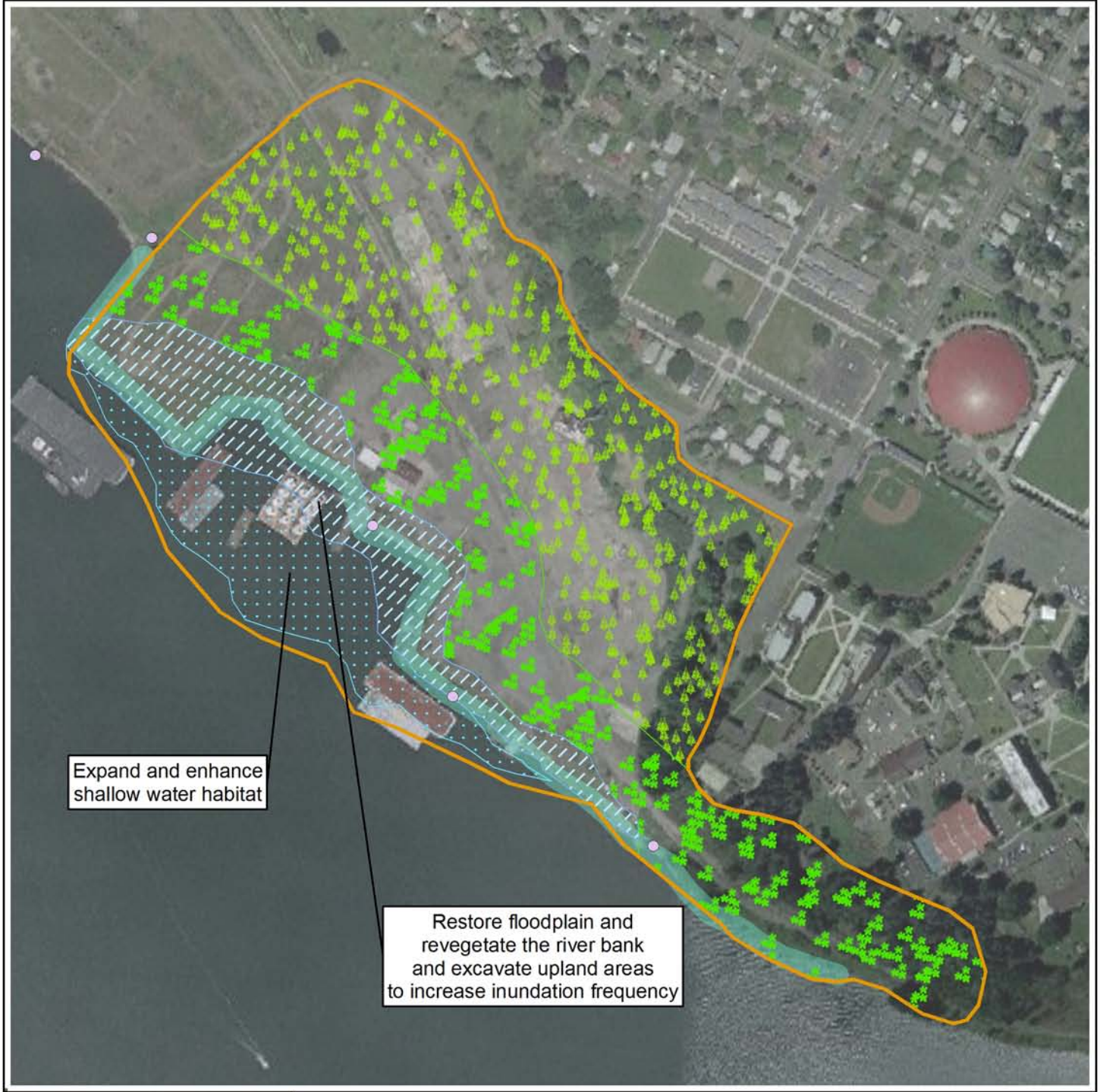
Benefits: Naturally sloped, vegetated stream banks increase floodplain connectivity and habitat diversity. Juvenile salmon, lamprey, and sturgeon prefer complex habitats that provide cover and feeding stations. Off-channel, shallow, slow moving waters gather wood and provide refuge and productive foraging areas for lamprey and juvenile salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Natural beaches and shallow wetlands also serve as foraging areas for mink and staging areas for spotted sandpiper and other migratory birds. Native vegetation will provide food and cover for a variety of species while reducing erosion and enhancing water quality. Mature trees will provide perching and nesting habitat for bald eagle, osprey and other native birds.

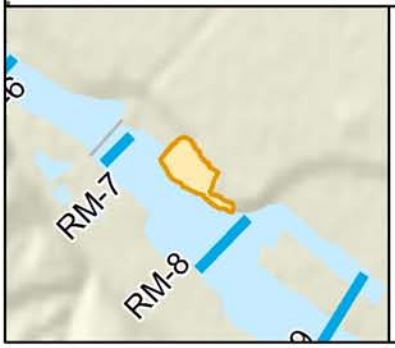
Feasibility: Remediation of sediments at the site must occur before restoration begins. There are no known permitting issues. Some minor ongoing maintenance would be required to assure maintenance of plantings and hydrology.

Other constraints/considerations: The opportunity for creating habitat connectivity is limited because the industrialized Swan Island is just upstream and the contaminated McCormick and Baxter site is just downstream of the property. The City is planning for a Greenway trail to run along the shoreline and through a portion of this site.

Triangle Property

Map prepared for Portland Harbor
Natural Resource Trustees





N

0 340

Feet

Outfall

Restoration Site

Potential Bank Restoration

Floodplain Restoration

Shallow Water Habitat

Riparian Shrubs and Trees

Upland Vegetation

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WILLAMETTE COVE

Landowner: Metro, City of Portland, Oregon Department of State Lands

Site description: The Willamette Cove site extends from river mile 6 to 6.5. Existing footpaths criss-cross the southern half of the site, the compacted soil impedes growth of vegetation and contributes to erosion. The site is contaminated in several locations and would need to undergo cleanup prior to restoration. The shoreline is classified as beach, vegetated rip rap and unclassified fill bank. The beach varies in width from 5 to 40 feet, is littered with debris and rubble, and is steeply graded for much of the site. Invasive vegetation dominates the site, though stands of Pacific willow, Pacific madrone, and black cottonwood are present. The cove has significant shallow water habitat, but the function of this area is severely limited by the McCormick and Baxter remedial cap.

Proposed restoration: Restoration activities that could occur at the site include creating off- channel habitat; removing rip rap along the shoreline; pulling back the river banks and expanding shallow in-water habitat and floodplain; and revegetating the site where possible with native vegetation.

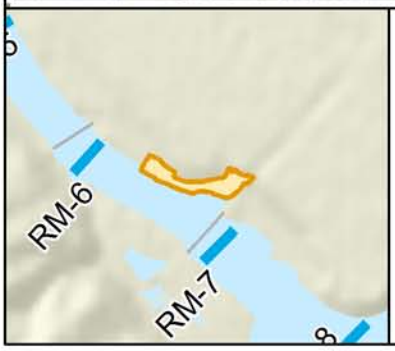
Benefits: Naturally sloped, vegetated stream banks increase floodplain connectivity and habitat diversity. Juvenile salmon, lamprey, and sturgeon prefer complex habitats that provide cover and feeding stations. Off-channel, shallow, slow moving waters gather wood and provide refuge and productive foraging areas for lamprey and juvenile salmon. Shallow areas can also serve as important hunting areas for bald eagles, osprey, spotted sandpiper, mink and other species. Natural beaches and shallow wetlands also serve as foraging areas for mink and staging areas for spotted sandpiper and other migratory birds. Native vegetation will provide food and cover for a variety of species while reducing erosion and enhancing water quality. Mature trees will provide perching and nesting habitat for bald eagle, osprey and other native birds.

Feasibility: Remedial actions need to be completed at the property before restoration can begin. There are planned recreational uses for the site that may conflict with maximizing the benefits of ecological restoration. There are no known permitting issues. The project would be largely self-sustaining.

Other constraints/considerations: This property is a rare backwater site; it offers a rare opportunity for creating off-channel habitat with few infrastructural constraints and has exceptional potential for wildlife enhancements. Any restoration options should consider preservation of the remedial cap. It is currently zoned for green space.

Willamette Cove

Map prepared for Portland Harbor Natural Resource Trustees



N

0 500

Feet

- Outfall
- Stream
- Restoration Site
- Potential Bank Restoration
- Off-Channel Habitat
- Riparian Shrubs and Trees
- Upland Vegetation

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Restoration Sites in the Broader Focus Area

BOARDMAN CREEK

Landowner: Private property owners, Beaverbrook Homeowners Association, Oak Lodge Sanitary District, Oregon Department of State Lands

Site Description: Boardman Creek meets the Willamette River near River Mile 23 on the east side of the river. The 13,000 foot creek runs through a highly urbanized part of Clackamas County, including the towns of Jennings Lodge and Gladstone, Oregon. There are currently three deteriorating culverts at the downstream end of Boardman Creek, about 1000 feet from its confluence with the Willamette River. Two of the culverts are located at the same crossing under River Road and the third culvert is buried beneath Walta Vista Court. Salmon and steelhead have been documented just downstream of the undersized culverts, which form a complete fish passage barrier. The riparian areas between the culverts and down to the confluence area are degraded, further limiting the water quality and habitat within the stream.

Proposed Restoration: Restoration at the site would include removing the culverts and replacing them with two single-span bridges. Restoration would also include enhancing the 300 feet of riparian habitat between the culverts and looking for opportunities to enhance riparian habitat and instream habitat complexity downstream to and including the confluence with the Willamette River. Replacing the Boardman Creek culverts will open 6000 feet of stream to fish and wildlife passage from the Willamette River up to McLoughlin Boulevard.

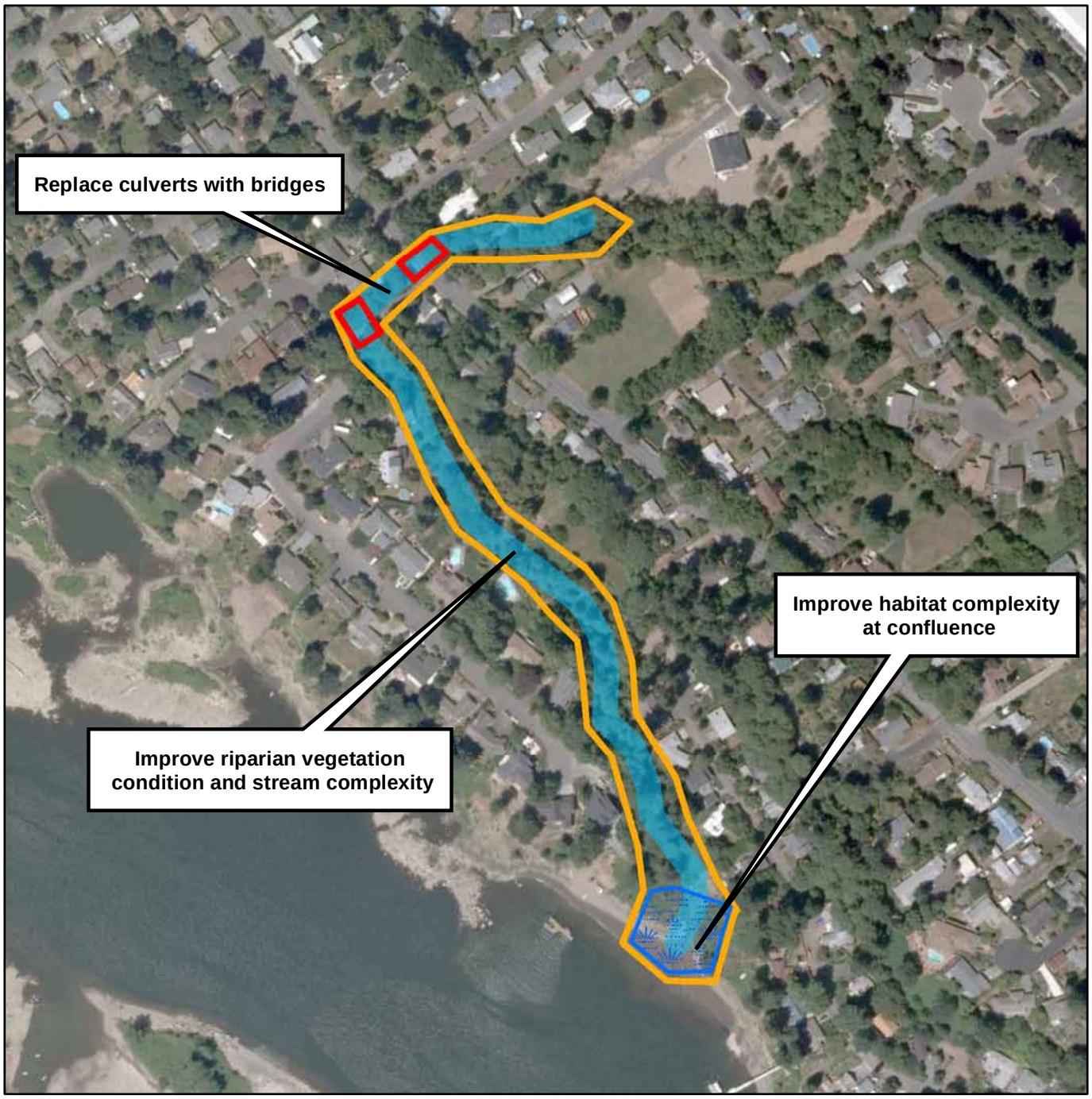
Benefits: This project would allow access for threatened and endangered salmonids as well as lamprey, and improve connectivity for mink and other wildlife species to over a mile of tributary habitat. This project will also improve instream habitat quality and complexity, improve access to off-channel habitat as refuge from the Willamette River during high flows, improve floodplain connectivity, and improve riparian habitat by restoring native vegetation. The riparian buffer will also improve water quality at the site.

Feasibility: The site includes a mix of public and private ownerships, so coordination among the various landowners will be necessary. The Oak Lodge Sanitary District has already completed an alternatives analysis and preliminary engineering work for the project and has chosen replacing the three culverts with two single span bridges as the most appropriate solution for fish and wildlife, flooding, and infrastructure concerns at the site.

Other Constraints/Considerations: The Oak Lodge Sanitary District was recently awarded a Nature in Neighborhoods Grant from Metro to finance part of the project

Boardman Creek

Map Prepared for Portland Harbor
Natural Resource Trustees



N

0 140 280 560
Feet

Culvert area

Restoration Site

Channel Restoration

Confluence Enhancement

This map represents conceptual fish and wildlife restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of the site will occur to determine the feasibility, cost, and habitat value of the restoration concept at a finer scale.

CEDAR ISLAND AND MAINLAND

Landowner: City of West Linn, Oregon Department of State Lands

Site Description: Cedar Oak Park, which contains a public boat ramp maintained by the City of West Linn, is located on the west side of the Willamette River at River Mile 23. The park contains a 4-acre riparian forest with a relatively intact overstory. The park also contains approximately 1,600 linear feet of gently sloping beach along the west shore of the Willamette. Cedar Island is located in the Willamette River adjacent to the park. The island was extensively mined in the past for sand and gravel, and is currently a 14-acre horseshoe-shaped island around a 20-acre central lagoon open at the downriver end. Most of the lagoon is 20 feet deep, though there is a central high spot that is only 15 feet deep, and a small hole that is 35 feet deep.

The City of West Linn purchased the island in the early 1990's, restored native habitat, and installed underwater structures in the lagoon for warm-water fish (i.e., bass, crappie, bluegill) habitat. The eastern arm of the island was developed for passive recreation, with trails and fishing platforms overhanging the lagoon. A seasonal footbridge connects the upper end of the island to the adjoining mainland at Mary S. Young State Park. The western arm was restored for native habitat only, with the intent of limiting recreational access near residential development. Since the mid-1990's, invasive vegetation has reclaimed much of the island.

