

FINAL DRAFT
Smith and Bybee Wetlands Natural Area Trail Feasibility Study



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Smith and Bybee Wetlands Natural Area Trail Feasibility Study Portland, Oregon

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TABLE OF CONTENTS

	Page Number		Page Number
I. Executive Summary	1	VII. Trail Design	40
▪ Purpose	1	▪ Pedestrian Trail	40
▪ Overview	1	▪ Multi-Use Trail	40
▪ Elements Common to All Alternative Alignments	2	▪ Landscape Mitigation	41
▪ Summary of Alternatives	4		
II. Background	6	VIII. Stakeholder/Public Input	44
▪ Study Area	6	▪ Technical Working Group	44
▪ Project Purpose	6	▪ Public Workshop and Tour	44
▪ Project Partners	7	▪ Stakeholder Meetings	45
▪ Technical Working Group	7	▪ Project Outreach	45
▪ Project Goals	7		
▪ Trail Goals	8	IX. Next Steps	46
III. Site Context	9	Bibliography	47
▪ Project Site	9		
▪ Project History	9	Appendices	
IV. Evaluation Criteria	12	A. Technical Working Group	
V. Trail Segments	14	B. Technical Memoranda	
VI. Alternative Alignments	17	C. Cost Estimates	
▪ Elements Common to All Alignments	17	D. Public Involvement	
▪ Ash Groves Trail Alignment	19		
▪ Landfill Trail Alignment	24		
▪ South Lake Shore Trail Alignment	29		
▪ South Slough Trail Alignment	34		
▪ Summary of Alignments	39		

Page Number

Maps

Map 1. Study Area	6
Map 2. Context	11
Map 3. Trail Segments	16
Map 4. Ash Groves Alignment	20
Map 5. Landfill Alignment	25
Map 6. South Lake Shore Alignment	30
Map 7. South Slough Alignment	35

Tables

Table 1. Related Planning Documents	10
Table 2. Alternative Alignment Segments	17
Table 3. Alternative Alignment Comparison	39

Figures

Figure 1. Soft Surface Pedestrian Trail in Natural Area	42
Figure 2. Boardwalk in Wildlife/Sensitive/Wet Areas	42
Figure 3. Paved Multi-Use Trail in Natural Area	42
Figure 4. Paved Multi-Use Trail in Landfill on 14' Road	43
Figure 5. Paved Multi-Use Trail in Landfill on 10' Road	43
Figure 6. Viewpoint on Landfill Cap	43
Figure 7. Viewpoint on Landfill Road	43

I. EXECUTIVE SUMMARY

Purpose

The Metro Council is being asked to select a trail alignment, in order to complete a missing link in the 40-Mile Loop and regional trail system in the vicinity of the Smith and Bybee Wetlands Natural Area (Natural Area). The four alternative alignments presented in this report were developed after many months of effort by a number of interested stakeholders. Key stakeholders that participated on a Technical Working Group for this study include: Metro Regional Parks and Greenspaces Department; Metro Solid Waste and Recycling Department; Portland Parks and Recreation; Smith and Bybee Wetlands Management Committee; the 40-Mile Loop Land Trust; the Friends of Smith and Bybee Lakes; and the St. Johns Neighborhood Association.

Years of previous effort have failed to produce a consensus on a single alignment. Conflicts between the desire for a user experience that interacts with a natural landscape and the desire to protect wildlife and habitat from further human encroachment have not been reconciled. However, there is agreement among key stakeholders who have engaged in this effort that the four alternative alignments under consideration represent an appropriate range of options, and that the facts and conclusions of this analysis are correct.

Overview

Each of the four alternatives has distinct advantages and disadvantages. Each has supporters and opponents. Any alignment selected for development would require further assurances prior to implementation (i.e. funding identified, property and ROW negotiations, permit approvals).

All four alternative alignments provide some level of aesthetic benefits, and make important connections between the Smith and Bybee Wetlands Natural Area and nearby parks, neighborhoods, and regional trails. Impacts to habitat vary from low to very high potential depending on the alignment. Railroad and Slough crossings contribute significantly to the cost of some of the alignments. The key variables for

Metro Council consideration are:

1. The trail user experience. Much research supports the intuitive assumption that people prefer to visit trails within or with views of natural scenery, including water, trees, wetlands, and green vegetation. This is not merely a matter of visual delight. Research shows that recreation and views of natural landscapes lower stress and blood pressure, and help urban residents lead more physically and psychologically healthy lives.
2. Impacts to fish/wildlife and their habitat. Research also supports the intuition that trails located within natural areas have demonstrated negative impacts and risks to wildlife. Nests may be abandoned, foraging disrupted, and habitat lost as a consequence of trail construction and regular use. These outcomes are not certain, but there is risk of one or more of them occurring with certain trail alignments.
3. Trail construction cost. The four options range from \$4 to \$7 million dollars to develop, exclusive of land acquisition.
4. Public sentiment. There is no clear consensus alternative alignment available. Those advocating one alignment or another have very good and sensible arguments in their favor based on their core values.

Elements Common to All Alternative Alignments

Each of the four alternative alignments links the east end of the Port of Portland Trail¹ through the Natural Area to neighborhoods, parks, and other regional trails. Each alignment has the potential to provide access for multiple trail users, including hikers, cyclists, and those with disabilities, although trail surface (hard vs. soft) has not been determined for some portions of some alignments. Each alignment includes

¹ The Port of Portland Trail (also known as the Rivergate Trail) refers to a 1.3-mile segment of the Columbia Slough Trail built by the Port of Portland in 2002.



Water control structure between Bybee Lake and North Slough



North Portland Road bridge over Columbia Slough



Wapato Wetland along the south side of the Columbia Slough

traveling the east side of the St. Johns landfill, and connecting the landfill to the St. Johns neighborhood through Chimney and Pier Parks.



