

MEMORANDUM

Integrated Summary of WHI Environmental and Economic Foundation Studies

FINAL

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PREPARED BY



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Technical Memorandum

Date: June 2, 2010
To: Community Working Group
cc: City of Portland, Port of Portland
From: Barbara Wyse
RE: **Integrated Summary of Environmental and Economic Foundation Studies**

1.0 INTRODUCTION

For over a year, members of the Community Working Group (CWG) have been considering reconciling a mix of land uses on WHI, and the implications and tradeoffs inherent in annexing the property and developing a long-range land use plan. Currently, the property is in the Portland Urban Growth Boundary, but is not within the City of Portland limits. For the past ten months, the ENTRIX team has been analyzing data and compiling information with the purpose of answering key questions raised by the CWG. The purpose of this document is to summarize for the CWG some key findings and points to consider as you deliberate on the viability of mixed uses on WHI.

WHI is located at the nexus of the primary ecological, economic, and recreation arterials in the region. It sits at the confluence of the Willamette and Columbia Rivers, which are key to all of these purposes as these rivers: a) provide deepwater navigation channels for marine transport, b) are the most used rivers by recreational boaters in the State of Oregon, and c) support highly diverse species populations and serve as a fish and wildlife movement corridor. The extensive shoreline and relatively large acreage of undeveloped land on WHI presents significant opportunities for all three of these uses.

The purpose of this memorandum is to integrate in one document the findings related to:

1. Benefits of marine-related economic activity, habitat preservation, and recreation uses on WHI,
2. Relationship between land acreage allocation and benefits by use, and
3. Potential compatibility of mixed use on WHI.

The final section summarizes additional resources that have been provided to the CWG that supplement the environmental, economic, and recreation studies that have been completed.

2.0 TYPES AND LEVELS OF LAND USE BENEFITS

This section summarizes the opportunities and land use benefits of the three analyzed land uses on WHI.

2.1 Marine-Related Economic Development

Findings from the economic foundation study indicate that over the next 40 years, demand for lands suitable for marine-related economic activity will exceed the available, suitable land supply by hundreds of acres. The shortage will particularly affect those uses that require parcels larger than 60 acres, such as large marine industrial facilities or marine terminals. WHI, owned by the Port of Portland, is the only large parcel of this size currently available for marine-related economic development in Portland Harbor. WHI's location at the confluence of the deepwater navigation channels in the Columbia and Willamette Rivers as well as its proximity to rail, highway, and airport infrastructure make it a desirable site for marine-related economic development. Metro has designated the site as a Regionally Significant Industrial Area on the Title 4 map in the Urban Growth Functional Plan.

If forecasted growth opportunities for both marine industrial and marine cargo uses are realized, marine-related land use on WHI will benefit the local economy by enabling the region to capitalize on these opportunities to increase employment, income, and tax revenues. Based on a previous study (Martin, 2005) conducted for the Port of Portland (and corroborated by findings in the Economic Foundation Study), each acre at existing marine terminal facilities in Portland directly supports 3.9 jobs and \$213,000 in personal income in the metro area. There are additional job and economic benefits that include income from indirect and induced jobs as well as taxes generated by marine facilities. Though employment would vary depending on the type of facility developed, it is expected that the impact on jobs and income would be of similar magnitude.

There is some uncertainty inherent in forecasts regarding the timing, composition, and magnitude of cargo and industrial growth opportunities and the competitiveness of Portland to attract these opportunities. Certainty associated with marine-related economic development benefits could be increased by:

- Further examination of potential (assumed small in the Economic Foundation Study based on available evidence) to significantly reconfigure and redevelop existing lands in Portland Harbor to create large parcels (60 to 150 acres) suitable for marine-related use.
- Research regarding the economic benefits that will accrue to Portland if marine-related economic development occurs elsewhere in the Lower Columbia River.

2.2 Recreation Use

Several attributes of WHI indicate that recreation land use has significant potential value. The attributes include its location and its natural resources. WHI's location increases its recreation potential as it is on rivers used extensively for boating and fishing, it has potential to provide a connection on regional trail systems such as the 40-mile loop and the Columbia River and Willamette River water trails, and it can serve to bring open space and recreation facilities to an area of Portland that is classified by Portland Parks and Recreation as underserved by parks (based on parks acreage per capita). The natural resources on WHI also enhance its potential as a recreation site, particularly for nature-based activities that are growing in popularity such as wildlife viewing, hiking, and environmental education. The extensive shoreline of WHI also provides opportunities for waterfront trails, boat launch areas, and beach access.

Development of recreation facilities on WHI would increase the proximity, availability, and diversity of recreation areas in the Portland metro area, and would therefore have economic benefit to recreational users and potentially to recreation-related businesses (assuming WHI recreation leads to more people recreating in the local area rather than elsewhere).