Proposed Restoration: Riparian habitat could be restored on Cedar Island and on the mainland at Cedar Oak Park, including invasive species removal and native plantings. Removal of the existing in-water structures would reduce habitat for invasive warm water fish. Habitat complexity could be enhanced on the beaches along the main and side channels.

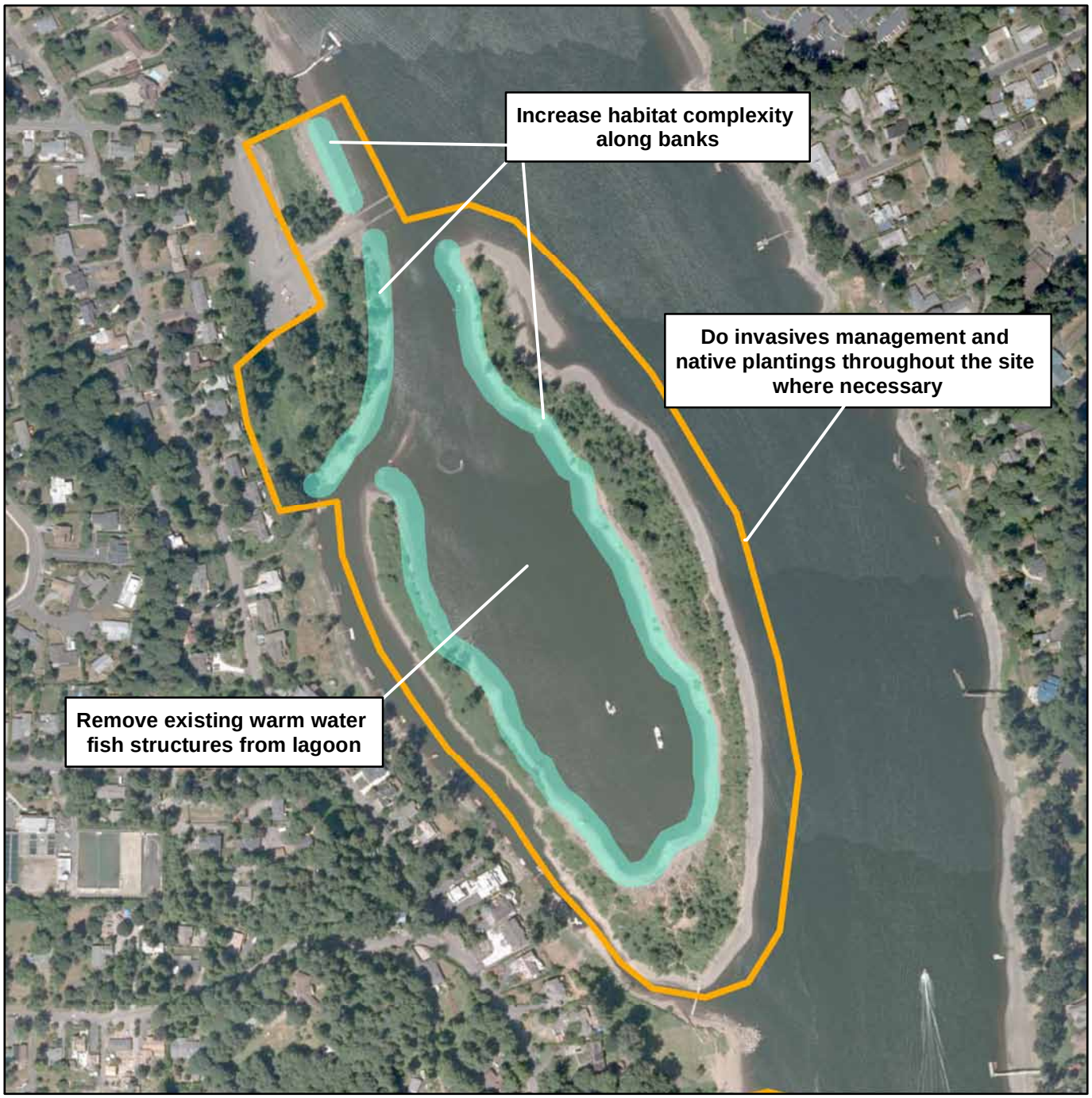
Benefits: Adding complexity to the beaches in the Cedar Island lagoon would provide refugia and habitat for migrating salmonids (particularly juveniles) and other native fish species. Removing the existing in-water structures from the lagoon would reduce habitat for invasive warm-water piscivores.

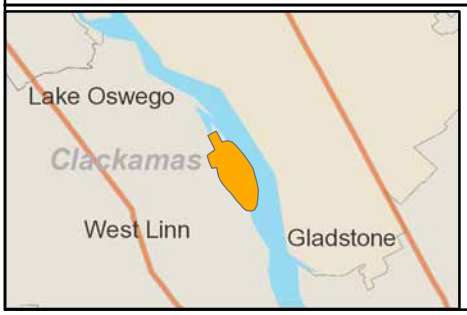
Restoring the native riparian plant community on the island would provide valuable feeding and breeding habitat for native terrestrial wildlife species as well as migratory birds and promote connectivity to other habitats near the confluence of the Willamette and Clackamas Rivers. In addition, a healthy native riparian vegetation community stabilizes stream banks, reduces and/or captures sediment flows, cycles nutrients and provides a source of large wood for adjacent and downstream areas.

Feasibility: The island and park are publicly owned and managed by the City of West Linn Parks & Recreation Department. A 1992 site assessment concluded that there was "no indication" of significant soil and/or groundwater contamination.

Cedar Island and Mainland

Map Prepared for Portland Harbor
Natural Resource Trustees





N

0 195 390 780
Feet

Restoration Site

Potential Bank Restoration

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COTTONWOOD BAY SHORELINE

Landowners: City of Portland, Avalon Hotel Owners, LLC, Cameron Oregon Properties, Shorenstein Properties, LLC, Lex Associates, Inc., Old Town Investors, LLC, State of Oregon, T&E Investments, Association of Unit Owners of Bowen Property Management Company, Oregon Department of State Lands

Site description: Cottonwood Bay is located at river mile 16.2 along the west bank of the Willamette River. Most of the 4.5-acre area is privately owned. However, a small portion is owned and managed as a natural area by the City of Portland Bureau of Parks & Recreation. The project site is a group of coves and inlets with riparian cottonwood and willow stands found along an otherwise unvegetated and developed shoreline. The site is located across the river from Ross Island and has been found to have significant fish use by the City of Portland's Willamette Fish Study.

Proposed restoration: Restoration at this site could include creation of a low floodplain bench by removing fill, a concrete ramp, and riprap. Restoration could also include regrading or reconfiguring the bank where possible. The quality of the vegetation in floodplain and riparian areas could be improved by removing invasive species and planting natives, particularly in the understory. Large wood placement along the shore and in shallow water would increase complexity and help create resting areas for juvenile salmon. Treating stormwater runoff from upland parking lots would help prevent contamination of restored habitat by reducing pollutant loading.

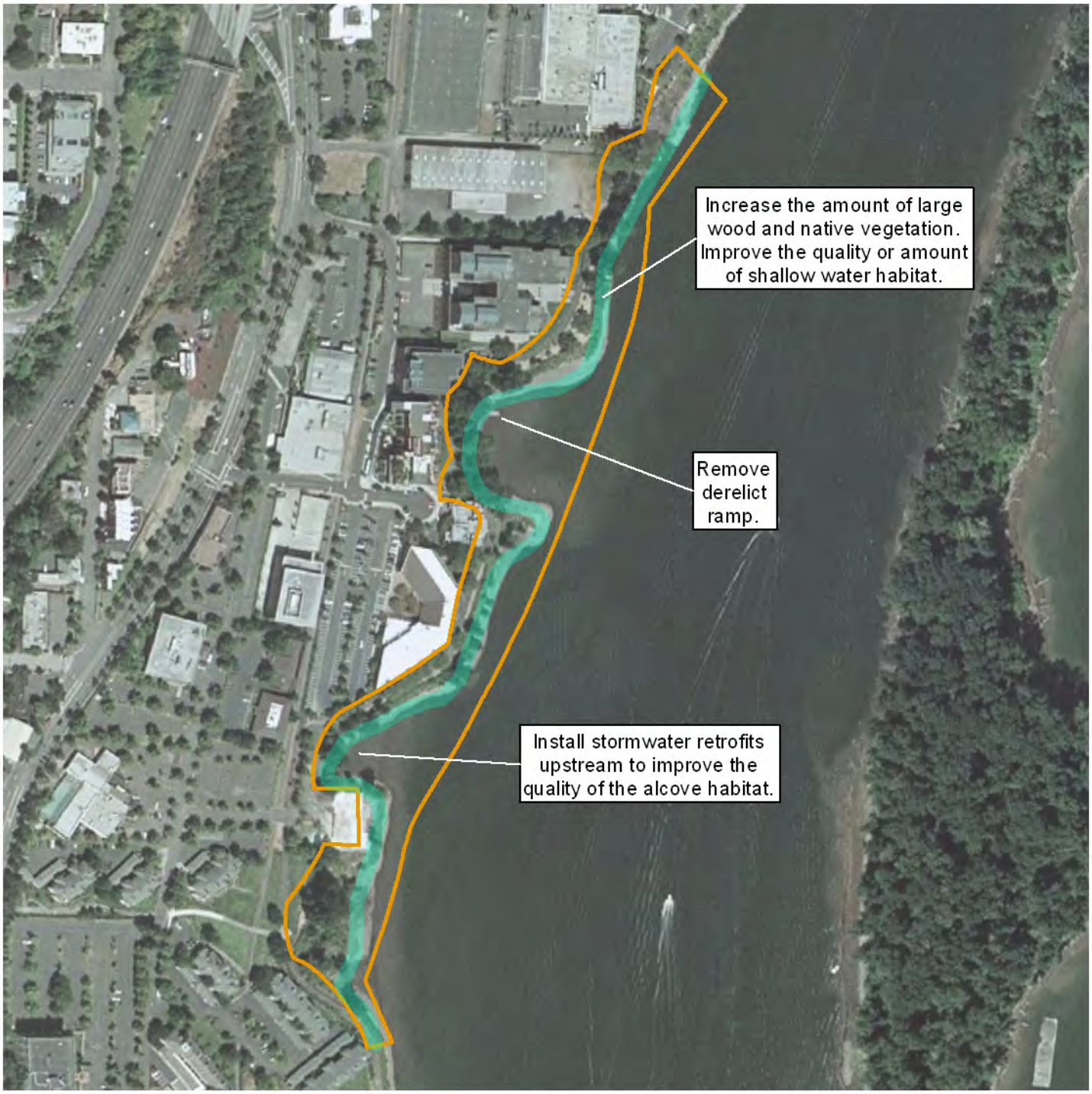
Benefits: Improvements in nearshore aquatic habitat, banks and floodplain would improve rearing and refuge habitat for fish species listed as threatened or endangered under the Endangered Species Act, including juvenile Chinook salmon, and enhance important foraging habitat and movement corridors for native wildlife such as mink. Improving riparian vegetation would help stabilize stream banks, capture sediment in stormwater runoff, support natural hydrologic processes and nutrient cycling, provide perching trees for birds such as eagle and osprey, and provide a source of woody materials to the river. This site presents an opportunity to enhance habitat in conjunction with other nearby habitats including Willamette Park, Ross Island, and Oaks Bottom Wildlife Refuge.

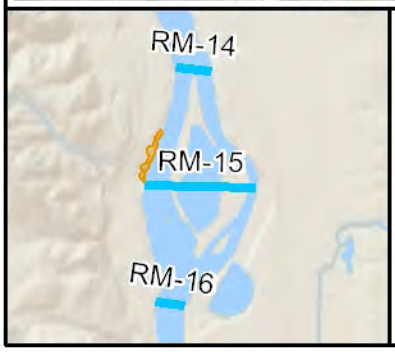
Feasibility: The site is owned by multiple private and public entities. The project would require permission and cooperation of multiple landowners. Concerns raised by nearby residents include tree maintenance, potential for hazard of falling trees/limbs, and view restrictions. These concerns could have major impacts on the potential function of the site for perching and nesting habitat for eagles and osprey.

Other constraints/considerations: Restoration actions could support and complement proposed restoration at South Waterfront. Upland development limits the degree of floodplain reactivation that may be possible at the site.

Cottonwood Bay

Map prepared for Portland Harbor Natural Resource Trustees





N

0 400

Feet

Potential Bank Restoration

Restoration Site

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

ELK ROCK ISLAND/SPRING PARK

Landowner**:** City of Milwaukie (Spring Park); City of Portland, GRS Properties, DLS Properties and other private owners (Elk Rock Island), Oregon Department of State Lands

Site description: Spring Park is a 6-acre site located on the east bank of the Willamette River at approximately river mile 19. Spring Park is largely undeveloped and is currently maintained by the North Clackamas Parks and Recreation District (NCPRD) as a natural area. A large unmapped wetland is located in its center, and the remainder of the site is composed of riparian forest and grasslands. Portions of the site are composed of geologically significant bedrock. A large population of invasive species, including blackberry, knotweed, clematis, English hawthorn, reed canary grass, common tansy, English ivy and Norway maple, currently inhabit the site.

Elk Rock Island is a 15-acre island park located in the main channel of the Willamette River at river mile 18.9. The island is accessible by foot at low water from Spring Park and by boat at all river levels. The island contains exposed rock, emergent wetlands, and riparian and upland forest which provide diverse habitats for a wide range of bird, mammal, reptile, amphibian and invertebrate species. Plants rare to the Portland metro area that may occur on the island include Pacific yew, Tiger lily, Cluster lily and Rattlesnake plantain. Oregon white oak woodlands and savanna habitats are also present on the island. Dominant tree species are black cottonwood, bigleaf maple, Douglas fir, and Oregon white oak.

Proposed restoration: Restoration at this site could include placement of large wood on the banks and shallow water areas. Acquisition of properties or easements along the off-channel alcove would allow for enhancement of this habitat. Rock outcrop and riparian vegetation could also be protected and improved. Removal of invasive species and planting native vegetation, which would improve remnant oak habitat, is also a possibility. The Spring Park path system which currently traverses the wetland habitat in the park could be relocated out of the wetland or elevated to protect and improve wetland function and natural hydrologic flow.