View of the Columbia Slough from the south shore of Smith Lake

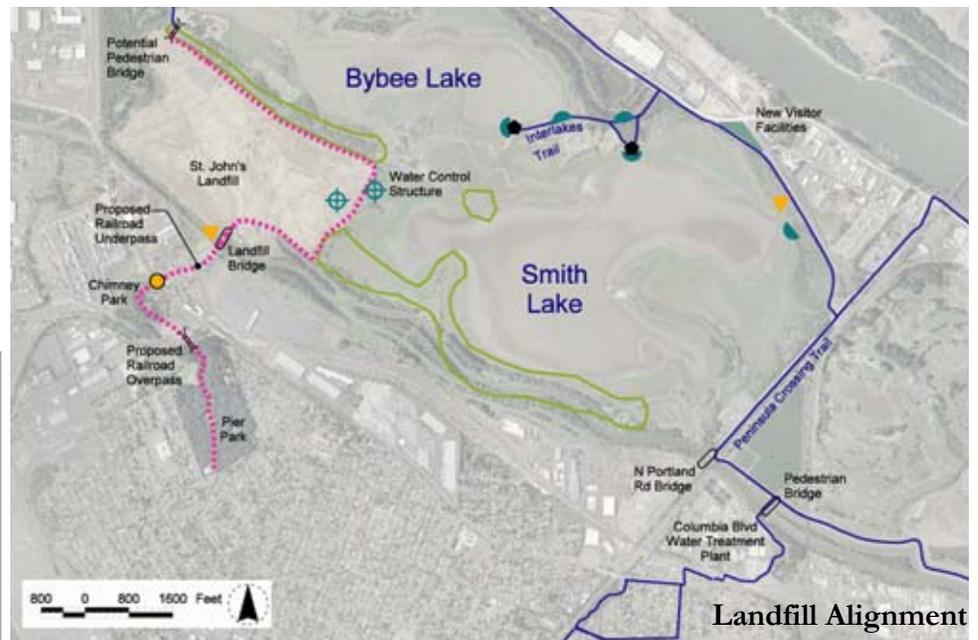
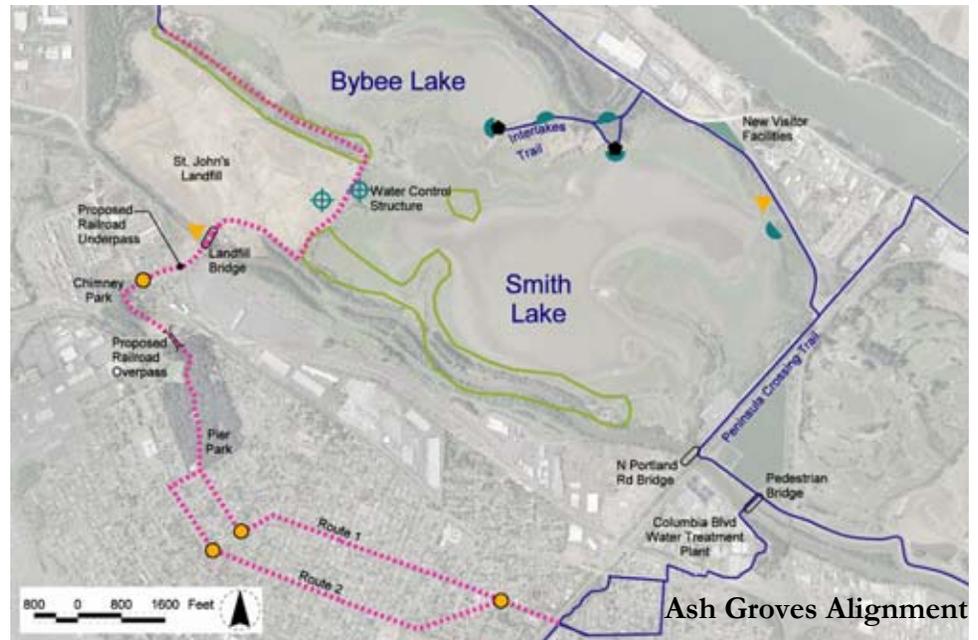
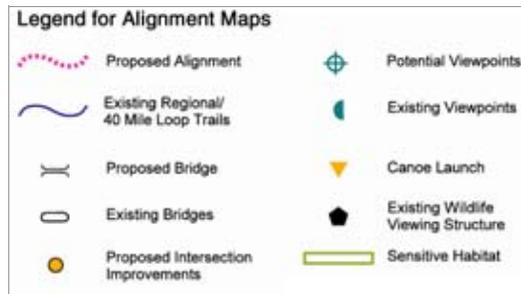
SUMMARY OF ALTERNATIVE TRAIL ALIGNMENTS

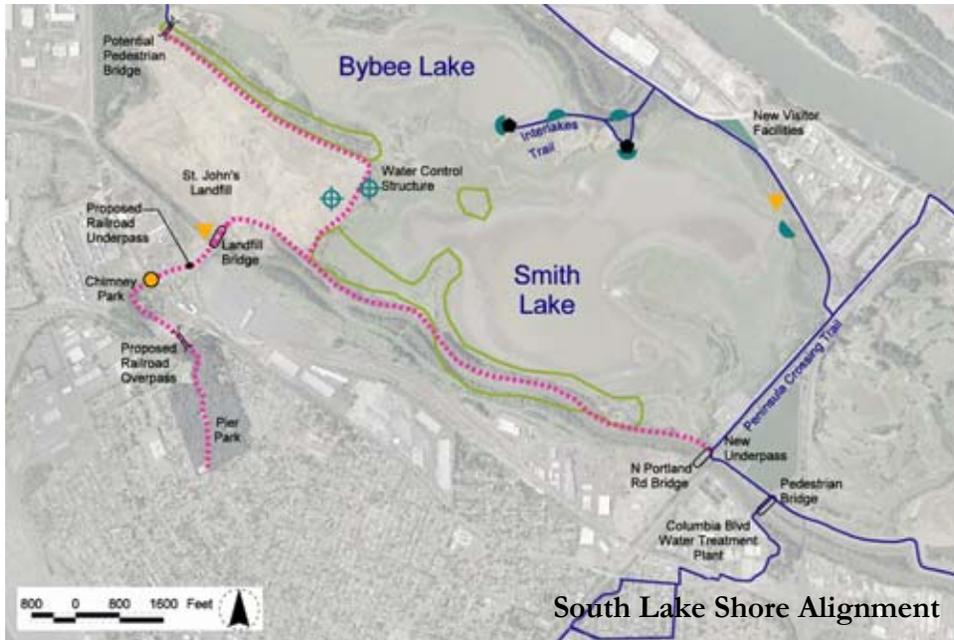
Ash Groves Alignment **\$4.6 million**

- Sensitive wildlife habitat will be impacted.
- No new bridge needed to cross Columbia Slough.
- High quality user experience through ash groves woodland.
- Crosses through western painted turtle nesting area yet avoids impacts to heron and Bald Eagles.
- Provides improved route through neighborhood to Peninsula Crossing Trail.
- May require crossing wetlands.
- Careful route selection can reduce impacts to old growth ash trees.
- Does not provide direct link to 40-Mile Loop trails along Columbia Slough east of the Natural Area.
- No land acquisition needed to complete.

Landfill Alignment **\$6.2 million**

- Requires new bridge to cross Columbia Slough, bridge engineering studies required.
- ESA listed fish in Columbia Slough.
- Lowest environmental impact.
- User experience not as high as Ash Groves or South Lake Shore alignments.
- Does not provide direct link to 40-Mile Loop trails along Columbia Slough east of the Natural Area.
- No land acquisition needed to complete.