Certainty associated with recreation benefits could be increased by:

- Comprehensive recreation needs analysis that considers in detail the local and regional supply and demand for recreation activities.
- Research on the range of possible recreation developments that could meet the needs of the local and regional populations, and associated uncertainty in levels of potential use and benefit

2.3 Natural Resources

WHI is designated as a high value riparian area, a Habitat of Concern in the regional inventory, and a Moderate Habitat Conservation Area in Title 13. Natural resources on WHI are currently providing habitat benefits to wildlife species, and economic benefits to society in the form of ecosystem service flows related to carbon sequestration, air purification, water purification, flood regulation, and habitat and biodiversity. As discussed in the restoration analysis provided by Parametrix, these benefits could be enhanced through restoration actions. In particular, benefits related to biodiversity, water purification by wetlands, and carbon sequestration could be enhanced. The economic value of current benefits is conservatively estimated to range between \$550,000 to more than \$4.7 million annually, of which shallow water habitat is expected to comprise much of the value (40 percent in the low estimate to 75 percent in the high estimate). Ecosystem service values are expected to increase with restoration by up to approximately \$2 million annually. The economic benefits of WHI are less than many other natural areas as there is very limited access and use of the site; this enhances the intrinsic ecological value of the site as there is limited disturbance.

In addition to economic benefits, there are intrinsic benefits associated with the habitat on WHI. Many fish and wildlife species rely on WHI as a migration corridor and area for nesting, breeding, foraging, and rearing young. Species associated with habitats on WHI include fish, amphibians, reptiles, birds, plants, and mammals. Benefits of WHI are primarily related to its location, positioned at an aquatic and terrestrial intersection at the Columbia River/Willamette River confluence and floodplain area in the midst of a fragmented urban landscape. WHI habitat also has greater ecological benefits due to its diverse habitat types located in close proximity and its connectivity through its wetlands and shoreline areas to water.

There is inherent uncertainty in natural resource benefits of WHI due to the complexity of relationships between island processes and habitats and landscape-level features and biodiversity. Certainty associated with natural resource benefits can be increased by:

- Comprehensive documentation of species use, diversity, and abundance on WHI, and
- Additional research regarding the ecological importance and specific role of WHI for migratory species.

3.0 LAND USE ALLOCATION CONSIDERATIONS FOR VIABILITY OF MIXED USES

This section summarizes how the viability of each of the three land uses would depend on land allocation.

3.1 Marine-Related Economic Development

There is a minimum size of land allocation required for most marine-related use to viably occur on WHI. As discussed in the Economic Foundation Study, on-site access to rail transportation infrastructure and efficient access to truck freight routes is very important for most marine cargo terminals and large marine industrial facilities. WHI is well-situated close to all of these transportation infrastructure elements, but requires investment in an access bridge for freight trucks (and other users) as well as construction of rail infrastructure on the island. Furthermore, while growth is forecasted for marine-related uses, the exact composition of marine cargo growth or marine industrial growth is not known with certainty, so flexibility in site size will increase long-term flexibility to meet changing demands.

There are thus three primary reasons for a minimum acreage allocation for marine-related uses to be viable on WHI:

- 1) To procure funding and support the costs of necessary infrastructure development, there needs to be sufficient economic activity on WHI and use of the infrastructure. The costs to construct a vehicular bridge on the south side of WHI to Marine Drive, as well as many of the costs to develop rail and on-site road infrastructure for marine-related operations will be fixed regardless of the level of economic activity and acreage used on WHI. Thus, economic benefits relative to costs rise as more land is developed and the per acre costs decline. The Port of Portland has estimated site development costs *excluding* the vehicular bridge costs and costs expected to be borne by any proposed development. Based on these estimates, the per acre site development cost falls from \$10 per acre to \$6 per acre as marine-related development size increases from 190 to 350 acres. This per acre cost difference can markedly affect the marketability and competitiveness of the site.
- 2) To ensure space for rail infrastructure and terminal operations, there needs to be adequate land available for development. Based on vessel size and rail slope and curvature restrictions, there are certain acreage configuration and size requirements that must be met for viable marine cargo operations. Required site dimensions are largely driven by the need to accommodate trains of 8,000 to 10,000 feet within the development area. Shoreline access and berth lengths must be sized from 1,000 to 1,500 feet to accommodate increasingly larger vessels, and due to draft depth would need to be located on the main channel of the Columbia River on the north side of WHI. The exact rail infrastructure alignment may vary based on different cargo needs, as will site requirements, but according to concept design plans developed for the Port of Portland, is likely on the order of 30 acres for an intermodal rail yard and 125 to 150 acres for a loop track (with terminal operations located in the interior of the loop).
- 3) To ensure long-term viability of operations, site size needs to be adequately large to ensure flexibility in facilities and site configuration to meet changing market needs. Marine cargo and marine industrial uses require substantial initial investments, so for adequate return on investment, facilities need to remain viable for decades into the future. General growth forecasts are much more accurate than cargo-specific or industry-specific forecasts, as technological

change and unforeseen economic shifts can alter the production and trade of commodities. Facilities thus need adequate size to ensure flexibility to shift between different cargo types.