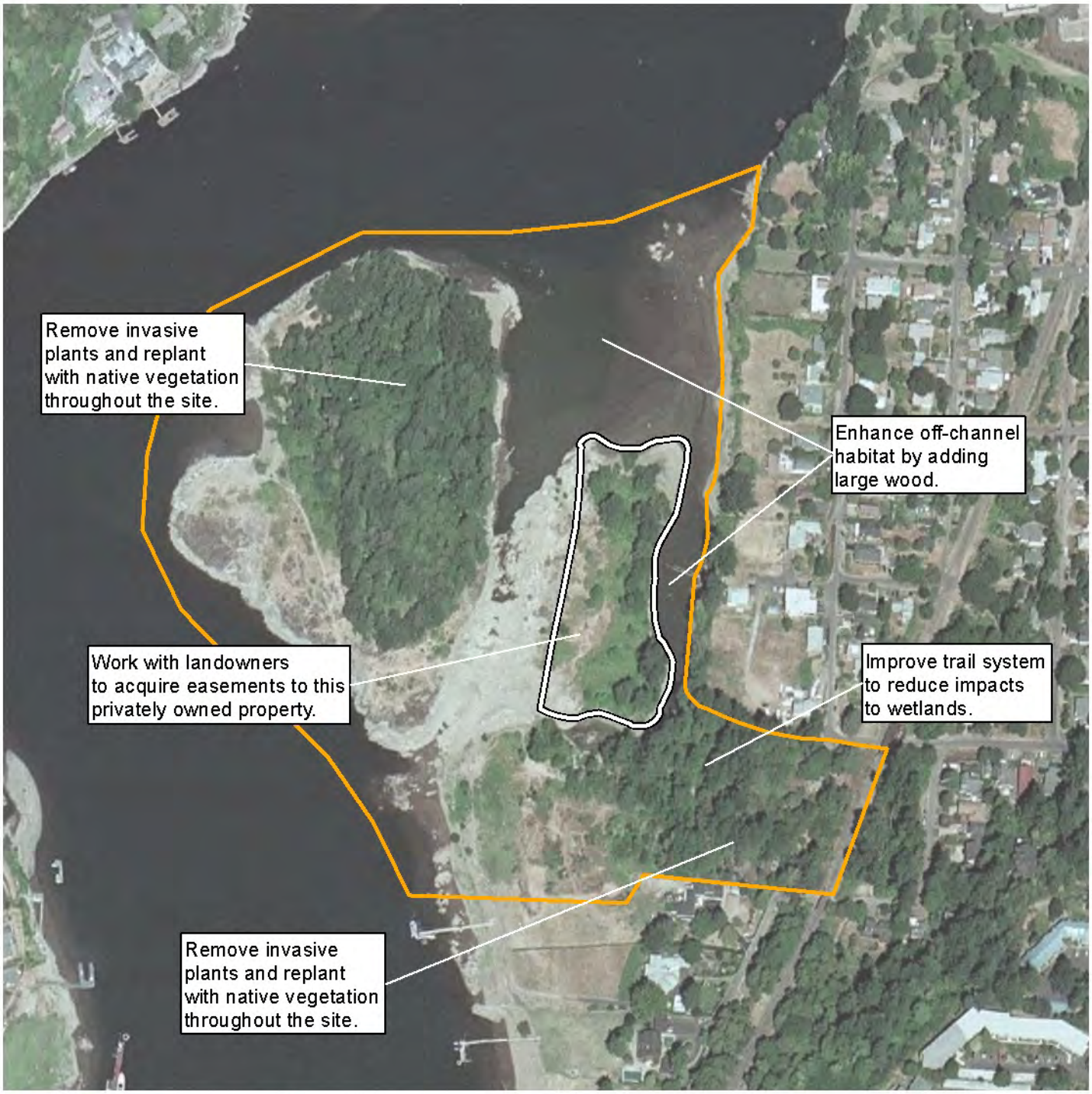
Benefits: This project will improve water quality through increased canopy cover and decreasing sedimentation caused by overuse. Establishing a healthy tree canopy will decrease water and soil temperatures, provide perching and possible nesting areas for birds such as osprey and bald eagles, and increase large woody debris recruitment over time. Re-routing or improving the user-created path at Spring Park out of the large wetland area in the middle of the site will improve habitat for wetland plant and wildlife species. Placement of large woody debris will increase habitat structure on the beach and in shallow water areas. Invasive species removal and native revegetation and protection will increase the habitat value of upland forest areas.

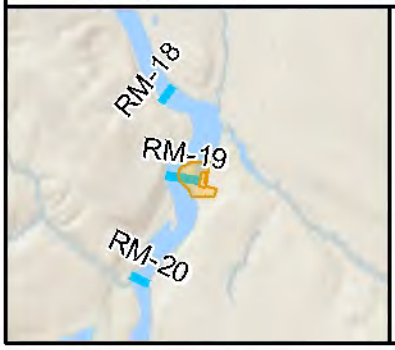
Feasibility: Private ownership of portions of Elk Rock Island would require permission and coordination from multiple landowners. Restoration work at Spring Park would require the project to be approved through a land use planning process at the City of Milwaukie.

Other constraints/considerations: A high level of human disturbance would limit the ecological benefits of the project to fish and wildlife.

Elk Rock Island/Spring Park

Map prepared for Portland Harbor Natural Resource Trustees





N

0 400

Feet

Restoration Site

Privately Owned

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

HOLGATE SLOUGH

Landowners: Metro, City of Portland, Ross Island Sand and Gravel, Portland Transit Company, Oregon Department of Transportation, Union Pacific Railroad Co., Oregon Department of State Lands, private property owners

Site description: Holgate Slough is located at river mile 14.2 along the east bank of the Willamette River, on the east side of Ross Island. As the only true side-channel in the area, Holgate Slough is an important component of the Oaks Bottom-Ross Island complex, one of the most diverse habitat complexes within the lower river with an extensive amount of shallow water and off-channel habitat. The site varies in width, and is constrained in some areas. In the more constrained areas, banks are unstable. In other areas, overhanging banks and vegetation are stable. Debris litters parts of the site. Mature riparian trees and a mix of native and non-native understory plants are the dominant vegetation type in the project area.

Proposed restoration: Proposed restoration at this site includes improving bank composition where banks have been eroded and steepened, to provide better habitat for fish species and to improve water quality. Protecting banks from boat wakes will maintain restored habitat in the long term. In addition, bank work would increase the connectivity of the floodplain within the riparian area. Removal of invasive species and increasing vegetation overall in the floodplain could also be accomplished. Large wood placement along the floodplain and riparian areas would add in-stream complexity. Litter and debris along the bank would be removed.

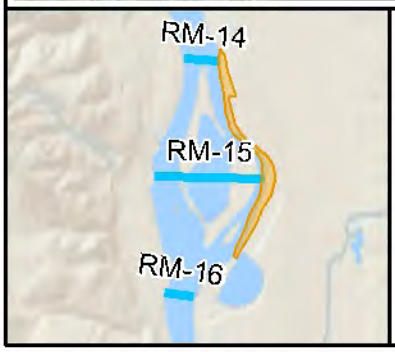
Benefits: Improvements in nearshore aquatic habitat, riparian areas and floodplain connectivity would improve rearing and refuge habitat for fish, and enhance important feeding, breeding, and nesting habitat for native wildlife. Improving riparian vegetation and placing large wood in the floodplain and riparian areas would help stabilize stream banks, capture sediment in stormwater runoff, support natural hydrologic flow processes and nutrient cycling, and provide a source of woody materials to the river. Links between Holgate Slough, Oaks Bottom and Ross Island would have cumulative benefit for various species, particularly where shorelines are preserved in a natural or semi-natural condition with overhanging vegetation, undeveloped banks, and large wood.

Feasibility: Much of the land is publicly owned, but the site is constrained by steepened banks. Infrastructure includes the Springwater Trail and the Ross Island access way. Highway 99 is in close proximity. Recreational use, including illegal camping, may limit the ecological benefits that could be provided through restoration at the site.

Other constraints/considerations: Restoration at this site could be coordinated with restoration efforts at nearby Oaks Bottom and Ross Island lagoon.

Holgate Slough

Map prepared for Portland Harbor Natural Resource Trustees



N

0 1,500

Feet

Potential Bank Restoration

Restoration Site

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KELLEY POINT PARK

Landowner: City of Portland, Oregon Department of State Lands

Site description: Kelley Point Park is located on the east bank of the Willamette River at its confluence with the Columbia River and at the mouth of the Columbia Slough. This is a Portland city park managed as a natural area by Portland Parks and Recreation. The banks at the site are in a more natural state than many other sites along the lower Willamette River with extensive beaches along the length of the shoreline. The majority of the park is forested with significant native vegetation, although some invasive species are interspersed with the native flora.

Proposed restoration: Restoration at this site could include removing fill to increase connections to the floodplain and excavation to recreate shallow water and off-channel backwater habitat for salmonids and other native species. Large wood placement along the shore would enhance fish benefits. Increasing native plant vegetation and invasive species removal will help restore riparian habitat and link it to upland habitat in the park. This site has excellent connectivity to a number of nearby habitats, and contains one of the few large remnants of historic bottomland hardwood forest communities along the Portland riverfront.

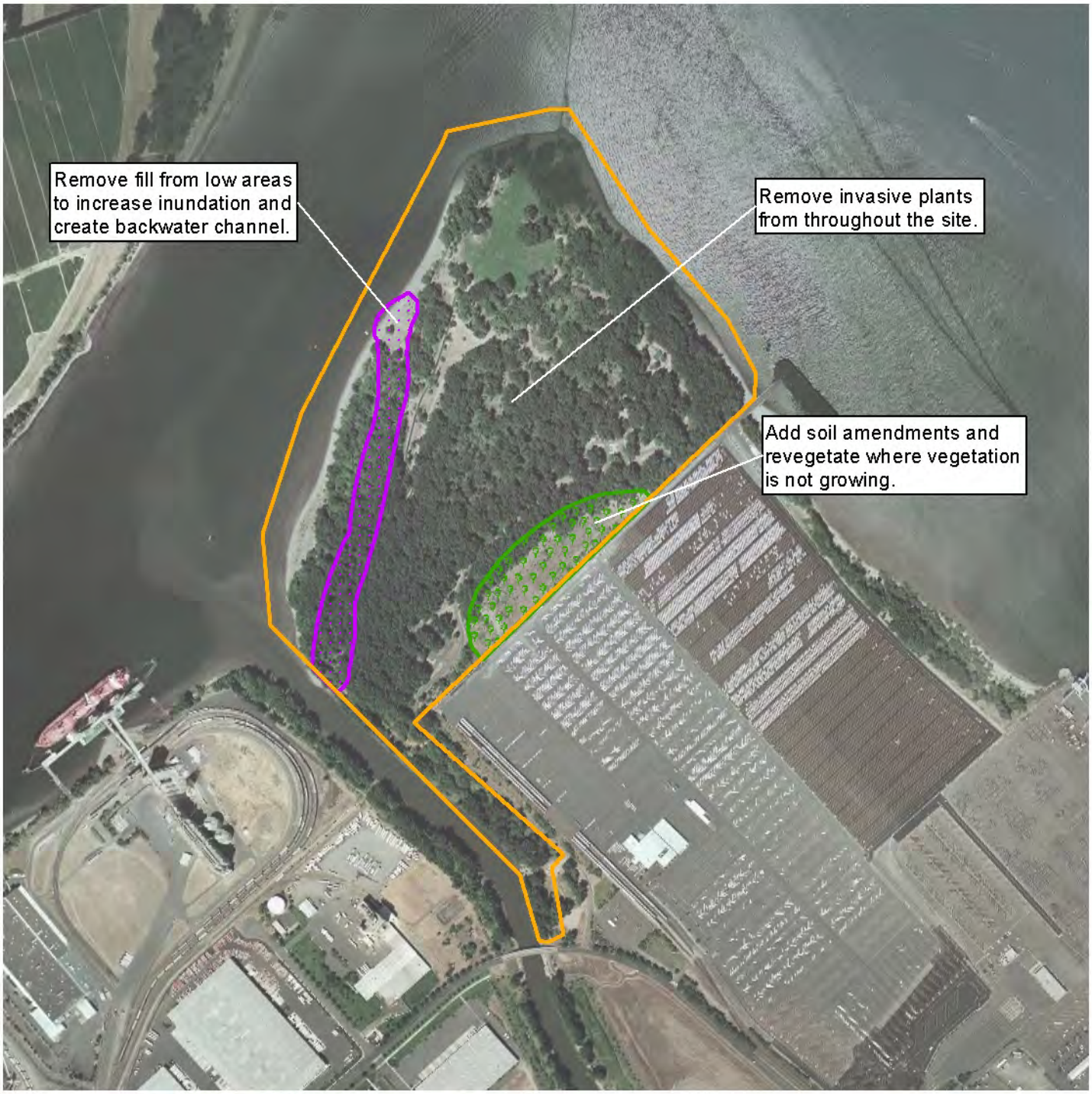
Benefits: Improvements in nearshore aquatic habitat, banks and floodplain would improve an already valuable rearing and refuge habitat for native fish species and breeding and nesting habitat for native wildlife species at the confluence of two major rivers. A number of salmonid species from both the Willamette and Columbia rivers likely utilize habitat at this site during various life stages. Recent restoration near the mouth of the Columbia Slough at the south end of the site may provide additional benefits for fish and terrestrial species. Improving riparian vegetation would help stabilize stream banks, capture sediment in stormwater runoff, support natural hydrologic flow processes and nutrient cycling, and provide a source of woody materials to the river. Terrestrial species likely utilize this habitat patch to travel to other suitable habitat, making it part of an important wildlife movement corridor as well as a distinct habitat patch.

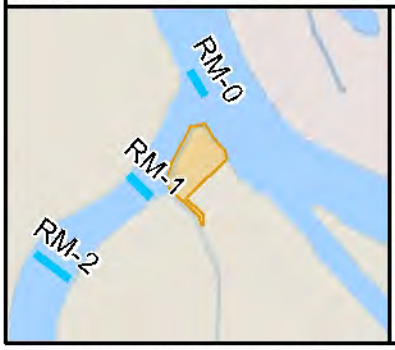
Feasibility: There is no known contamination at the site and the project could be implemented immediately. There is some human disturbance associated with recreation at this city park. Recreation needs may also create some minor permitting obstacles. The site is in public ownership with a willing landowner.

Other constraints/considerations: This site is a high value site because of its location at the confluence of the Willamette and Columbia rivers, which also makes it a unique site. The site also has excellent connectivity with other restoration sites, but may present some design challenges due to multiple user groups (e.g. boating, park users).

Kelley Point Park

Map prepared for Portland Harbor Natural Resource Trustees





N

0 900

Feet

Restoration Site

Backwater Channel Creation

Revegetation

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

KELLOGG DAM REMOVAL

Landowner: City of Milwaukie, Oregon Department of Transportation, Oregon Department of State Lands, private property owners

Site description: This site is located on the east side of the Willamette River at river mile 18, upstream of the Portland Harbor Study Area and immediately south of downtown Milwaukie. Kellogg Dam was originally constructed to power a grist mill in 1858 and has been reinforced several times since then. The dam is a significant barrier to fish passage on Kellogg Creek. Behind the dam sits Kellogg Lake, a 14-acre warm water reservoir with average depths ranging from 1 to 3 feet.

Proposed restoration: Restoration at this site would include the removal of a dam on Kellogg Creek, a major tributary of the Willamette River, and draining Kellogg Lake. This project would restore tributary, wetland and native riparian habitat, including creation of an approximately .75-mile meandering stream channel within the former lake bed, control of exotic, invasive plant communities, planting of native vegetation, and placement of large woody debris structures.