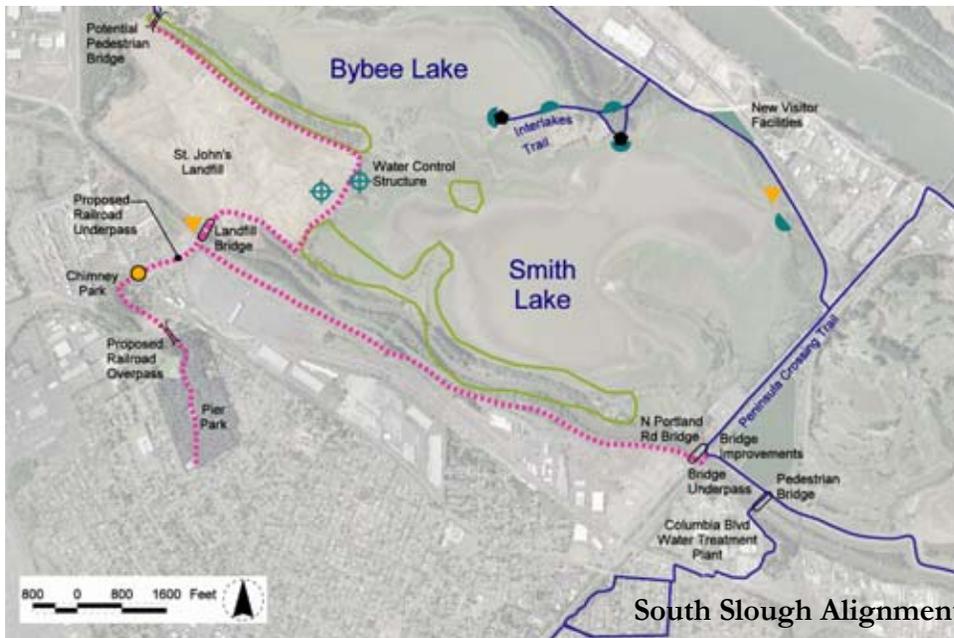




South Lake Shore Alignment

South Lake Shore Alignment **\$7.1 million**

- Trail would run close to a 70 nest heron rookery and four Bald Eagle (ESA listed species) nesting sites.
- Wetlands may be impacted.
- Requires new bridge to cross Columbia Slough, bridge engineering studies required.
- ESA listed fish found in Slough.
- Trail route used as a wildlife crossing between Slough and Smith Lake.
- High quality user experience.
- Provides a direct link to the 40-Mile Loop trails east of Natural Area.
- Route crosses two small parcels in private ownership – acquisition or purchase required.
- This alignment shown in 1990 Management Plan adopted by the City of Portland.



South Slough Alignment

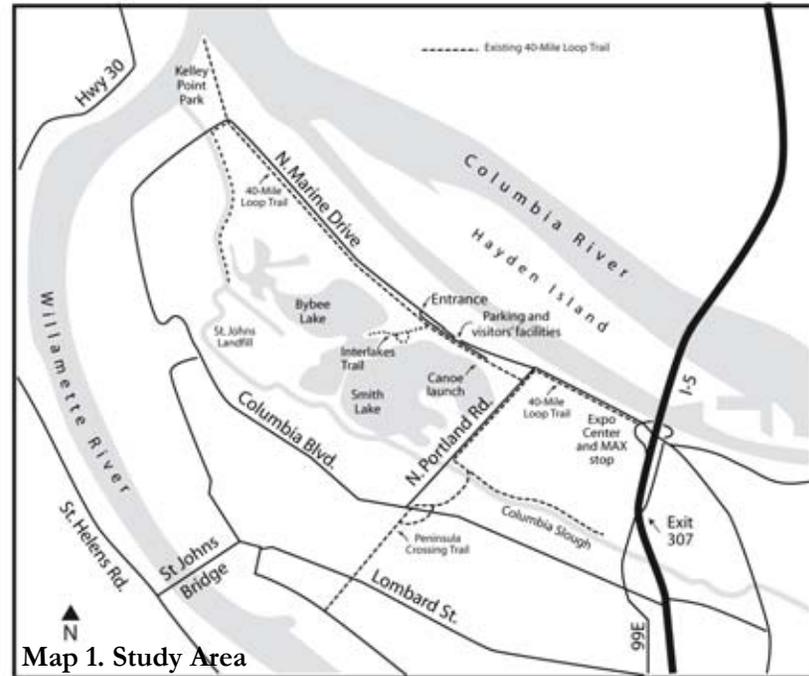
South Slough Alignment **\$7.6 million**

- Requires new bridge to cross Columbia Slough, bridge engineering studies required.
- Need major improvements to North Portland Road bridge to accommodate widened sidewalk.
- Provides direct link to 40-Mile Loop trails east of Natural Area.
- Wetlands may be impacted.
- User experience lower than South Lake Shore and Ash Groves, yet 'Wapato Wetland' provides high quality wildlife viewing opportunities.
- Most of the South Slough segment of trail in private or other agency ownership. Easements or acquisition required.

II. BACKGROUND

Study Area

This project involves examining alternative trail alignments on the North Portland Peninsula, generally in the southern portion of the Smith and Bybee Wetlands Natural Area, including the St. Johns landfill (landfill).



The project study area is bounded by the Columbia Slough to the west, the St. Johns neighborhood to the south, North Portland Road to the east and the Smith and Bybee wetlands to the north (Map 1). Nearby neighborhoods include St. Johns, Kenton and Portsmouth.

Project Purpose

The purpose of this study is to provide an objective and factual analysis of potential trail alignments to connect the Smith and Bybee Wetlands Natural Area with nearby neighborhoods, parks, and local and

regional trails. A number of options for completing this missing link in the 40-Mile Loop and Regional Trail System have been discussed over the years without reaching a consensus among the various trail, neighborhood, and Natural Area advocates.

Project Partners

Metro's Regional Parks and Greenspaces Department managed this feasibility study in collaboration with Portland Parks and Recreation and Metro's Solid Waste and Recycling Department. An Intergovernmental Agreement (IGA) was signed by both agencies to work together to hire a consulting team to resolve the long-standing issues surrounding the siting of this important section of trail. The IGA also mandated that a technical working group be established to insure that the process was unbiased and provide the technical expertise necessary to insure that all pertinent information was included and considered.

Technical Working Group

A seven-member Technical Working Group comprised of representatives of major stakeholder groups met at project milestones to provide feedback and approval of evaluation criteria, criteria measurements, trail segment analysis, and alternative trail alignments. This advisory group also attended the public workshop to assist in presenting the study process and recommendations. Notes from each Technical Working Group meeting are included in Appendix A. The Technical Working Group includes the individuals listed below including the group they represent:

- Joe Adamski—St. Johns Neighborhood Association
- Pam Arden—40-Mile Loop Land Trust
- Troy Clark—Smith and Bybee Wetlands Management Committee
- Deborah Lev—City of Portland Parks and Recreation
- Emily Roth—Friends of Smith and Bybee Lakes
- Elaine Stewart—Metro Regional Parks and Greenspaces Department
- Paul Vandenberg—Metro Solid Waste and Recycling Department

Project Goals

Goals for this study were developed by the project partners through the review of previous planning efforts and documents relating to the siting of trails at Smith and Bybee Wetlands Natural Area.

The *Natural Resource Management Plan for Smith and Bybee Lakes (NRMP)*, adopted by Metro and the City of Portland in 1990, currently guides site management and development within the Natural Area. The goal of the *NRMP* is:

. . . to protect and manage the Smith and Bybee Lake area as an environmental and recreational resource for the Portland region. The lakes will be preserved as historical remnants of the Columbia River riparian and wetlands system. They will be maintained and enhanced, to the extent possible, in a manner that is faithful to their original natural condition. Only those recreational uses that are compatible with environmental objectives of the Management Plan will be encouraged. Smith Lake and adjacent uplands will be the principal location for recreational activities. Bybee Lakes will be less accessible. Its primary use will be as an environmental preserve.

The *NRMP* identified a trail alignment within the Natural Area. Since the *NRMP* was adopted there is new information and greater understanding of natural resources; many changes have occurred within the Natural Area and along the identified alignment. This feasibility study looks at a larger context beyond the Smith and Bybee Wetlands Natural Areas to include nearby parks, industrial properties and neighborhoods.

Project goals for the Trail Feasibility Study include:

- Re-evaluate the *NRMP* alignment in light of new information and changes that have occurred within the Natural Area.

- Achieve consensus among project partners on the criteria used to evaluate trail segments, and on the factual results of the evaluation of alternative alignments.
- If possible, find a consensus alignment to recommend for development.
- Provide the Metro Council with enough information to assist them in making an informed decision on a trail alignment.
- Make this study and analysis transparent, inclusive, and open to input from project stakeholders and the wider public.