Certainty regarding marine-related land need on WHI can be increased by:

- Additional information on specific site needs associated with potential future site uses, including acreage size and configuration requirements,
- Additional data on costs of WHI development and comparative costs of developing alternative sites. Development costs to prospective site users will partly determine the competitiveness and marketability of the site.

3.2 Habitat

Similar to marine-related economic uses, there is a minimum size of land required from an ecological standpoint. As discussed in the Environmental Foundation Study, many species have minimum habitat patch size as well as habitat diversity requirements to meet their life history needs. Species with larger and more diverse habitat requirements need to move freely between habitat types and access water. Additionally, many species need habitat that is separated from developed areas as proximity to development is associated with disturbance (such as noise, vibration, artificial lighting, human activity, changes in surface and ground water hydrology, and other non-natural disturbances) that negatively affects the productivity and abundance of many species. Due to limited food and shelter resources as well as predator/prey relationships, large parcels are also necessary to reduce inter- and intra-species competition for resources.

There are thus three primary reasons for a minimum acreage allocation for the viability of natural resource areas on WHI:

- 1) To meet species minimum habitat size and diversity requirements, there needs to be maintenance of diverse habitat types and sufficient land allocated to support species diversity and abundance. There is limited data available to indicate a specific threshold at which overall species population or diversity dramatically changes due to the amount of habitat. Specific species needs per breeding pair can vary from very small acreage areas to areas larger than several hundred acres, but this does not indicate acreage necessary for population viability. As habitat in the Lower Columbia River is already fragmented, small reductions of habitat in an increasingly small habitat inventory have greater ecological significance. In general, loss of habitat area would result in an overall decrease in the population size and diversity of animals and plants on WHI. With greater loss of any particular habitat type, a decline in use by species adapted to that habitat would be expected.
- 2) To maintain interior habitat areas free from disturbance there needs to be adequate land available that the ratio of habitat edge near development is low relative to interior habitat areas. While all species may be affected by human disturbance, it has been identified as a key limiting factor for many birds, mammals, and reptiles associated with WHI habitats. For example, potential road infrastructure could contribute to road mortality or hinder migration, and recreational activities could disrupt behaviors, particularly breeding and nesting. To limit disturbance, habitat areas need to be configured such that interior habitat is maximized and adequate buffers and separation from human activity and disturbance are maintained.

- 3) To maintain species diversity, there needs to be maintenance of healthy riparian, wetland, and shoreline areas. Of the species types on WHI, many are most dependent on riparian, shoreline, and shallow water areas. In particular, amphibians, reptiles, and fish are all most dependent on these habitat types located in or near the Columbia River and wetlands. Mammal and bird species are also dependent on riparian areas, in addition to often requiring significant upland habitat areas. Although all of WHI can function as riparian habitat, most riparian functions are concentrated in the riparian fringe within 150 feet of the Columbia River and wetlands. Again, acreage requirements differ by species, but examples of minimum requirements include: northern red-legged frog needs 20 acres of riparian and wetland habitat per breeding pair, a breeding pair of turtles may require 55 acres, and the scientific literature indicates that fish require functional, complex shoreline habitat every one-quarter mile or so along the migration corridor.

Certainty regarding species habitat land needs on WHI can be increased by:

- Additional research regarding the potential adaptation of WHI species to disturbance and edge effects near mixed use areas,
- Information regarding the potential effectiveness of mitigation to compensate for reduced habitat acreage. The restoration analysis indicates that natural functions can be restored and biodiversity enhanced through management actions on the island. It is not known to what degree this habitat quality enhancement can offset a habitat quantity change on WHI.