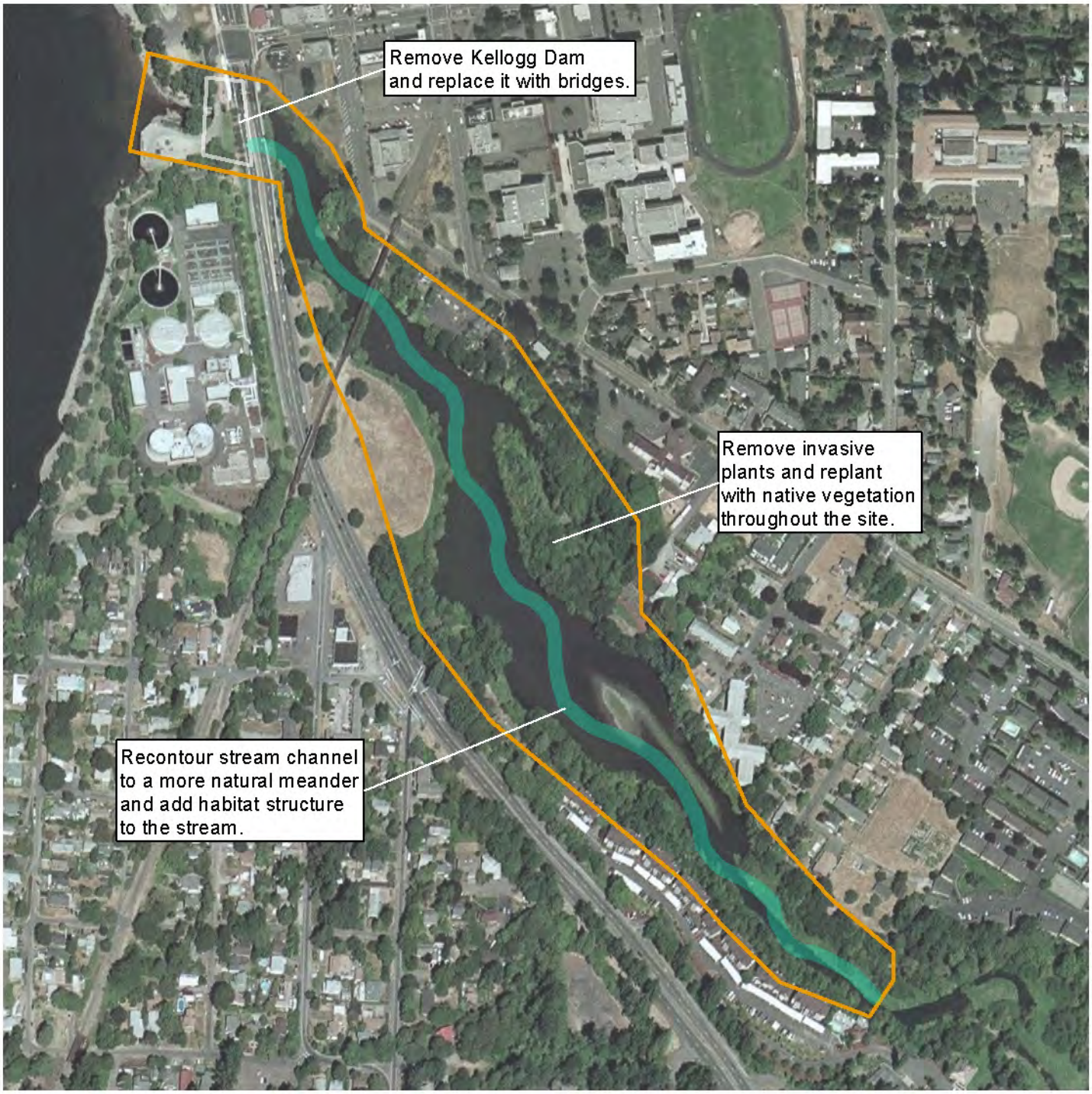
Benefits: Dam removal would open up fish access to the lower 5-mile extent of Kellogg Creek and provide partial passage to the upper reaches of the Kellogg-Mt. Scott watershed (a total of 9 miles of passage), increasing the availability of shallow water and off-channel habitat. Drainage of Kellogg Lake would eliminate a known detriment to salmonid populations by reducing water temperatures and predation concerns. Management of contaminated sediments in the lake could decrease risks to fish and wildlife and improve overall water quality. Habitat enhancements within the lake bed would provide cold-water rearing and refuge areas for juvenile coho and spring Chinook and would create new floodplain capacity. The cold water springs surrounding the site may also contribute unique habitat for terrestrial and aquatic species. Removal of invasive plant species and revegetation with native species would provide diverse habitats for native macro-invertebrate, amphibian and wildlife communities. The site is adjacent to Milwaukie's developing, transit-oriented South Downtown and could provide public education and recreation benefits in addition to habitat benefits.

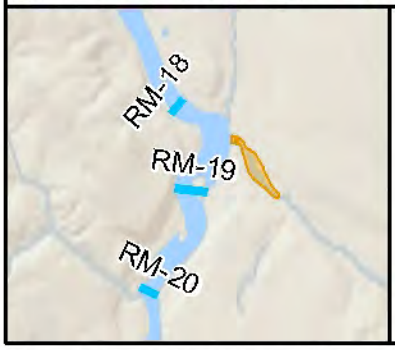
Feasibility: The site is in public ownership and the landowner is supportive of the restoration work. In 2002, the U.S. Army Corps of Engineers (Corps) detected contaminants in lakebed sediments above the guidelines adopted for use in the Dredge Material Evaluation Framework and DEQ's Level II screening values at multiple sample points. Sediment management would be necessary as part of the restoration effort. Highway 99E sits atop the dam and transportation upgrades may be necessary if the dam is removed. In addition, a sanitary sewer line, which sits on the lakebed one-half mile above the dam, would need to be relocated. TriMet's Light Rail Transit crossing will be built over the lake just upstream of Hwy 99E, adjacent to an active Union Pacific Rail Road trestle, adding infrastructure considerations to the project.

Other constraints/considerations: The Corps has re-initiated a feasibility study, which will likely be completed in 2011. Project design could commence in 2011 with the possibility for in-water construction in 2013. A number of private landowners currently border the lakebed; the City of Milwaukie is actively working with these landowners to address potential concerns about the project and continue to build community support.

Kellogg Dam Removal

Map prepared for Portland Harbor Natural Resource Trustees





N

0 500

Feet

Potential Bank Restoration

Restoration Site

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MARY S. YOUNG STATE PARK

Landowner: Oregon Parks and Recreation Department (managed by City of West Linn Parks and Recreation), Oregon Department of State Lands

Site Description: Mary S. Young State Park (MSY Park) is a 128-acre park located along the Willamette River in West Linn. There are nearly 8 miles of trails in the park, along with athletic fields, parking lots and a pet exercise area. Over 90 acres of MSY Park are forested, primarily with Douglas fir and Western hemlock and a riparian zone of black cottonwood, mixed willow species, and red twig dogwood. Invasive English ivy is found throughout much of the upland areas, although the city and local volunteer groups are working to remove it. Invasive species such as Armenian blackberry and reed canary grass are found in the riparian zone.

Several small creeks, including Mary S. Young Creek and Turkey Creek, flow through MSY Park to their confluences with the Willamette River. The Oregon Department of Fish and Wildlife has found juvenile Chinook and coho salmon in Mary S. Young Creek. The shoreline at MSY Park retains its natural contour, and alternates between sandy beaches and basaltic outcrops. These outcrops form a small lagoon at the downriver end of the shoreline and protect the beaches at the upriver end of the shoreline.

Proposed Restoration: Restoration at this site could include enhancing shoreline complexity along the beach and in the lagoon area and removal of non-native vegetation and native plantings within the riparian areas. In addition, there is an opportunity to reconnect a side channel of the river and regrade the floodplain upstream of the lagoon. Finally, replacing the culvert along Mary S. Young Creek and restoration of the creek to its original channel is also a possibility.

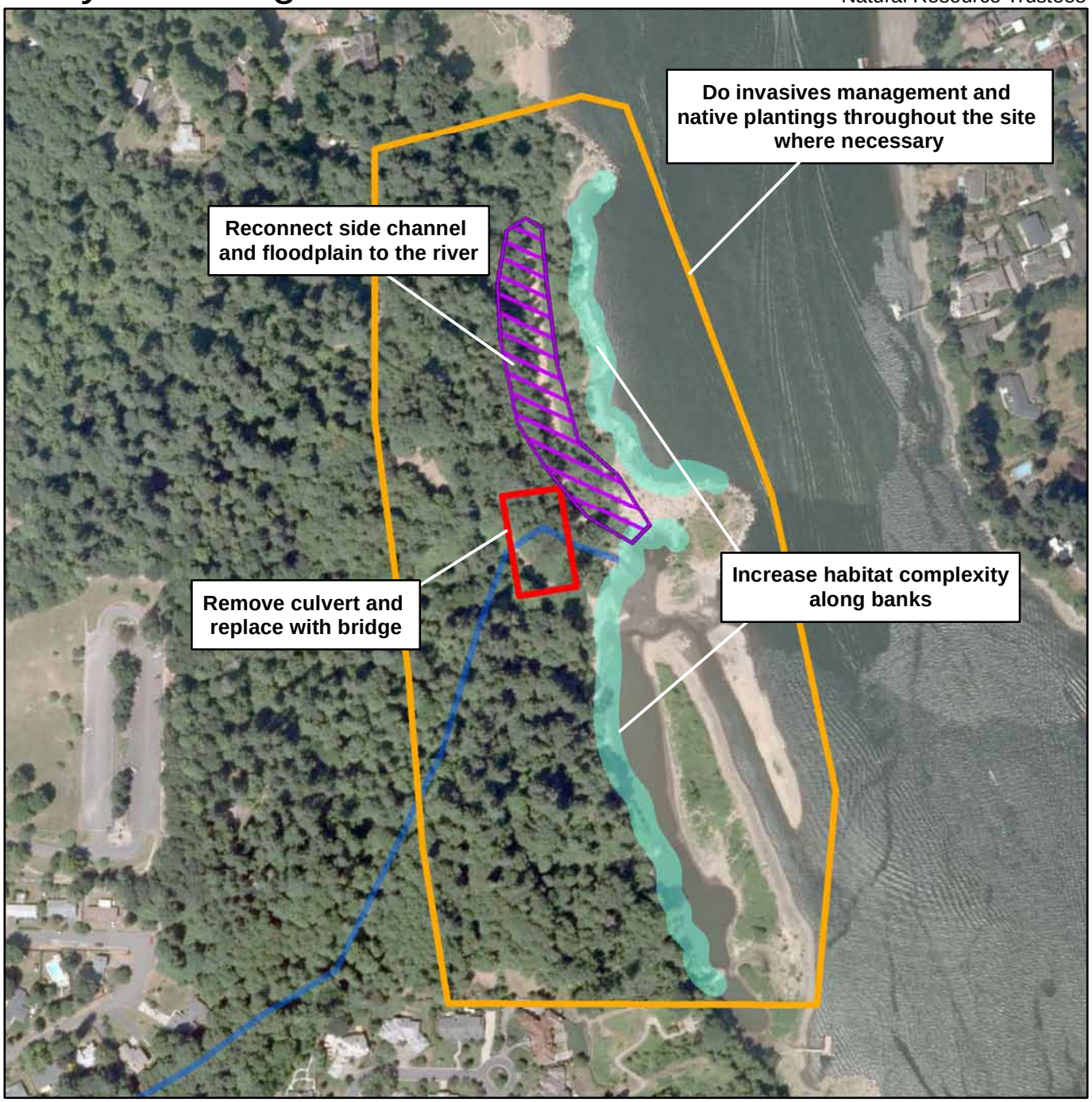
Benefits: Reconnecting side channels and floodplains to the main channel are among the most effective restoration strategies to benefit juvenile Chinook salmon as they provide off-channel refugia during high river flows. Replacing culverts, restoring the creek's original channel form, and enhancing habitat complexity along the Willamette shoreline and in the lagoon would provide additional refugia and habitat for migrating salmonids (particularly juveniles) and other native fish and wildlife species. Restoring the native plant community along the riparian corridor would provide valuable feeding, dispersal, and breeding habitat for native terrestrial wildlife species as well as migratory bird species near the confluence of the Willamette and Clackamas Rivers. In addition, a healthy native riparian vegetation community stabilizes stream banks, reduces and/or captures sediment flows, cycles nutrients and provides a source of large wood for adjacent and downstream areas.

Feasibility: Project site is publicly owned and already protected as a natural area. Site was previously a private estate; no known contamination issues are present. Replacement of a pipeline that runs through part of the site is in the planning stages. Timing of restoration at the site must take these activities into consideration and avoid the pipeline during any excavation work.

Other constraints/considerations: Part of the restoration area is currently used as an off-leash area for dogs. Appropriate restrictions may be necessary to ensure riparian restoration and plantings are not disturbed by park users including off-leash pets.

Mary S. Young State Park

Map Prepared for Portland Harbor
Natural Resource Trustees



N

0 155 310 620
Feet

Culvert area

Off-Channel Habitat

Restoration Site

Potential Bank Restoration

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McCarthy Creek

Landowner: Private property owner, Oregon Department of State Lands

Site Description: McCarthy Creek is a 12.2-mile tributary on the west side of Multnomah Channel. USDA Natural Resources Conservation Service manages a 127-acre wetland conservation easement that includes the mouth and lower ~2500 feet of McCarthy Creek, extensive wetlands and bottomland hardwood forest. The creek on this property was relocated when the railroad was constructed. Currently the stream channel is incised, the stream banks are steep, and the entire site is overrun by reed canary grass and other invasive species. A culvert confines the channel about 1200 feet from the confluence. There are two water control structures on the site which regulate water levels for a wetland restoration site on a neighboring property. The site is often inundated during high flows and spring freshets. Beaver, river otter, salmon, and other fish and wildlife species are known to use McCarthy Creek and the emergent wetlands and forested habitats that surround it. The site is adjacent to the 417-acre Burlington Bottoms Wetland Mitigation Site and across Multnomah Channel from Oregon Parks and Recreation Department's 156-acre Wapato Access Site.

Proposed Restoration: Restoration at this site would focus on enhancement of McCarthy Creek to improve in-stream habitat quality, floodplain connectivity, and riparian habitat quality and function. Stream restoration activities would include enhancing the confluence of McCarthy Creek with Multnomah Channel, re-grading the stream banks where the channel is entrenched, and removing the concrete culvert. Large wood structures would be added to restore habitat complexity. Increased inundation, removal of invasive species such as reed canarygrass and re-vegetation would enhance and promote expansion of the existing riparian, forested and emergent wetland habitats.

Benefits: Juvenile salmonids will benefit from the increased availability of high-flow refuge habitat, increased habitat structure and complexity, and increased food inputs from restored riparian zone and wetlands. Reshaping and replanting the stream banks would reduce sedimentation in the creek and enhance water quality for the benefit of fish and wildlife. In the long term, beaver and other wildlife species would benefit significantly from new sources of food, wood and cover generated from a healthy riparian forest community.

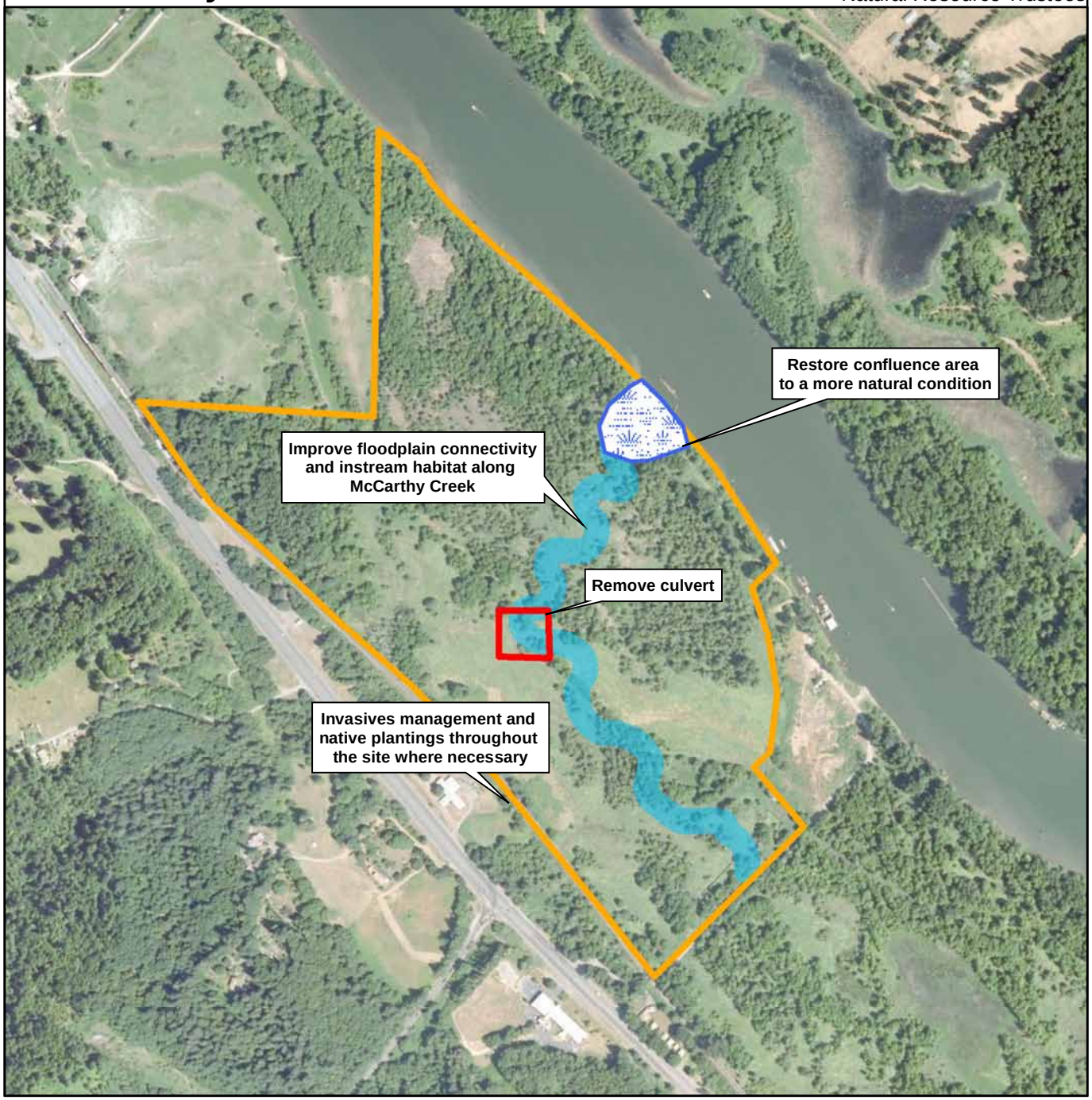
Feasibility: Multiple re-vegetation efforts have been attempted at this site with little success. The reed canary grass is persistent and the beaver are hungry for a food source. Re-vegetation will require careful site preparation, appropriate plant species selection, extensive maintenance as well as beaver exclosures.