Trail Goals

The goals listed below were developed by the project partners with input from the Technical Working Group. The trail goals are as follows:

- Connect nearby neighborhoods, parks, and existing local and regional trails with the Natural Area.
- Close gaps in the 40-Mile Loop and regional trail system.
- Protect sensitive wildlife habitat and species.
- Maintain public safety and security of trail users.
- Protect the infrastructure of the landfill.
- Provide a positive trail user experience.
- Design trails to avoid/minimize/mitigate negative impacts to sensitive wildlife habitat wherever possible.

III. SITE CONTEXT

Project Site

Smith and Bybee Lakes and their associated sloughs and wetlands are remnants of formerly extensive river bottomlands located near the confluence of the Willamette and Columbia rivers. Part of the Columbia Slough watershed, these large shallow lakes and wetlands are part of the 1,928-acre Smith and Bybee Wetlands Natural Area. The Natural Area also includes the St. Johns landfill, a 238-acre closed landfill. The Natural Area is managed primarily for wildlife habitat protection and enhancement while providing passive recreational opportunities for the Portland metropolitan area. As a regionally significant urban natural resource area, Smith and Bybee Wetlands Natural Area provides productive habitat for large and small mammals, waterfowl, birds of prey and numerous other species.

Adjacent industrial land uses include the Union Pacific auto distribution center, Port of Portland storage facilities, Columbia Steel Casting facilities, and numerous automobile-wrecking yards.

During the last fifteen years several portions of the 40-Mile Loop and the regional trail system have been completed adjacent to and near the Natural Area. These routes are found along North Marine Drive to the north, the Port of Portland Trail providing connections to Marine Drive and Kelley Point Park to the west, the Peninsula Crossing and Columbia Slough Trails to the east and an on-street route through the St. Johns neighborhood connecting to the St. Johns Bridge to the south.

Recreational facilities available at the Natural Area include a canoe launch, ADA-accessible paved trails with viewing platforms, interpretive art and signage, picnic shelter, restrooms, and parking. All of these facilities are accessible off of North Marine Drive.

Project History

This site, tucked away in North Portland, has been studied and altered for decades. Early settlers from Native Americans to farmers benefited

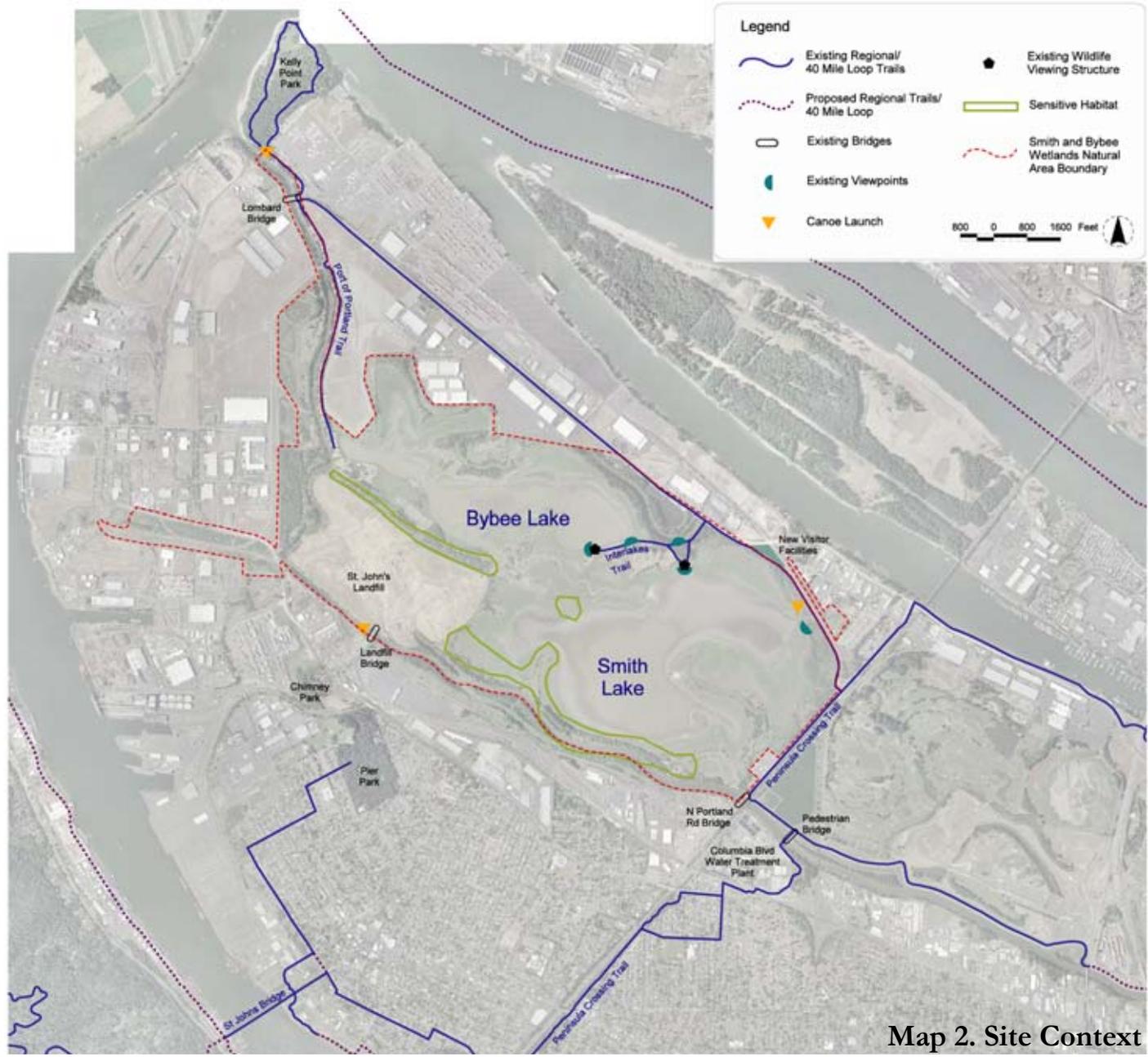
from the rich diversity of plant and animal life. Physical changes to the waterways include dredging, diking, filling and land clearing since the 1800s. Garbage was deposited at the St. Johns landfill from 1932 until 1991, when it was closed to waste disposal. Landfill closure activities are regulated pursuant to a 10-year closure permit renewed by DEQ in 2003.

Numerous natural resource and recreational planning documents were also prepared for this site (see Table 1). The 1972 *North Portland Peninsula Plan* was an early look at balancing preservation with development. In 1983, the *40-Mile Loop Master Plan* showed the potential layout of trails in North Portland. Setting the tone for future development, preservation and restoration in the Natural Area, the 1990 *NRMP* was completed by the City of Portland and the Port of Portland. This plan, adopted by the Portland City Council and Metro Council, continues to direct management and guide projects in the Natural Area. The establishment of the Smith and Bybee Wetlands Management Committee (Management Committee) was a requirement of the *NRMP*. Subsequently, the *1999 Recreation Facilities Plan* was completed which created the concept for the newly improved visitor facilities accessed from North Marine Drive.

In 2003, following considerable discussion and work, the Management Committee recommended an alignment along the landfill’s southwest perimeter road and a feasibility study to explore alignments between the landfill and the Peninsula Crossing Trail. The Management Committee’s recommendation is documented in a letter included in Appendix B.