3.3 Recreation Use

Recreation use is the most flexible land use in terms of site size, as indicated by the range of acreage in parks in the City and the region. Sellwood Riverfront Park is under nine acres while Kelly Point Park is nearly 100 acres. Site facilities, design, and location determine benefits associated with many recreation activities as much or more than site size. However, as many of the benefits of a recreation site on WHI is related to the natural resources on the site, there are several important land use considerations for potential recreation sites on WHI. These include:

- 1) To meet high demand for waterfront trails, boat launches, and/or beach access, recreation sites on WHI need to be located in shoreline areas. Hayden Island residents have specifically noted their desire for increased access to the river and the beach for a variety of activities including public boat launches. Due to bank hardening on the Willamette River, there are few opportunities on the Willamette River in Portland for beach access, and WHI has the setting to provide this opportunity.
- 2) To provide recreation opportunities in natural areas, recreation sites could include trails and/or wildlife viewing areas that provide access to nature. Trails are Portland's most popular recreation resource, and enhancing the Portland trail system is an objective both for the City and the Hayden Island community. There is increased demand for nature-based recreation, and WHI could help meet this demand with walking trails, mountain biking trails, and/or nature trails with interpretive signs.
- 3) To enhance trail systems in the City, recreation sites on WHI could be designed to connect into regional trails. With development of a bridge to WHI from Marine Drive, paved trails on WHI

could be connected to the 40-mile loop trail system. This connection would enhance the loop and add an additional destination for recreationists. Additionally, WHI could be a destination on the Columbia River and Willamette River water trails.

Certainty regarding recreation land needs on WHI can be increased by:

- Comprehensive study of the scope and range of recreation possibilities and associated demand on WHI.
- Site analyses to assess the feasibility or design of potential recreation areas.

4.0 SUMMARY AND COMPATIBILITY OF A MIX OF USES

As described above, all three uses of natural resource conservation, recreation, and marine-related economic development have the potential to provide significant benefits. All three uses also have the potential to provide greater benefits with increased allocation of land. Given the inherent tradeoffs associated with allocating land to one use versus another, what are the elements of compatibility, and what are the elements of conflict? This section attempts to identify some of these key elements.

It is important to first recognize that there are existing examples, including Rivergate and the Smith and Bybee Lakes, of areas with a viable mix of marine-related economic uses, habitat preservation, and recreation. There are several features of this area that provide insight into compatibilities between these uses. First, recreation areas, together with appropriate vegetation screening, can serve as a buffer between marine-related economic development activities and habitat areas. As described in the recreation analysis, **recreation can be compatible with marine-related economic use if there are appropriate buffers and restrictions** to prevent safety and security hazards. Due to its relatively small footprint requirements for most activities, and as indicated by the dual purpose of the National Wildlife Refuge system, **recreation can also be compatible with habitat conservation, but must be managed in such a way to minimize disturbance from humans and habitat modification.** Management actions include concentrating recreation use in certain areas and providing habitat sanctuaries separated from human use.

Potential incompatibility centers on the acreage requirements for viable marine-related economic use and habitat conservation, and the potential impacts on species of habitat reductions. In particular, shoreline areas are highly valuable for both uses. Functioning riparian, wetland, and shallow water habitats are identified as potentially the most limiting factors for many species associated with WHI. Likewise, marine vessels require use of shoreline areas for berthing. However, **there is potential for increased compatibility with marine-related site designs that minimize the footprint in the riparian, upper beach, and shallow water habitat areas.** Preliminary designs conducted for the Port of Portland indicate that an offset extending 300 feet inland from the edge of shallow water habitat is feasible. Terminal activities can be largely consolidated in upland areas. Also as identified in the quality/quantity evaluation and the restoration analysis in the Environmental Foundation Study, the upland areas on the north side of the island have generally low to medium habitat quality, and there may be opportunities to enhance other areas to offset impacts to these upland areas.

5.0 ADDITIONAL RESOURCES

While the ENTRIX foundation studies and supplemental reports on Ecosystem Services, Recreation, and Restoration Opportunities (Parametrix) are reviewed through this Integrated Summary, there are a number of other reports and memos that have been generated over the course of this project to support the CWG's work. Below is a list of the additional work produced. All of these pieces can be found on the City's project web site: <http://www.portlandonline.com/bps/whi>.

Additional Reports Produced:

- Mitigation Requirements (Enviroissues)
- Mitigation Evaluation for Development (SWCA)
- Black Cottonwood White Paper (SWCA)
- Local impacts of Industrial Development (City)
- Marine Cargo Forecast for Portland (BST Associates)
- Terminal Site Requirements (HDR Engineering)
- Environmental Initiatives at Seaports Worldwide (I2S2)

Memos that have been produced to respond to Community Working Group questions include:

- Port Cost Estimates for Terminal Development (Port)
- Ports & Recreational Amenities (Port)
- Regulatory Framework Information (City)
- Port Stoppage of 1999 process (Port)
- Port of Portland in the Global Market place (Port)
- Transportation related memo (DEA)
- Mitigation opportunities on Gov't island (Port)
- Mitigation mapping based on one development concept (City)
- Balancing Natural Resource and Industrial Development- case studies (City/Port)
- Sample marine terminal development footprints from other NW Ports (Port)