Other Constraints/Considerations: Currently there is significant utilization of the site by beaver and red legged frogs. Care must be taken to avoid impacts to these and other species during construction. Hunting access is allowed at the site. This use is protected by the conservation easement already in

place on the site. There may be other aspects of the existing easement that need to be taken into consideration during restoration planning and implementation.

McCarthy Creek

Map Prepared for Portland Harbor
Natural Resource Trustees



N

0 250 500 1,000 Feet

Confluence Enhancement

Culvert area

Restoration Site

Channel Restoration

This map represents conceptual fish and wildlife restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of the site will occur to determine the feasibility, cost, and habitat value of the restoration concept at a finer scale.

Oaks Amusement Park/Oaks Crossing

Landowners: Oaks Park Association, City of Portland, Metro, Oregon Department of State Lands

Site description: Oaks Amusement Park is located at river mile 16 on the east bank of the Willamette River. The park area adjacent to the river consists of a low riparian zone lined with native and invasive vegetation that averages approximately 40 feet in width. Upslope, the bank is lined with a fence and walking path that serves as the boundary of the amusement park. The low floodplain willow thicket wetland is submerged at high flows and may serve as high water refuge habitat. Oaks Crossing is a riverfront park located at river mile 16.25 of the Willamette River with significant beach, bottomland forest and wetland habitat within the floodplain. These sites are located in close proximity to the Oaks Bottom wildlife area.

Proposed restoration: Restoration at Oaks Amusement Park and Oaks Crossing could include enhancing the area's existing native plant community by removing invasive plants, and increasing the amount of wood on the banks and in shallow water channel areas. At Oaks Crossing, there is the potential to investigate the feasibility of creating off-channel habitat. At Oaks Amusement Park, there may be an opportunity to reconfigure some banks to increase the amount of floodplain and flood storage, and to create shallow and off-channel habitat.

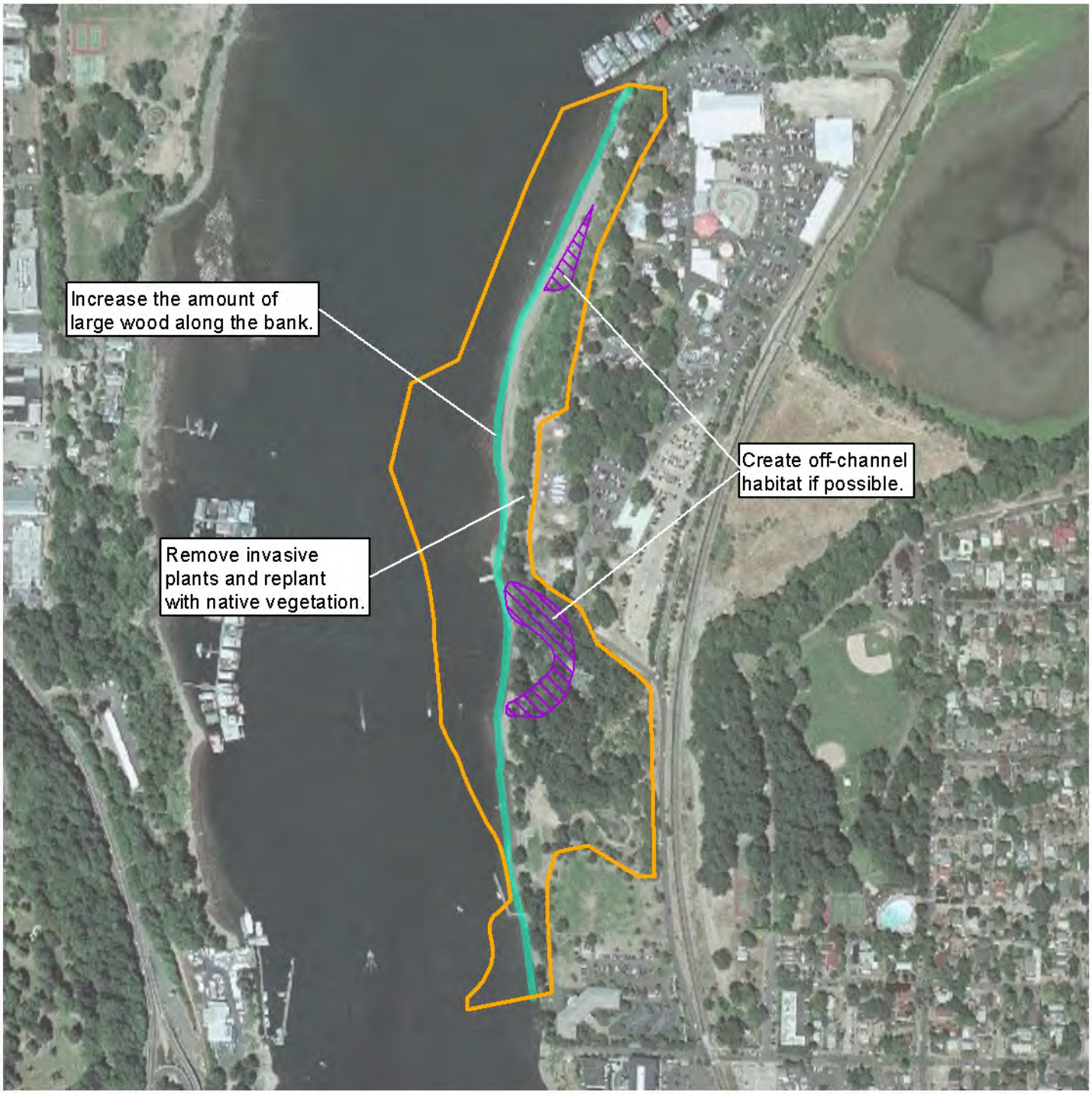
Benefits: Improvements in nearshore aquatic habitat, riparian areas and floodplain connectivity would improve rearing and refuge habitat for fish species and enhance important feeding, breeding and nesting habitat for native wildlife. Off-channel, shallow, slow moving waters provide refuge and productive foraging areas for lamprey and juvenile salmon. Improving riparian vegetation would help stabilize stream banks, capture sediment in stormwater runoff, support natural hydrologic flow processes and nutrient cycling, and provide a source of woody materials to the river.

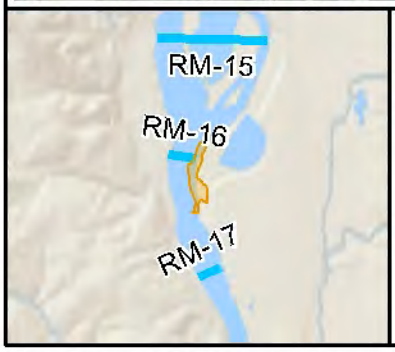
Feasibility: Existing infrastructure at Oaks Crossing includes power lines and towers, boat docks, piers, parking lots and roads. This infrastructure may limit opportunities for significant bank improvements.

Other constraints/considerations: Oaks Amusement Park is privately owned and landowner willingness is unknown at this time. Recreational use associated with the park may affect or limit the ecological benefits provided by restoration at the site.

Oaks Amusement Park Shoreline & Oaks Crossing

Map prepared for Portland Harbor Natural Resource Trustees





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0 600

Feet

Potential Bank Restoration

Restoration Site

Off-Channel Habitat

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

OAKS BOTTOM WILDLIFE REFUGE HABITAT ENHANCEMENT

Landowner: City of Portland, Oregon Department of State Lands

Site description: Oaks Bottom Wildlife Refuge is a 170-acre city owned property comprised of meadows, wetlands and bottomland forest on the eastside of the Willamette River at river mile 15.5, just north of the Sellwood Bridge. The site presently provides habitat for a number of bird, amphibian, mammal and invertebrate species, but is largely disconnected from the river. Significant populations of invasive plant species, including purple loosestrife, currently inhabit the site. Nutria, an invasive mammal, is also present at the site.

Proposed restoration: Restoration at this site would include replacing an existing culvert and water control structure with a larger box culvert to enhance fish passage and provide a greater connection between the wetlands and the Willamette River by improving the flow of river water in and out of the refuge. There is also potential to excavate tidal slough channels and enhance wetlands habitats at the southern end of the refuge. Restoration would include removal of invasive vegetation and replanting with native species.

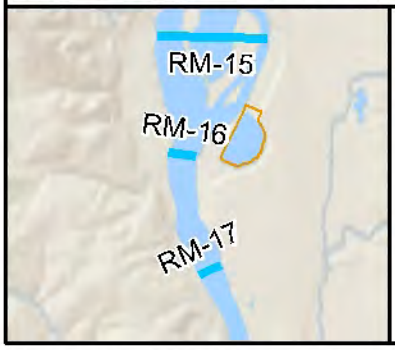
Benefits: The site is the largest remaining natural area within the lower Willamette River floodplain and provides important habitat for fish and wildlife. Improved hydrologic connection would enhance rearing and refugia habitat for salmonids by establishing a more significant connection between refuge wetlands and the mainstem Willamette, increasing the flow of water and decreasing water temperature. Native revegetation would help stabilize stream banks and provide a source of woody debris to the river. The addition of large woody debris in the off-channel area will provide significant amounts of instream habitat structure for salmonids and lamprey. This site also provides an opportunity for connectivity with proposed restoration at nearby sites, including Ross Island Lagoon and Holgate Slough. Mammals including mink, otter, and beavers utilize the site and will benefit further from the addition of large wood. Maintaining beaver activity is important to create slower water forage sites for mink and otter. Daily tidal influence will increase shorebird forage areas. Eagles and osprey already utilize the area for locating food sources that will be maintained or increased with greater connectivity to the river.

Feasibility: The site is in public ownership and has a willing landowner. Contaminants in wetland sediment and the continued addition pollutants from stormwater from outfalls will continue to impact water quality at the site. Parts of the site were previously used as a landfill, and the continuing impacts of landfill-related contaminants are not known. Clean up of significant persistent contamination (DDT is of notable concern) should occur prior to project implementation.

Other constraints/considerations: Project funding is pending through the U.S. Army Corps of Engineers. Some funding has already been secured through the U.S. Fish and Wildlife North American Wetlands Conservation Act program. The project is also scheduled to receive City capital funds for project construction.

Oaks Bottom Wildlife Refuge Habitat Enhancement

Map prepared for Portland Harbor Natural Resource Trustees



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Feet

Replacement culvert

Potential Channel Restoration

Restoration Site

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

OREGON YACHT CLUB WILDLIFE HABITAT

Landowners: Oregon Yacht Club, City of Portland

Site description: The Oregon Yacht Club is located at river mile 15.75 on the east bank of the Willamette River, abutting Oaks Bottom Wildlife Refuge. Although some filling and bank alterations have occurred in the past, this site is primarily vegetated floodplain with no apparent structures. A houseboat community is located just offshore. The riparian zone at this site ranges from 100-200 feet in width. Mature trees with native/non-native understory comprise most of the area, with some disturbed and bare areas across the site. The site's close proximity to significant natural areas such as Oaks Bottom Wildlife Refuge and Ross Island increases the value of habitat protection and improvement on this property for wildlife and aquatic species.

Proposed restoration: Restoration at this site could include removing invasive plants and increasing the amount and quality of vegetation in floodplain and riparian areas. Filled and disturbed areas could be restored. Snags and downed large wood could be increased along the banks and throughout the floodplain.

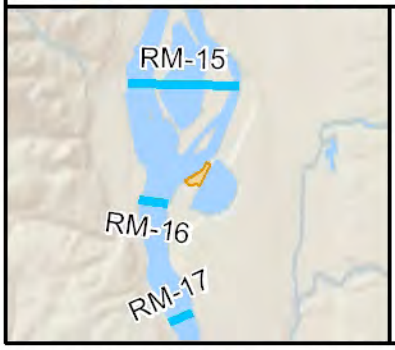
Benefits: This site could be protected and maintained as a natural area. Improvements in the banks and floodplains would enhance important feeding, breeding and nesting habitat and movement corridors for native wildlife. Improving riparian vegetation would increase the quality and quantity of wildlife food and cover, help stabilize stream banks, capture sediment in stormwater runoff, support natural hydrologic flow processes and nutrient cycling, and provide a source of wood material to the river and to floodplain and riparian habitats. Mature patches of trees exist on the site that can provide perching and nesting opportunities for bald eagle and osprey.

Feasibility: Implementation of this project will require the permission and cooperation of the Oregon Yacht Club (landowner has indicated willingness to allow some level of restoration). The amount of aquatic species-related restoration may be limited by the need to protect existing terrestrial habitat and to ensure an attractive nuisance is not created if sediments along the shoreline are contaminated. The proximity of houseboats may preclude the addition of large wood, or require that the wood be stabilized so that it does not threaten the houseboats.

Other constraints/considerations: The presence of houseboats may constrain the extent to which potentially mobile large wood could be incorporated into project design. Current human uses at the site should be further evaluated and addressed in a restoration plan for the area.

Oregon Yacht Club

Map prepared for Portland Harbor Natural Resource Trustees



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0 300

Feet

Restoration Site

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

PORT OF ST. HELENS NATURAL AREA

Landowner: Port of St. Helens, Oregon Department of State Lands

Site description: The site is located in Scappoose Bay. Currently, a portion of the site is under industrial use, but a significant amount of natural area remains on the property. Habitat types include approximately 20 acres of freshwater tidal emergent wetland, 6 acres of tidally influenced scrub-shrub wetland, 14 acres of forested wetland (5 acres tidally influenced), and 4 acres of oak woodland. Dominant vegetation in the wetlands includes black cottonwood, willow, reed canary grass, and carex. Yellow flag iris and Himalayan blackberry are also present. Much of the emergent wetland has been hydrologically altered by the installation of a drainage ditch, which has allowed reed canary grass to develop into a large mat across much of the wetland. Nine acres of the forested wetland have been hydrologically altered by road fill surrounding the wetland, preventing normal tidal influence.

Proposed restoration: Restoration opportunities could include removal and control of exotic, invasive plants; restoring the emergent wetland by removing the drainage ditch and creating off-channel habitat; and installing large wood within the emergent and scrub-shrub wetlands. Restoration could also include laying back the banks of the stream channel and planting with native, riparian vegetation.