Table 1. Related Planning Documents

1972	<i>North Portland Peninsula Plan</i>
1983	<i>40-Mile Loop Master Plan</i>
1987	<i>Smith and Bybee Lakes Environmental Studies</i>
1990	<i>Natural Resource Management Plan for Smith and Bybee Lakes (NRMP)</i>
1999	<i>Smith and Bybee Lakes Recreation Facilities Plan</i>
1999	North Portland Trails Summit
1999	<i>Recreation Facilities Plan</i>
2003	Smith and Bybee Lakes Management Committee Recommends Trail Feasibility Study
2005	<i>Smith and Bybee Wetlands Natural Area Trail Feasibility Study</i>



IV. EVALUATION CRITERIA

The consultant team recommended, and the Technical Working Group accepted, a number of evaluation criteria to be applied to nine possible trail segments. Eight categories of criteria were developed, with more specific items within each category. Listed below are all of the evaluation criteria and a brief explanation. More detailed explanations are included in Appendix B. Each evaluation criterion also received a measurement – a means for evaluating and measuring that criterion. Measurements for each criterion are also found in Appendix B.

Safety:

- Number of collector or arterial road crossings.
- Number of railroad crossings
- Proximity to landfill facilities that are vulnerable to vandalism, such as standing pipes, valves, monitoring stations.
- On-road distance, where trail is located adjacent to roadways with no separation between trail users and motor vehicles.

Environmental:

- Habitat fragmentation, including the need to cut through and divide important natural habitats.
- Loss of riparian area, including estimated direct loss of native riparian vegetation.
- Proximity to known Bald Eagle nesting sites and associated risk of abandonment.
- Proximity to known great blue heron rookery, and risk of abandonment.
- Proximity to known western painted turtles basking or nesting areas and risk of abandonment or damage due to disturbance.
- Impacts to wetlands.

Cost Considerations:

- Number of new bridges and/or improvements to existing bridges over the Columbia Slough.
- Amount of fencing need to protect facilities or users.

- Amount of grading required to meet accessibility requirements.
- Acquisition needs for private land easement or purchase.
- Need for new pedestrian road crossings.
- Number of new railroad crossings – underpass and/or overpass.
- Estimated cost of maintaining trail.
- Eligibility of route for grants and other funding.
- Costs associated with mitigation required for permits.

Multi-Use Potential:

- Opportunity for locating an 8’ wide paved multi-use path – dependent on size of area, topography.

User Experience:

- Naturalness of foreground views (within 1/8 mile).
- Opportunities for distant views, including Portland, west hills, Cascade mountains.
- Sounds, including positive (birdsong) and negative (highway, industry).
- Extent that trail user shares space with automobiles and trucks.
- Potential for trail closures due to landfill activities.
- Opportunities for wildlife viewing.
- Opportunities for interpretive signage.
- Potential for trail closures due to flooding, including areas expected to be under water for part of most years.

Permitting:

- ODOT: permits needed for railroad crossings or for underpass beneath Portland Road bridge.
- Union Pacific Railroad: permit required for crossing tracks.
- DEQ: permits required for changes to use of St. Johns landfill.
- NOAA Fisheries and USFWS: Consultation required for potential impacts to species protected under the Endangered Species Act (e.g. salmonids, Bald Eagle).

- Oregon Department of State Lands (DSL): State of Oregon law strictly limits fills within Smith and Bybee Lakes, also regulates fill in wetlands. DSL does not allow more than 50 cubic yards of fill to be placed below 11 feet mean sea level within Smith Lake and Bybee Lake. The text of this regulation is found in Appendix B.
- US Army Corps of Engineers (ACOE): regulates fills in wetlands.
- City of Portland: Environmental zone permitting (E-Zone) applies in many areas, also Portland Department of Transportation (PDOT) approval needed for pedestrian improvements to roadways. Enforces Natural Resource Management Plan policy and development activities.

Management:

- Potential for disruptions to landfill staff.
- Amount of time required for staff to patrol trails.
- Ability of emergency services to reach trail users.

Trail Connectivity:

- Linkage of Natural Area directly to neighborhoods and parks.
- Linkage to existing local and regional trails in the vicinity.

V. TRAIL SEGMENTS

The evaluation criteria were used as a means to review trail segments. These segments are logical sections of trail that were part of larger trail alignments identified in previous documents such as the *Natural Resource Management Plan* and by the Smith and Bybee Wetlands Management Committee or the consulting team.

The criteria were applied to each of the following nine trail segments, and a qualitative rating was given for each. The detailed scoring of the segments by criteria is shown in Appendix B.

The segments are shown in Map 3 and their locations are described below:

Ash Groves: located near the north bank of the North Slough following for much of the route along an existing social trail used infrequently by maintenance vehicles that travels through an old-growth Oregon ash forest. This segment also crosses the water control structure. Some grading would be required to maintain ADA accessibility as the trail travels up the hill from the water control structure to the landfill segments.

Southwest Landfill: travels along the landfill perimeter road between the northwest corner of the landfill and the south side of the existing landfill bridge. This segment would require a new bridge over the North Slough.

North Landfill: follows landfill perimeter road on the north side of the landfill, connecting to the East Landfill segment. This segment would require a new bridge to cross the North Slough.

East Landfill: travels along the east side of the landfill along the existing perimeter road. This segment terminates at the south side of the existing landfill bridge crossing the Slough.

South Lake Shore: heads down a steep bank from the East Landfill segment, past the south edge of wetlands bordering Smith Lake, and continues on top of an existing social trail used infrequently by maintenance vehicles along the bank of the Columbia Slough. The route

then travels beneath the North Portland Road bridge to connect with the Peninsula Crossing Trail.

Landfill Connector: after crossing the existing landfill bridge over the Columbia Slough this route travels on the north and west sides of the landfill offices and then underneath the Union Pacific tracks in a proposed new pedestrian underpass. At Columbia Boulevard, this segment would cross the roadway with an at-grade crossing with median and a standard pedestrian crossing signing. User-activated flashing beacons mounted on a pole would mark this crossing.

South Slough: veers east from the end of the existing landfill bridge, and loosely parallels the Slough through industrial lands owned by the Union Pacific Railroad, Columbia Steel and the City of Portland Columbia Slough Waste Water Treatment Plant. This segment would require major improvements to the North Portland Road bridge to provide for safe pedestrian and bicycle travel.

Pier Park: from Columbia Boulevard, this route travels through Chimney Park, skirting the dog park. A new pedestrian bridge is needed to cross the Union Pacific railroad tracks that divide Chimney and Pier Parks. The route then follows existing trails in Pier Park. From the south end of Pier Park, two neighborhood alternative routes are possible utilizing existing bike lanes and sidewalks along either North Fessenden or North Smith Streets. Minor arterial improvements would be needed to create safer crossings for bicyclists.

Columbia Boulevard: this segment travels along the south side of Columbia Boulevard between Chimney Park and North Portsmouth Avenue at the intersection with the Peninsula Crossing Trail.

Following the segment analysis the Technical Working Group dropped the Columbia Boulevard and Southwest Landfill segments from further study. The Columbia Boulevard segment was eliminated due to high safety risks due to volume of truck traffic and insufficient right-of-way for bike lanes or an off-street path. The Southwest Landfill segment scored low on the user experience and would be difficult

to meet ADA standards due to steep grade in one narrow area adjacent to the Slough and the existing landfill bridge.



Map 3. Trail Segments

VI. ALTERNATIVE ALIGNMENTS

Four draft trail alternative alignments were developed by the consulting team and were presented to the Technical Working Group for review and comment. These draft trail alignments represent a range of options of experience and impacts to habitat. These four draft alignments were discussed, some changes were made, and the Technical Working Group recommended the final four alternative alignments that would be forwarded for further analysis and presentation to the public. Table 2 shows the segments that are included in each of the four alternative alignments.