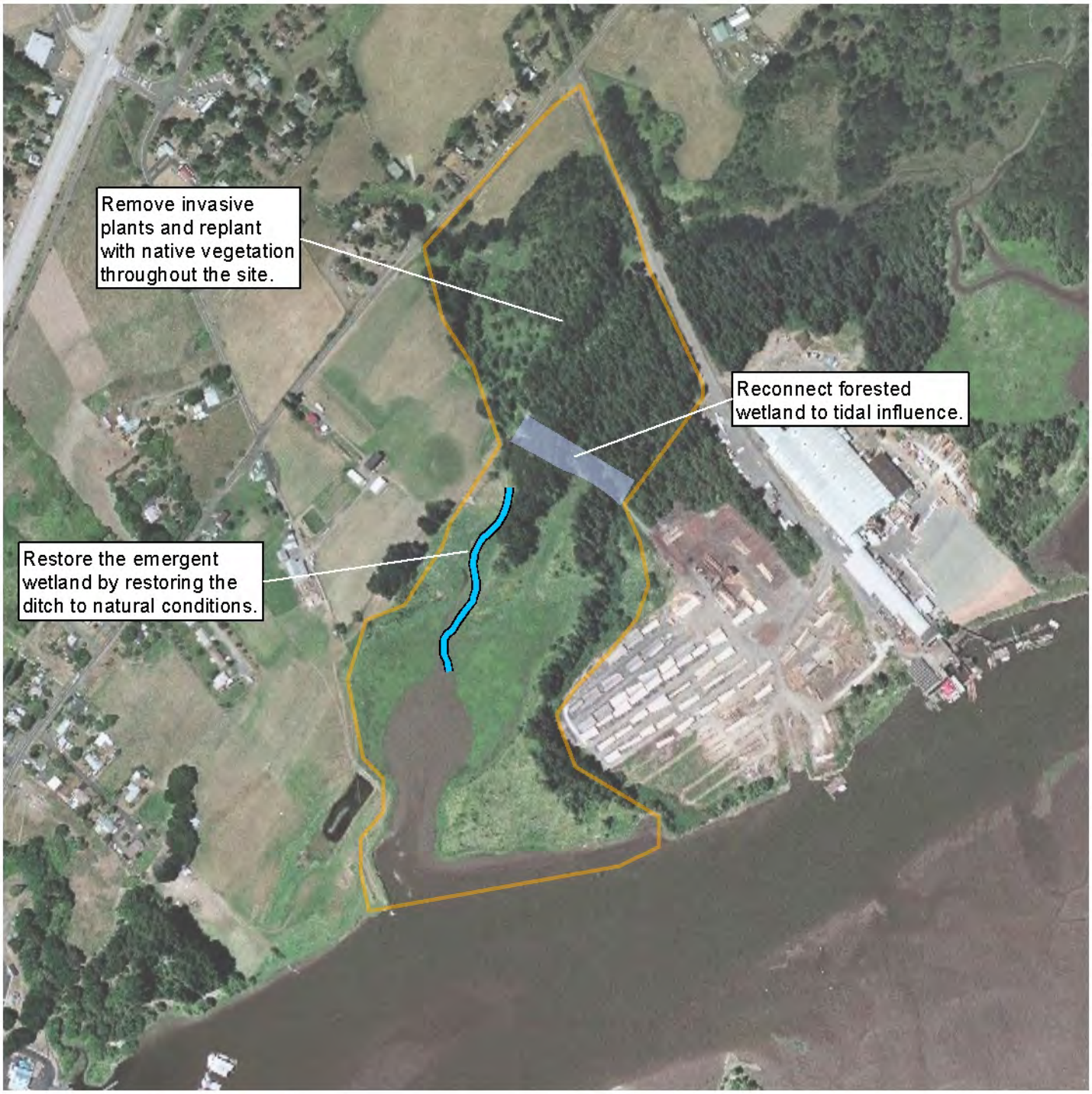
Benefits: Naturally sloped, vegetated stream banks increase floodplain connectivity and habitat diversity. Off-channel, shallow, slow moving waters provide refuge and productive foraging areas for lamprey and juvenile salmon. Shallow areas can also serve as important foraging areas for spotted sandpiper, mink and other species. Riparian vegetation provides trees for bald eagle and osprey perching and nesting opportunities, and cover and foraging areas for mink and other species.

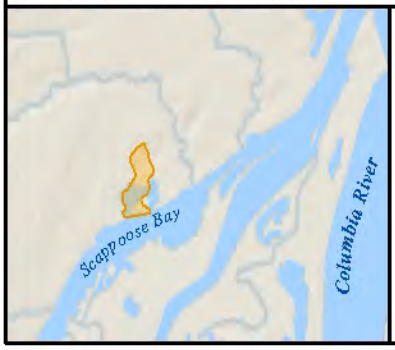
Feasibility: The land is publicly owned. The Port of St. Helens is interested in restoring and/or enhancing the natural areas for fish and wildlife. There are no known permitting obstacles at this time. Minor ongoing maintenance of invasive vegetation at the site will be necessary.

Other constraints/considerations: Part of the area is used as a Port access point for large trucks; any restoration design will need to accommodate this function.

Port of St. Helens Natural Area

Map prepared for Portland Harbor Natural Resource Trustees





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0 700

Feet

Potential Channel Restoration

Restoration Site

Forested Wetland

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

POWERS MARINE PARK, RIVERVIEW CEMETERY AND CULVERTS

Landowner: City of Portland, Tri-Met, Lewis and Clark College, Riverview Cemetery Association of Portland, Union Pacific Railroad (leased to City of Portland), Oregon Department of State Lands

Site description: This proposed restoration site is located at river mile 16.8 on the west side of the Willamette River. Powers Marine Park is a 15-acre riverfront park with beach habitat and a connected floodplain with an extensive stretch of shallow water habitat along the shore. The park is a mixture of conifer and bottomland forest types, including mature Douglas fir and black cottonwood trees. Several large snags exist within the forested area. The Riverview Cemetery property is located across Highway 43 from Powers Marine Park. This property consists of approximately 185 acres of undeveloped contiguous forestland. The health of this forest is threatened by significant invasive plant species. Seven streams, which provide year round cold water to the Willamette River, flow through Riverview Cemetery, under Highway 43, and through Powers Marine Park to the river. Five are perennial and two are seasonal or intermittent. These streams all flow through a short section of culverts under Highway 43, the railroad corridor and a portion of the Powers Marine Park pedestrian trail. The culverts are undersized, poorly functioning and, in some cases, failing. The culverts also act as aquatic connectivity barriers to fish and other aquatic organisms.

Proposed restoration: Restoration at this site could include acquisition of available portions of the Riverview Cemetery property, removing invasive plant species such as English ivy that is threatening forest health, revegetation of disturbed areas with native species, protecting trees and snags, enhancing shallow-water and creating off-channel habitat, establishing wood jams or other habitat structures and enhancing stream confluences. Replacing or upgrading the seven culverts for wildlife passage and enhanced tributary and riparian habitat is also a possibility.

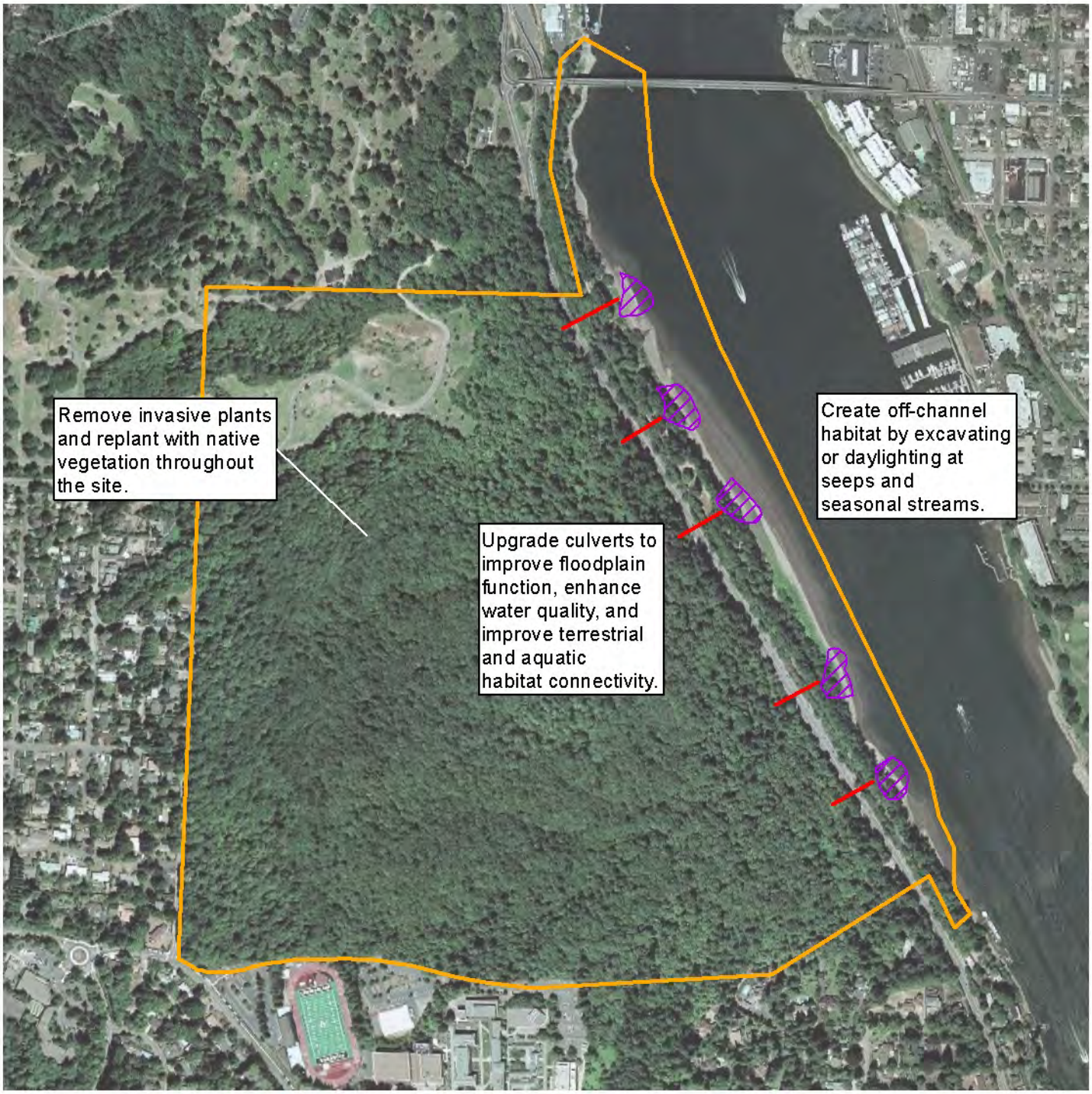
Benefits: Improvements in nearshore aquatic habitat, banks and floodplain would improve rearing and refuge habitat for salmonids and other native fish species as well as feeding and breeding habitat for terrestrial species. Upgrading or replacing culverts could increase off channel habitat, floodplain connectivity, water quality, and connectivity to upland habitat. Acquisition, protection and restoration of the cemetery property and restoring connectivity to the river could benefit wildlife such as mink by connecting upland and riverine habitats, protecting and improving nesting and breeding habitat for birds, and restoring a movement corridor that is currently non-functional because of Hwy 43.

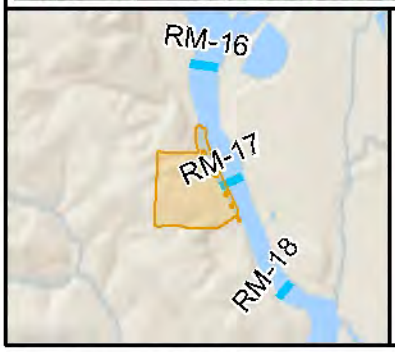
Feasibility: The project site has no known contamination issues and can be implemented immediately. Conflicts between habitat improvements, maintenance, and human uses may be less at this park than other riverfront parks due to lower levels of use.

Other constraints/considerations: Multiple landowners would be involved. Full support and willingness of all landowners would be necessary to project implementation.

Powers Marine Park, Riverview Cemetery & Culverts

Map prepared for Portland Harbor Natural Resource Trustees





N

0 800

Feet

Culverts

Restoration Site

Off-Channel Habitat

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

Rinearson Creek Natural Area

Landowner: City of Gladstone, Robinwood Riverie Property Association, Cottonwood Homeowners Association, Rinearson Creek Homeowners Association, River Cove Association, Oregon Department of State Lands, private property owners

Site description: Rinearson Creek is a short perennial tributary to the Willamette River located at river mile 24. The creek is just downstream of the City of Gladstone's Meldrum Bar Park, which provides approximately 30 acres of riparian and bottomland forest along the river. An earthen dam and water control structure are located on Rinearson Creek near its confluence with the Willamette River. The dam creates an impoundment, which has altered hydrology and blocks fish passage. The impoundment is infested with a variety of invasive plant and wildlife species that thrive in the stagnant system, including English ivy, yellow flag iris, red eared slider turtles, and bullfrogs. A small population of western painted turtles also resides in the area. Downstream of the dam, the creek has been altered by an auxiliary channel excavated between the historic creek channel and Meldrum Bar.

Proposed restoration: A coalition of landowners, neighbors, local government agencies, and environmental groups has initiated an effort to identify potential restoration options at the site. Restoration at this site could involve removing the existing earthen dam, filling in the auxiliary channel, excavation to remove sedimentation from the historic channel, recontouring the stream channel to a more natural meander, and adding large woody debris to the restored channel. Restoration could include creation of seasonal and perennial emergent wetland and open water habitats. Invasive vegetation would be removed and the riparian habitat and associated uplands replanted with native vegetation. The restoration design would likely include pond habitat in some portion of the site to support ongoing turtle conservation work.

Benefits: Removal of the dam and excavation of the historic channel would restore fish passage to Rinearson Creek up to the natural barrier (waterfall) and improve off-channel habitat for rearing, resting and foraging juvenile salmon and lamprey. Off-channel habitat is severely lacking in this stretch of the Willamette River. Removal of the dam would also create seasonal emergent wetland habitat for macroinvertebrates and native amphibians. Shallow water areas with large woody debris could also improve foraging habitat for a variety of wildlife species; open water habitat will benefit osprey and bald eagle, while seasonal drying of wetlands may benefit shore birds. Hydrology in the downstream reach of the creek would be restored to more historical conditions due to dam removal and filling of the auxiliary channel, which would improve water quality by decreasing algal blooms and reducing water temperatures, and restore sediment transport processes.

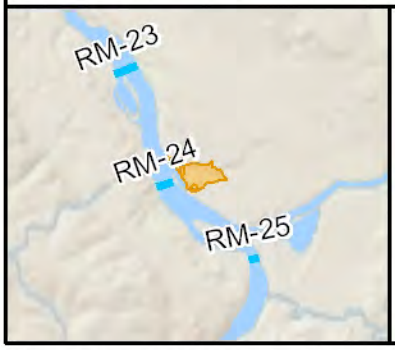
Feasibility: There is no known opposition to restoration at this site among affected landowners; however, any restoration actions implemented downstream of the dam will require cooperation of that HOA. Given the longstanding interest of the coalition, any restoration project(s) should be coordinated with the various stakeholders and coalition members. The coalition is in the process of securing funds to

conduct a feasibility study of restoration options at the site. The study is expected to be complete in 2011.

Other constraints/considerations: The dam was originally built as mitigation for filling of wetlands at the headwaters of Rinearson Creek in 1997 pursuant to a Clean Water Act Section 404 permit. It has since been determined that the original goals of the permit were never achieved as the dam has not been managed as originally intended. Further discussion is needed with the U.S. Army Corps of Engineers in regards to the permit. Potential sediment contamination issues have not been explored; these may be addressed in the feasibility study described above.

Rinearson Creek Natural Area

Map prepared for Portland Harbor Natural Resource Trustees



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0 400

Feet

Potential Channel Restoration

Dam

Restoration Site

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

SCAPPOOSE BAY MARINA

Landowner: Port of St. Helens, Oregon Department of State Lands

Site description: The site is located on Scappoose Bay near the mouth of Multnomah Channel. A 5-acre natural area with a trail is located adjacent to the Scappoose Bay Marina. Various native floodplain plant communities inhabit the natural area, as well as some invasive species, including reed canary grass. A raised trail, built on fill material, meanders through the natural area. This trail, including an undersized culvert that bisects the trail, restricts tidal flow to and from these wetlands.

Proposed restoration: Restoration at this site could include installation of a bridge to replace an undersized culvert to improve tidal flow to and from the wetlands and provide off-channel habitat. Alternatively, or in conjunction with culvert replacement, the trail could be elevated onto a boardwalk along the waterfront of the natural area to further improve tidal flow, creating a full connection to the floodplain and off-channel habitats. Invasive species removal and native re-vegetation is also recommended.

Benefits: Water quality could be improved by reconnecting the river with the floodplain. Benefits would be maximized if the trail was elevated as a boardwalk and fill was removed. Replacing the undersized culvert or elevating the trail on a boardwalk would also significantly increase off-channel habitat providing feeding, rearing and refugia for native fish. Increased off-channel habitat would also provide salmon with a refuge from extreme conditions within the river and a place to escape larger piscivorous fish during migration. The reconnection of the wetland to the river would also provide foraging habitat for mink.

Feasibility: The Port of St. Helens supports restoration of fish and wildlife habitat at the site. The extent of support for creating a full boardwalk trail is unknown.

Other constraints/considerations: The trail through the site is presently used for recreational hiking, wildlife viewing, etc. Although an elevated boardwalk would reduce the structural impacts of the trail on habitat at the site, heavy recreational use of the area could limit the ecological benefits provided to fish and wildlife.

Scappoose Bay Marina

Map prepared for Portland Harbor Natural Resource Trustees

N

0 300

Feet

Restoration Site

Fill Material

Culvert Area

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

SOUTH WATERFRONT SHORELINE

Landowners: Zidell Marine and ZRZ Realty Company, River Campus Investors, North Macadam Investors, OHSU, T&E Development, The Landing at Macadam LLC, OSF International Inc., Oregon Department of State Lands

Site description: South Waterfront is a major 130-acre redevelopment project located at river mile 14, south of downtown and bounded by the Marquam Bridge and Hamilton Street. The site includes 6,500 linear feet of Willamette riverfront; it represents the last major underdeveloped area within Portland's Central City. The land directly adjacent to the river is proposed for protection as the South Waterfront Greenway Natural Area Park. The remainder of the area is currently in various stages of redevelopment for high-density residential and commercial uses. Limiting habitat factors include: disconnection of the river from the floodplain, hardened banks, loss of riparian vegetation, invasive species, degraded channel conditions, and a lack of large wood.

Proposed restoration: Restoration at this site could include reducing bank slopes; reducing bank hardening; improving the connection between the river and the floodplain; increasing shallow water habitat; increasing the amount and quality of vegetation in riparian and floodplain areas; and increasing the amount of large wood on the shoreline and in shallow areas.

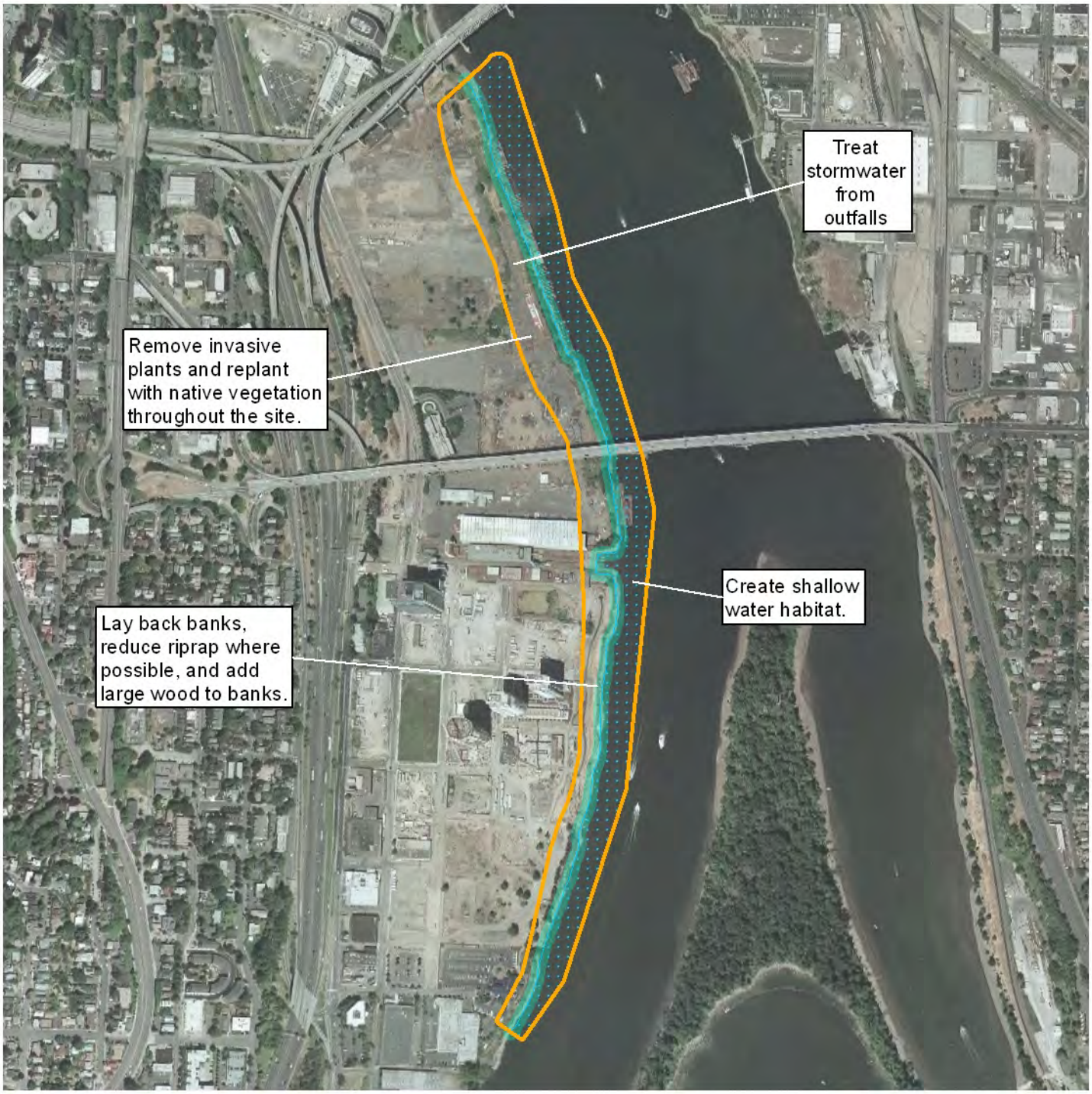
Benefits: Improvements in nearshore aquatic habitat, banks and floodplain would improve rearing and refuge habitat for salmonids and enhance important feeding, breeding and nesting habitat for native wildlife. Improving riparian vegetation would help stabilize stream banks; support natural hydrologic flow processes and nutrient cycling; and provide a source of wood material to the river. The benefits of restoration at this site would be amplified by its connectivity to Ross Island and the Oaks Bottom Wildlife Refuge.

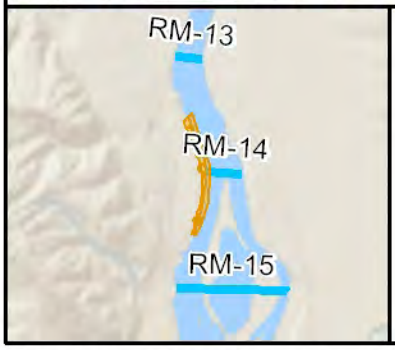
Feasibility: Constraints on restoration at this site include infrastructure at the Zidell facility; adjacent high-density urban redevelopment; demand for recreational access and river views; and a long history of environmental contamination from industrial uses.

Other constraints/considerations: A number of DEQ Environmental Cleanup Sites exist in close proximity to this site. Restoration at this site may be delayed by design and permitting considerations related to cleanup actions.

South Waterfront

Map prepared for Portland Harbor Natural Resource Trustees





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0 800

Feet

BFA_shorelines

Restoration Site

Shallow Water Habitat

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

TRYON CREEK HIGHWAY 43 CULVERT REMOVAL

Landowner: Oregon Department of Transportation, Metro, multiple infrastructure rights of way (ODOT, City of Lake Oswego, railroad)

Site description: The Tryon Creek culvert is located under Highway 43 approximately 1,000 feet upstream of the confluence of Tryon Creek and the Willamette River at river mile 20. The 400-foot long, 80-year old concrete box culvert is a partial barrier to endangered fish species migrating from the Willamette River into the Tryon Creek State Natural Area and the Tryon Creek watershed. The culvert/road is a complete barrier to lamprey migration into Tryon Creek and terrestrial wildlife species with the exception of birds. Recently, some action has been taken to improve passage and restore habitat in the immediate confluence of Tryon Creek below the culvert, but the height, length and slope of the culvert cause it to remain a significant passage barrier.

Proposed restoration: Restoration at this site would include removal of the existing culvert under Highway 43 and daylighting Tryon Creek, restoring fish and wildlife movement from the river up the tributary. Transportation upgrades would include bridging Highway 43 and the rail lines and realigning the roadway over the newly restored stream channel. Restoration would include restoration of stream banks to natural slope and planting with native vegetation.

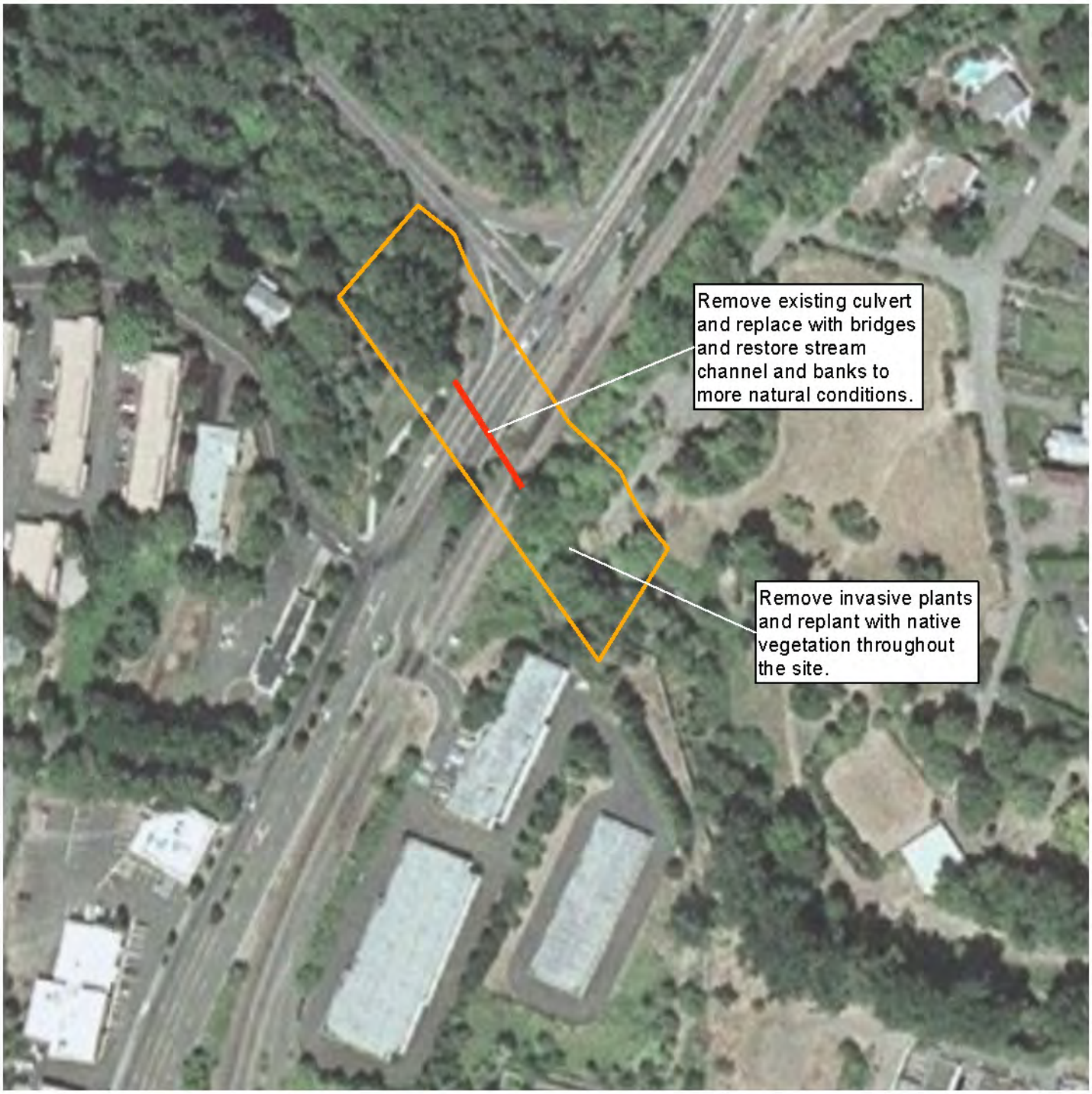
Benefits: This project would improve access for threatened and endangered salmonids, as well as mink and other wildlife species and provide access for lamprey to a major Willamette River tributary. The 645-acre Tryon Creek State Natural Area is one of the largest contiguous high quality habitats within the city of Portland. The project will also improve stream and stream bank habitat, quality and complexity, improve access to off-channel habitat as refuge during high flows, improve floodplain connectivity, and improve riparian and upland habitat by restoring native vegetation.

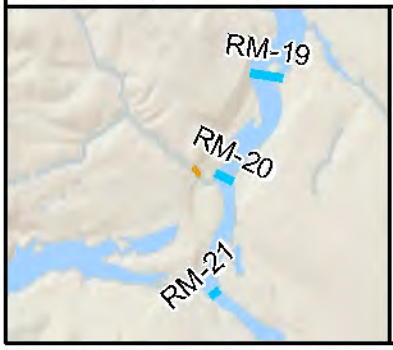
Feasibility: The site is in public ownership. The project was the subject of a study conducted by the City of Lake Oswego through a Greenspaces Grant that involved numerous partners and stakeholders including agency representatives and technical experts. This award led to the 2007 Tryon Creek @ Hwy 43 Culvert Alternatives Analysis, which outlines some of the feasibility issues and other aspects of this potential project.

Other constraints/considerations: The need to replace the culvert with a bridge that can accommodate Highway 43 as well as the rail lines may pose permitting challenges. Other infrastructure and land use planning projects that affect the project area should also be considered.

Tryon Creek Highway 43 Culvert Removal

Map prepared for Portland Harbor Natural Resource Trustees





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0 150

Feet

Culvert

Restoration Site

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.

WAPATO ACCESS SITE

Landowner: Oregon Parks and Recreation Department, Oregon Department of State Lands

Site Description: Wapato Access is an approximately 156-acre natural area located on Sauvie Island along Multnomah Channel. The site is outside of the Army Corps constructed levee system. The banks of Multnomah Channel are naturally high at this site, likely due to natural deposition, forming a natural levee that inhibits fish and all but the highest flood waters from accessing the site. As a result, juvenile salmonids cannot access the wetland during the majority of the period (November – June) when off-channel habitat and flow refuge is most critical. The existing wetlands and lake edges have low habitat complexity and portions of the floodplain and upland areas are dominated by non-native, invasive plants that further limit the site's functionality as habitat for juvenile salmonids and wildlife.

Proposed Restoration: Restoration at this site would focus on restoring the hydrologic connection and enhancing the capacity of the site to provide rearing and high-flow refuge habitat for juvenile salmonids. A new connection between Multnomah Channel and site would be excavated to enhance the hydrologic connection and provide access for juvenile salmonids to use the lake for rearing and refuge during high flows, increasing the frequency and duration of inundation of the site. Large wood structures would be added to restore habitat complexity. Increased inundation, removal of reed canarygrass and planting riparian vegetation will promote expansion of emergent wetland plant communities. Upland invasive species treatment and establishment of native oak savannah are also planned at this site.

Benefits: The project will create juvenile salmonid access to up to 50 acres of off-channel and wetland habitat intermittently with seasonal high river flows and tidal fluctuations. Juvenile salmonids will benefit from the increased availability of high-flow refuge habitat, as well as increased habitat structure and complexity, and increased food inputs from a restored vegetated zone and adjacent upland forest. Multiple wildlife species would benefit from the restoration of a native emergent wetland plant assemblage. Slow, shallow, open water habitat with greater fish presence will provide increased forage areas for bald eagles, mink, and otter.