The following section includes a detailed description of each of the four trail alternatives studied. Appendix C contains detailed cost estimates for all of the trail segments studied. A map and photos accompany each alternative alignment.

Elements Common to All Trail Alternative Alignments

There are many issues and costs that are found in all of the alignments. These commonalities are summarized below.

Safety

- A safety concern to all routes is the at-grade crossing of Columbia Boulevard. The crossing will be designed to meet all traffic standards but the fact remains that this is a very busy truck route.

Environmental

- The East Landfill segment is common to all alignments. Fencing along the landfill side of the East Landfill perimeter road will keep trail users off of the landfill but there is some risk that trail users may wander off the perimeter road and into the wetland area east of the road.

Table 2. Alternative Trail Alignments

Alignment	Segment							
	Ash Groves	North Landfill	East Landfill	South Lake Shore	South Slough	Landfill Connector	Pier Park	
							with NR	without NR
Ash Groves	X		X			X	X	
Landfill		X	X			X		X
South Lake Shore		X	X	X		X		X
South Slough		X	X		X	X		X

NR= Neighborhood Routes

Capital Costs

• East Landfill segment	\$493,737
• Landfill Connector segment	\$2,333,555
• Pier Park segment (excludes neighborhood routes)	<u>\$1,413,836</u>
• Total Common costs shared by all routes	\$4,241,128

The cost of the East Landfill segment includes grading, surfacing of trails, and fencing. The cost of Landfill Connector segment includes minor improvements to the existing landfill bridge, grading and surfacing of the trail, a proposed pedestrian/bicycle railroad underpass, and a proposed at-grade crossing of Columbia Boulevard into Chimney Park. The cost of the Pier Park segment includes a proposed pedestrian/bicycle bridge over the Union Pacific railroad tracks that currently separate Pier Park from Chimney Park.

Multi-Use Potential

- All routes have the potential to provide access to multiple trail uses, including hikers, cyclists, and those with disabilities, although trail surface (hard versus soft) has not been determined for some portions of some routes.
- Trail design will consider many variables in determining the appropriate trail width for a particular route, but it is expected that the trail widths may range between 8' to 12' given the specific location and setting. Settings range from landfill roads to sensitive wildlife habitat to local park trails to neighborhood bike lanes and sidewalks.

User Experience

- Two proposed viewpoints are recommended near the northeast corner of the landfill. One would be located on the slope of the landfill that would offer 360-degree spectacular views of Forest Park to the south and west and Bybee and Smith Lakes and the Cascade Mountains to the north and east. The landfill viewpoint would be part of a later phase of development, when landfill closure activities no longer occur in that area. The other

viewpoint would be on the east side of the landfill road, providing a view of Smith Lake.

- There can be seasonal flooding of parts of the Port of Portland trail and the four alternative routes, all of which will require periodic closures. During flooding episodes, access to the alignments would only be available from the landfill side, since the Port of Portland trail is at a lower elevation and floods first.
- There are existing trail heads and public parking provided in the vicinity of the Natural Area at the following locations:
 - Kelley Point Park
 - Smith and Bybee Wetlands Natural Area on the north side of Smith Lake off of Marine Drive
 - Chimney Park
 - Pier Park
 - Columbia Slough Waste Water Treatment Plant
 - There is also the potential for a small trailhead at the existing canoe launch on the south side of the Slough near the landfill offices. This potential trailhead needs to be further explored in future phases of this project.

Permitting

- Right-of-way easements will be required from the Union Pacific for the proposed railroad underpass and overpass needed to link the landfill to the neighborhood.

Management

- Management issues are alignment specific and described in detail beneath each alignment subheading later in this chapter.

Trail Connectivity

- All routes connect to the southern end of the Port of Portland Trail near the northwest corner of the landfill.
- All routes connect to Peninsula Crossing trail.
- All routes provide a connection between the landfill and the St. Johns Neighborhood via the Landfill Connector segment.

Alternative 1: Ash Groves Alignment

The Ash Groves alignment begins at the end of the Port of Portland trail in the west, and extends east between Bybee Lake and the North Slough. The trail then crosses the water control structure, and heads south along the east side of the St. Johns landfill on an existing landfill access road. It crosses the existing landfill bridge, goes through a proposed pedestrian underpass under the Union Pacific railroad tracks, and crosses Columbia Boulevard with an at-grade crossing before entering Chimney Park. A proposed pedestrian overpass would take trail users across the railroad tracks between Chimney and Pier Parks. This is the only alignment that includes improvements to existing bike lanes, intersections and sidewalks between Pier Park and the Peninsula Crossing trail along either North Fessenden Street or North Smith Street.

Safety

The route through the Ash Groves and landfill is safe from vehicular traffic although trail users may occasionally encounter a landfill maintenance vehicle on the landfill road. The Ash Groves portion of this alignment is isolated with little visibility and patrols will be important to monitor unauthorized uses. Proposed on-street improvements through the neighborhood will improve safety for trail users. The risk to the landfill infrastructure is the least of any alternatives, as this alignment minimizes the distance traveled on or around the landfill.

Environmental

This trail poses high potential impacts to habitat and wildlife. The Ash Groves contains the only remnant stands of Oregon ash in the Natural Area, many of which are 200 years old. There are very few of these stands left in the region, and their gnarled bark provides rare habitat for wildlife such as songbirds and bats. Existing groundcovers are, for the most part, non-native grasses and forbs with limited habitat value. There are direct habitat connections between Bybee Lake, the associated wetlands, and the North Slough through this area. Several turtle basking sites are found in the vicinity. There are wetlands throughout

the area and while the trail may encroach upon wetlands in a few areas, a route that avoids crossing wetlands directly is feasible. Constructing the trail would likely not require removal of any of the mature ash trees, though there may be a few willows that would need removal. Trail design, mitigation and management can play a role in keeping trail users from leaving the trail in this sensitive area.

Capital Costs

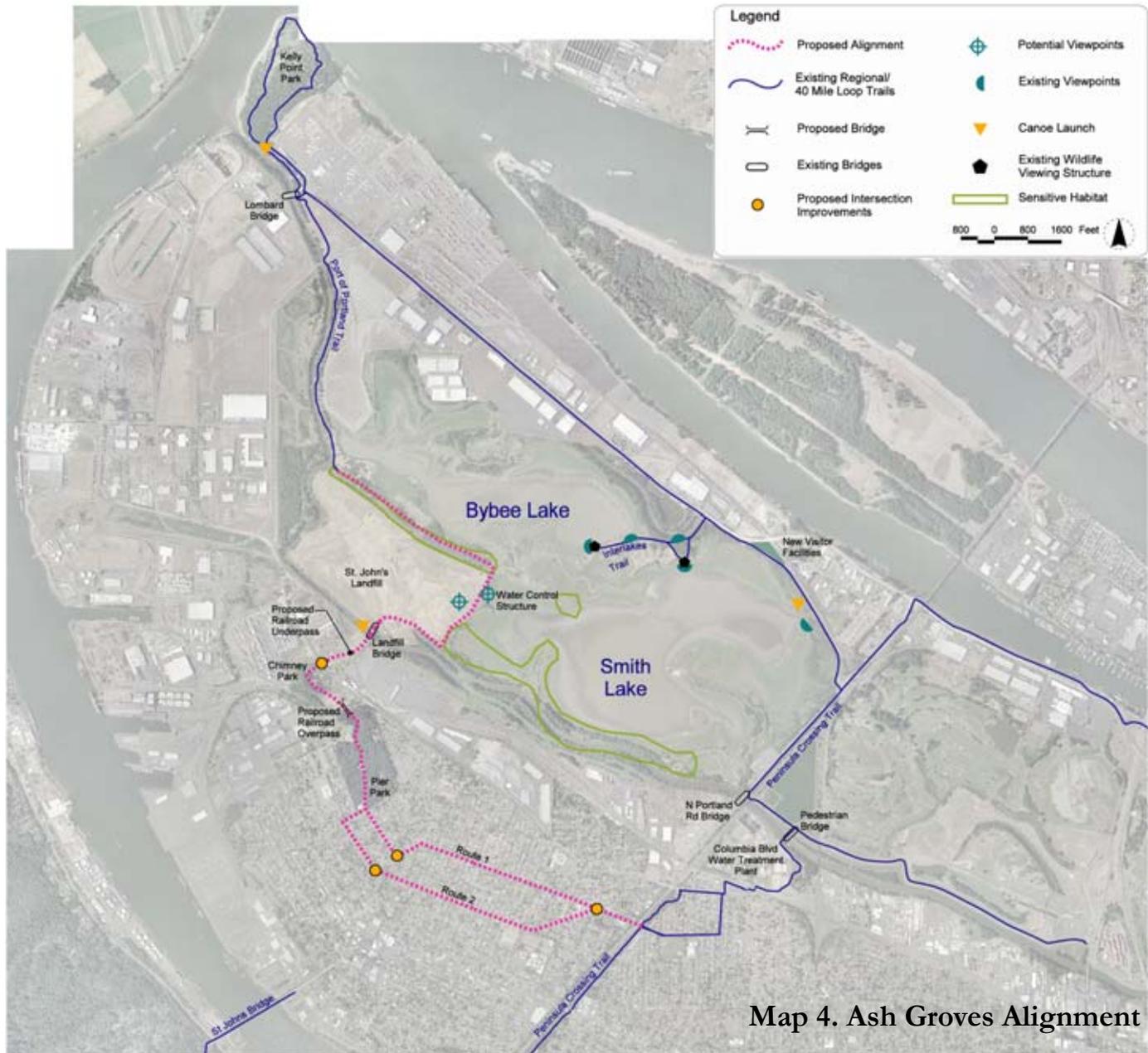
This alignment is the lowest cost of the four alternatives. By going through the Ash Groves and using the existing water control structure, the expense of a new pedestrian bridge over the North Slough is avoided. Grading or rerouting will be required to connect the trail to the landfill perimeter road from the water control structure to meet accessibility standards.

Multi-Use Potential

This route has good multi-use potential between the southern end of the Port of Portland trail and south side of Pier Park. From this point to the Peninsula Crossing Trail, trail users would use multi-modal on-street bike lanes and sidewalks along either North Fessenden Street or North Smith Street. Further study will be necessary to determine which of these streets should be improved for trail users.

User Experience

This alignment ties with the South Lake Shore alignment for highest-ranked user experience. The route in the Ash Grove travels through an attractive woodland. There are several opportunities for capturing views of the North Slough and Bybee Lake. Over time some of these views will be obscured by plant growth from revegetation projects. The Ash Grove area is far from highway and industrial noise. A trail here opens an area up to use that is presently remote and seldom visited. Interpretive and environmental education opportunities are good – especially surrounding the ash forest.



Permitting

Multiple permits would be required for this and all route alternatives. The permits specific to this route could be related to wetland encroachment, and concerns from NOAA Fisheries due to the trail's proximity to salmonid habitat in the North Slough. There is enough higher ground through the Ash Groves segment to meet the DSL regulation on fill below 11 feet elevation.

Management

As this alignment has the shortest distance of travel on the landfill, it thus would impact daily operations at the landfill the least. Vehicular access for the Ash Groves segment is available from the Port of Portland trail or landfill side. Patrolling and maintaining the isolated Ash Groves segment will require more time than the other segments in this alignment.

Trail Connectivity

The route through the Ash Groves links the Port of Portland trail to the water control structure. From there the route crosses the east end of the landfill and connects to the St. Johns neighborhood, but does not offer a direct connection to the Peninsula Crossing or Columbia Slough Trails near the North Portland Road bridge. Users would traverse improved neighborhood sidewalks and bike lanes to complete the connection.

Advantages:

- The route through the Ash Groves and along the east side of the landfill is very scenic, quiet, and opens new environmental interpretation opportunities.
- Crossing the North Slough at the existing water control structure avoids environmental impacts and the expense associated with building a new pedestrian bridge.
- There are no expected expenses associated with new land acquisition.

- This is the least costly alternative.
- By going through the neighborhood, potential impacts to Bald Eagle nests, the heron rookery, and other sensitive wildlife areas along the south shore of Smith Lake are avoided.
- Improved on-street bike lanes, intersections, and sidewalks between Pier Park and Peninsula Crossing Trail will result in a safer and more enjoyable experience for trail users.

Disadvantages:

- Building a new trail through the undeveloped Ash Groves may disturb wildlife in this area, including western painted turtles and nesting songbirds (e.g. willow flycatcher) and river otter, and may negatively impact the roots of ash trees.
- There could be encroachment and impacts to wetlands in the Ash Groves.
- There is the potential for vandalism at the water control structure.
- This alternative fails to provide a direct link to the Peninsula Crossing Trail or Columbia Slough Trail near the North Portland Road bridge. It relies instead on existing sidewalk and street improvements through the neighborhood.

Cost Estimate*

Ash Groves segment	\$357,500
East Landfill segment	493,737
Landfill Connector segment	2,333,555
<u>Pier Park segment</u>	<u>1,475,539**</u>
Total Cost Estimate:	\$4.6 million

*Cost estimate for 8' wide asphalt trail with 2' gravel shoulders.

**Includes Neighborhood Route 2 providing improvements to existing on-street bike lanes, sidewalks and intersections from Pier Park to Peninsula Crossing Trail.



1. Southern end of Port of Portland Trail where Ash Groves trail would begin.



2. Looking east into Ash Groves route from southern end of Port of Portland trail.



3. View across north slough to landfill.



4. View of Smith Lake from viewpoint along east perimeter road on landfill.



5. Heading west toward landfill entrance on southern perimeter landfill road.



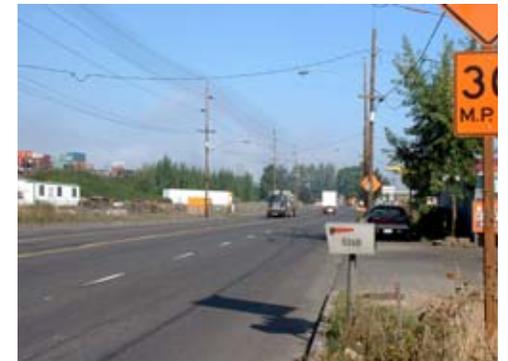
6. Looking south towards Forest Park from north side of landfill bridge.