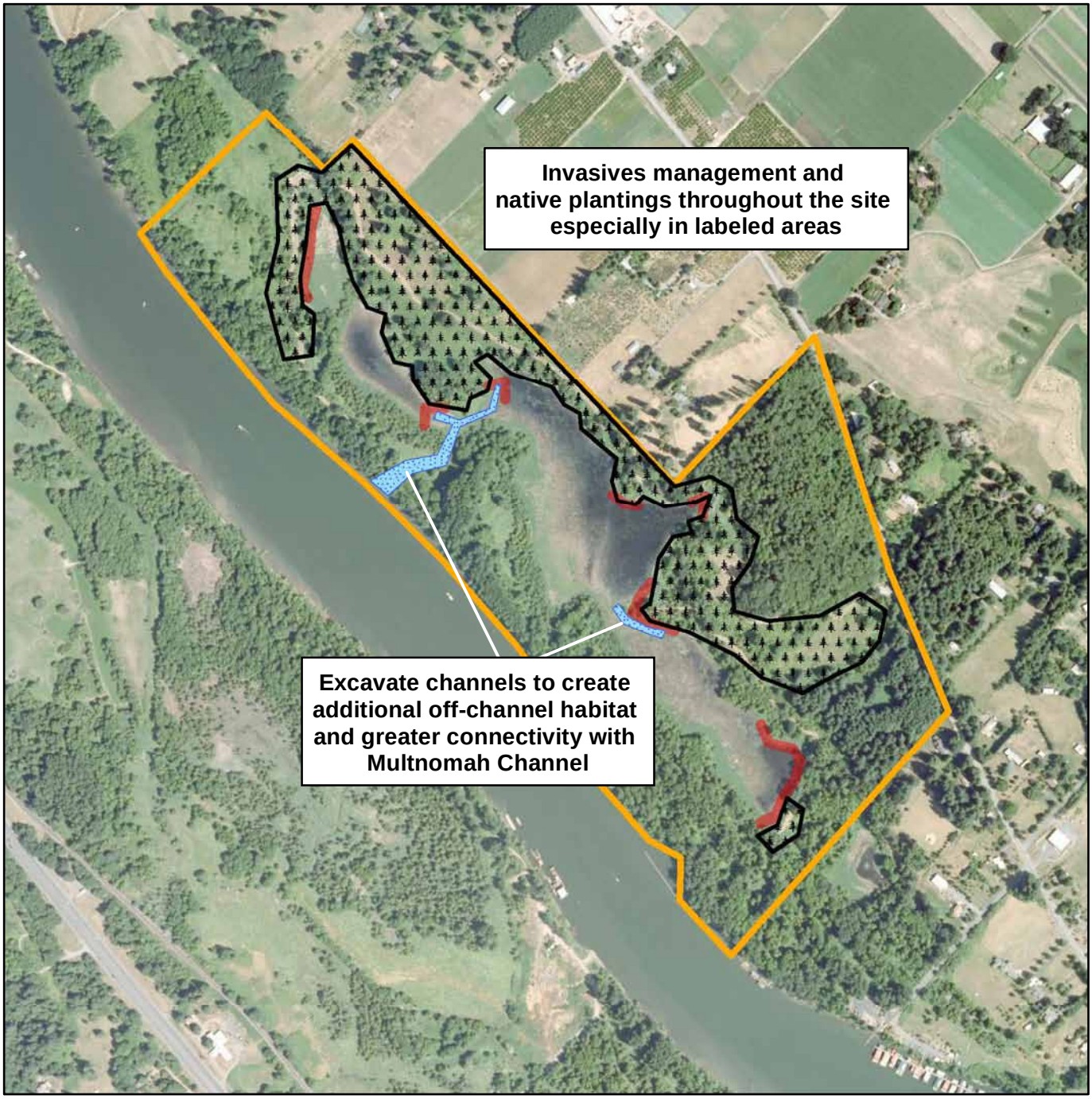
Feasibility: The land is publicly owned and there are no known obstacles related to zoning, permitting, or contamination issues. A dirt and gravel path surrounds the existing pond, and public access is permitted; public access would have to be managed in a way that protects restored habitat, particularly while riparian plantings are becoming established. The feasibility of a flow-through channel at the site (rather than a single channel connecting the wetland to the main channel) should be explored; this may help address concerns about water temperature and the potential for fish stranding.

Other Constraints/Considerations: There is significant utilization of the site at present by non-native bullfrogs, so potential predation on juvenile salmonids must be considered. Bullfrog eradication may need to be included as a project component. The impacts of introducing non-native carp present in the Multnomah Channel needs to be analyzed. Carp dig up aquatic vegetation and decrease water quality.

This area appears to be one of the few that do not presently have carp and therefore has the potential to have high quality aquatic vegetation including wapato, a plant that often disappears after carp introduction. Baseline monitoring is underway to characterize avian, amphibian and turtle use of the site to help inform restoration designs in order to gage how changes in waterflow and timing may affect those species. The embankments at the southeast and northwest ends of the existing wetlands may need to be moderately enhanced to ensure that there are no impacts to neighboring private properties.

Wapato Access Site

Map Prepared for Portland Harbor
Natural Resource Trustees



N

0 380 760 1,520
Feet

Restoration Site

Channel excavation

Invasive Removal and Native Planting

Addition of Large Wood

This map represents conceptual fish and wildlife restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of the site will occur to determine the feasibility, cost, and habitat value of the restoration concept at a finer scale.

West Hayden Island

Landowner: Port of Portland, Portland General Electric Company, Oregon Department of State Lands

Site description: Hayden Island is located in the Lower Columbia River just east of the confluence with the Willamette River. The island is part of a significant regional network of natural areas that provide habitat for migrating birds and many other species. Hayden Island is bisected by the Burlington Northern Santa Fe Railroad line. The western half of the island is 800+ acres of relatively undeveloped land located within the 100-year floodplain. Much of West Hayden Island is vegetated; it supports one of the largest stands of cottonwood-ash bottomland forest on the Lower Columbia with an understory of native and non-native plants. There are also meadows, wetlands, open sandy fill areas, beach and shallow water areas. West Hayden Island supports a variety of mammal, bird, reptile, amphibian, and insect species. Forest habitat provides nesting, roosting, and perching locations for a number of bird species. Salmon and lamprey migrate past Hayden Island to upstream spawning grounds. Lamprey larvae may use nearshore areas around the island as they have been found in similar habitats nearby.

Proposed restoration: Potential restoration actions include the development and restoration of hydrologic connections between and across the island's interior and the Columbia River, connecting existing wetlands to the river, and addressing invasive species on the island. Potential actions could include excavating a portion of the current dredge spoil site to create an off-channel aquatic habitat and a series of grass and shrub habitat areas. The large interior wetland could be seasonally connected with a new channel that would cross the island, similar to a historic channel previously present on the island. Removal of obsolete rock groins and other manmade features could enhance floodplain connectivity. Finally, all of the forested area on the island could be treated to manage the spread of invasive species and to support natural recruitment in the forested areas. Additional grassland and wetland restoration actions have been proposed for other parts of the island.

Benefits: In-channel islands are unique landforms that provide a highly diverse array of habitats and functions for fish and wildlife. Restoration of shoreline, shallow water and off-channel habitats provides resting and rearing areas for salmon and lamprey; natural beaches and shallow areas can serve as important foraging areas for spotted sandpiper, mink and other species, and as staging areas for spotted sandpiper and other shorebirds. Native vegetation will provide food and cover for a variety of species while reducing erosion and enhancing water quality. The structural diversity, snags, and large wood that may be enhanced in the forested portion of the site provide valuable habitat complexity for terrestrial species. Revegetation would enhance opportunities to develop large trees and forested areas for perching and nesting for bald eagle, osprey and other birds. The project will improve floodplain connectivity, which will help restore fluvial processes that help create and maintain certain habitat types.

Feasibility: The Port of Portland has proposed development of a 300-acre portion of West Hayden Island. This development would require annexation and re-zoning of the area by the City of Portland, which has convened a Technical Panel to evaluate the current habitat value of the island. Although

restoration of portions of West Hayden Island may provide habitat value, this restoration could be impacted by the type and scale of activities associated with development that may eventually take place (for example, a rail loop or spur). Recreation at the site could also limit or impact ecological benefits. In terms of technical feasibility of the proposed restoration actions, the altered hydrologic regime of the Lower Columbia and Willamette rivers due to regional dam operations is the most significant constraint to restoration.

Other constraints/considerations: The Port has developed a suite of potential restoration designs on 500 acres of West Hayden Island. For purposes of this evaluation, the Trustees considered the potential "lift" provided by restoration of all 800 acres, recognizing that the entire area may not ultimately be available for restoration. This approach to evaluating the island's restoration potential does not represent a Trustee Council position on the question of re-zoning the island for development.

West Hayden Island

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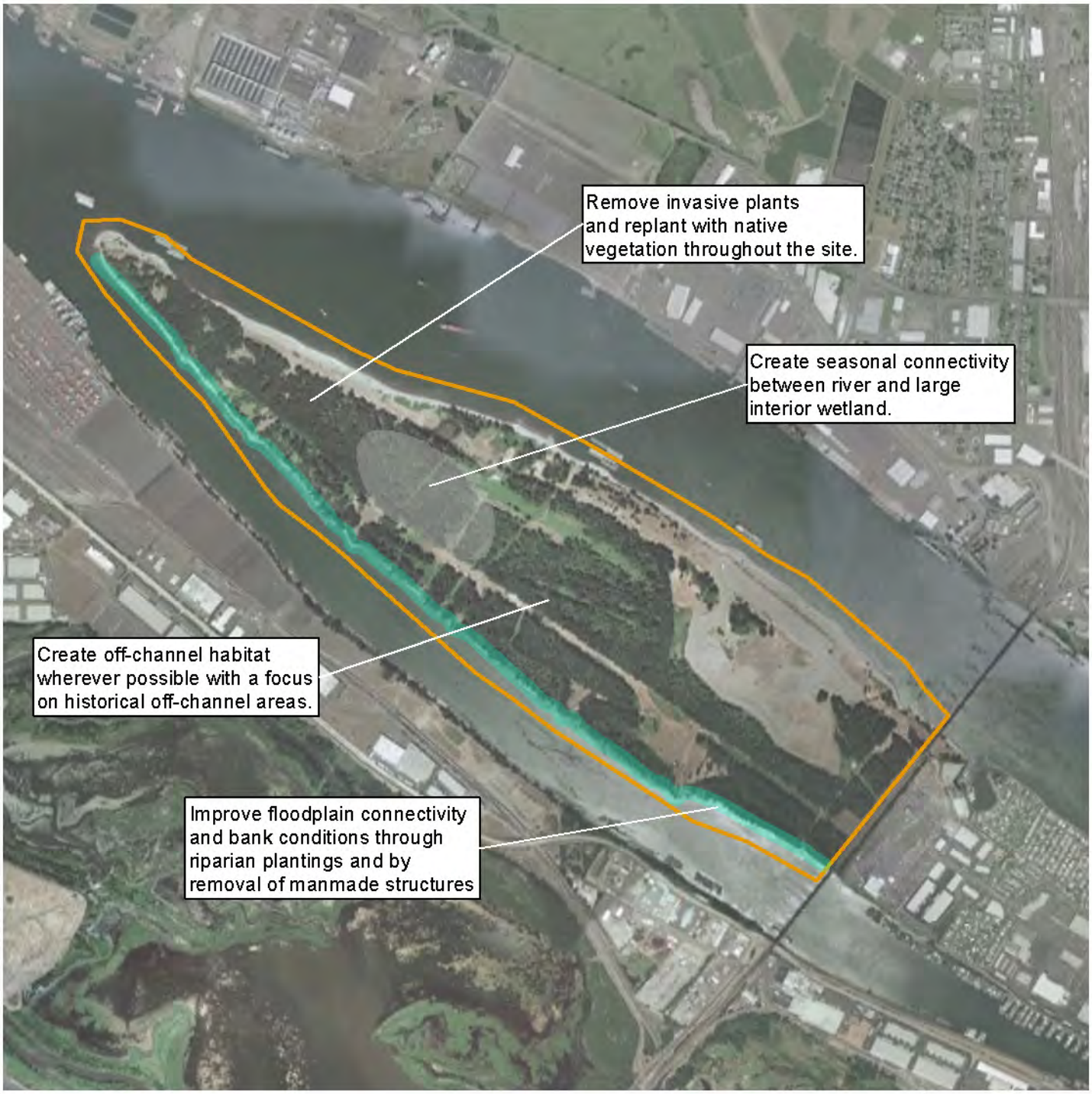

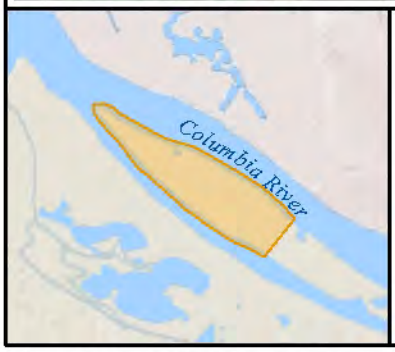

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0 2,500

Feet

Potential Bank Restoration

Restoration Site

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WILLAMETTE PARK

Landowner: City of Portland, Oregon Department of State Lands

Site description: Located at river mile 15.75 on the west bank of the Willamette River, Willamette Park is a 26-acre hybrid park that has both developed uses (boat ramp and dock, soccer fields, etc.) and natural areas that include wetlands, bottomland hardwood forest, beaches, mudflats, and rock outcrop islands. The site contains about 2,000 linear feet of riparian zone. Limiting habitat factors include hardened and steepened banks, disconnected floodplain, high human use, and untreated stormwater from the parking lot and boat launch.

Proposed restoration: The open spaces along the riverbank provide opportunities to restore steepened and hardened banks, widen the riparian corridor and to create shallow water habitat. Restoration at this site could include reducing bank slope and reducing the amount of hardened banks; improving the connection between the river and the floodplain; increasing the amount of shallow water habitat; increasing functional riparian and floodplain areas; and increasing the amount of large wood. There may also be opportunities to create off-channel habitat.

Benefits: Some portions of Willamette Park have excellent existing shallow water habitat that can be used as a reference for other shallow water restoration projects. The mudflats and rock outcrop islands provide unique habitat for shorebirds and fish. Improvements in riparian and nearshore aquatic habitats, banks and floodplains would improve rearing and refuge habitat for salmonids and enhance important feeding, breeding and nesting habitat for native wildlife. Increasing and improving riparian vegetation would increase available habitat and help stabilize stream banks; capture sediment in stormwater runoff; support hydrologic flow processes and nutrient cycling; and provide a source of woody material to the river.

Feasibility: Recreational use of the park, including the desire of park users for views of and access to the water from the park, is a key challenge to effective habitat restoration. In addition, restoration design will need to carefully avoid impacts to existing good-quality shallow water/mud flat habitat at the park.

Other constraints/considerations: BES is currently designing stormwater treatment retrofits for two areas in the park. These projects would address stormwater from the boat launch and large parking areas.

Willamette Park

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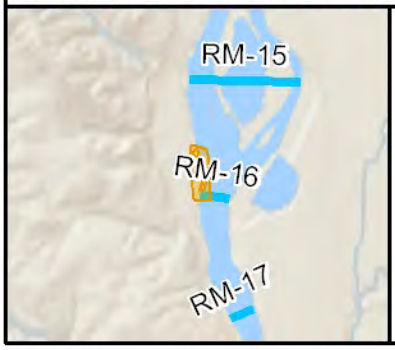

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Feet

Restoration Site

Off-Channel Habitat

Revegetation

This map represents conceptual fish and wildlife habitat restoration opportunities which have been screened against criteria developed by the Portland Harbor Natural Resource Trustees. Further analysis of this site will occur to determine the feasibility, cost, and habitat value of the restoration concepts on a finer scale.