7. Looking south towards Chimney Park near landfill office.



8. Columbia Blvd. crossing location at Chimney Park driveway.



9. Columbia Blvd.



10. In Chimney Park looking across railroad tracks to Pier Park.



11. Pier Park entry at N. Seneca Street.



12. Existing bike lanes on N. Smith Street.



13. Existing bike lanes on N. Fessenden Street.



14. Connection to Peninsula Crossing trail at N. Fessenden Street

Alternative 2: Landfill Alignment

The Landfill trail alignment begins at the end of the Port of Portland Trail, and immediately crosses over the North Slough to the St. Johns landfill on a proposed pedestrian bridge. It then follows an existing maintenance road along the south bank of the North Slough, heading east. It loops around the east end of the landfill, in the same alignment as described in the text for Alternative 1 - Ash Groves. It crosses the existing landfill bridge and makes its way through Chimney and Pier Parks. The trail continues through the St. Johns neighborhood along existing (unimproved) bike lanes and sidewalks on either North Fessenden or North Smith Streets to Peninsula Crossing Trail.

Two significant differences between the Landfill and Ash Groves trail alignments are the construction of a new pedestrian bridge across the North Slough (to avoid impacts to habitat and wildlife in the Ash Groves area) and no improvements to neighborhood streets between Pier Park and the Peninsula Crossing Trail.

Safety

The route using landfill roads is felt to be quite safe from vehicles. Occasional use of these roads by Metro staff may interfere with trail users, but does not pose much risk. Additional time spent on the landfill could expose trail users to more hazards associated with landfill operations.

Environmental

This trail poses the least risks of impact to habitat and wildlife. However, placement of the bridge over the North Slough will need to take an existing turtle basking site into consideration and may have impacts to fish in the crossing area. There will be soil disturbance and loss of riparian vegetation at the points where the bridge footings are built. In addition, constructing footings in this location could alter groundwater flow and movement of potential contaminants in the groundwater in this vicinity.

Capital Costs

This alignment is the second lowest cost of the four alternatives. The estimated cost of this alternative is greater than the Ash Groves alignment largely due to the proposed North Slough bridge. Other expenses are in paving the surface of the existing gravel landfill perimeter roads, and fencing to protect landfill infrastructure from vandalism.

Multi-Use Potential

Good multi-use potential from the end of Port of Portland trail through Pier Park. Existing bike lanes and sidewalks provide for multiple uses between Pier Park and Peninsula Crossing trail.

User Experience

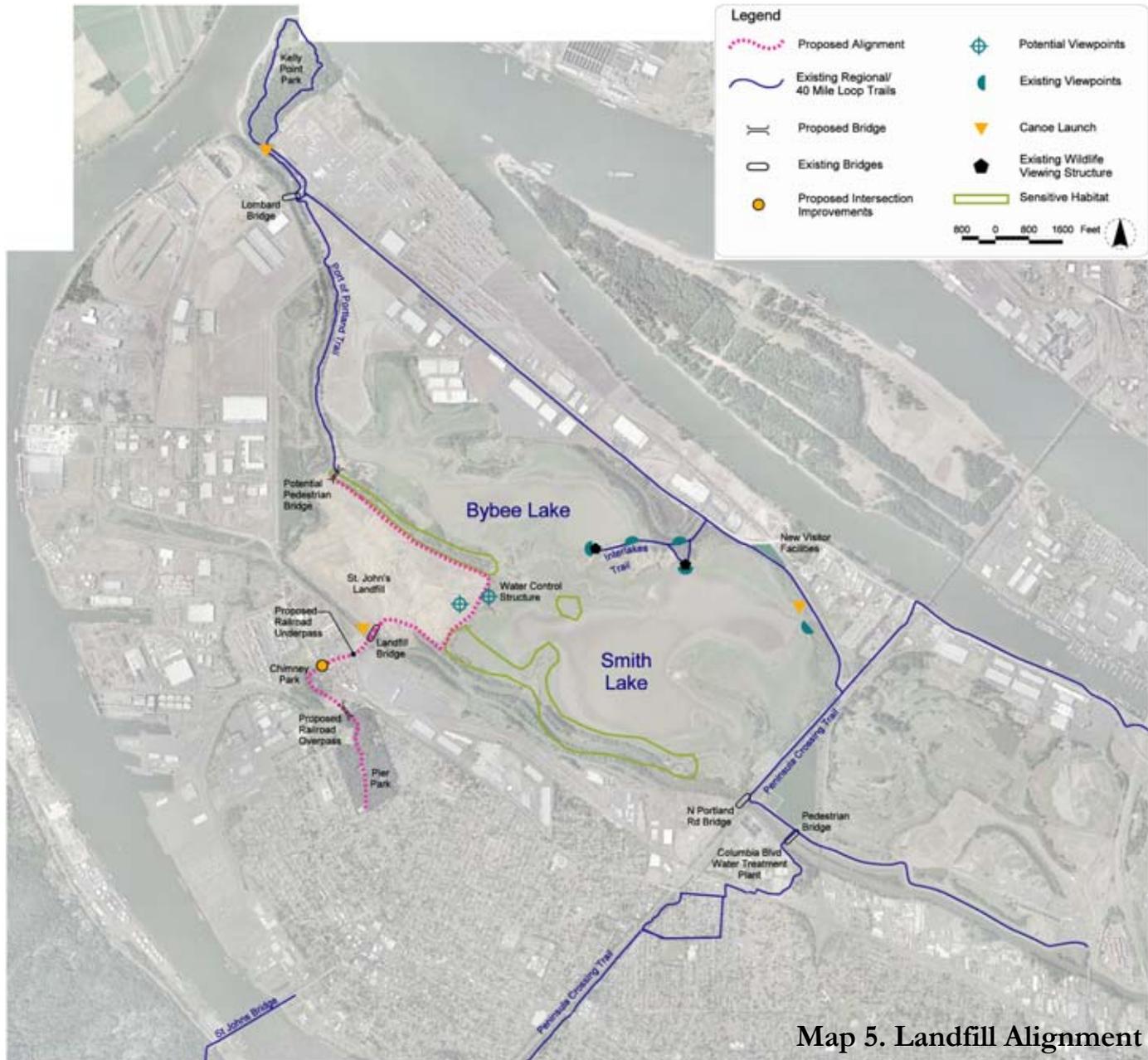
The North Slough bridge will offer exceptional views and interpretive opportunities. The route across the landfill is fairly attractive, with views of water and the Natural Area to the north and east. On the negative side, the trail user would have a fence and landfill infrastructure on one side, with natural landscapes on the other. Overall, this alternative ranks lowest of the four with regard to user experience.

Permitting

Multiple permits would be required for this and the other two routes that include the North Landfill segment. The main issues for permitting agencies will be related to the North Slough bridge design and construction. National Marine Fisheries Service consultation is likely due to the presence of federally listed juvenile salmonids in the North Slough.

Management

The main management concerns are the greater length of trail on the landfill, as compared with the Ash Groves alternative. This raises the risk of vandalism to landfill infrastructure, a risk common to Alternatives 3 and 4 as well. This trail could be easily maintained, as there is easy vehicular access to all segments.



Map 5. Landfill Alignment

Trail Connectivity

This route links the Port of Portland trail to the landfill and on to Pier Park. This alignment does not offer a direct link to the Peninsula Crossing and Columbia Slough trails as Alternatives 3 and 4 do. Users would traverse existing (unimproved) neighborhood sidewalks and bike lanes from Pier Park to complete the connection to the Peninsula Crossing Trail.

Advantages:

- Crossing the North Slough and use of the existing landfill perimeter roads avoids impacts to wildlife and habitat that would occur with development in the Ash Groves and South Lake Shore routes.
- The new bridge could be an attractive feature, and opens new views over the water at the confluence of the North and Columbia Sloughs.
- The north end of the landfill has good views of water and the Natural Area.
- This alternative has the lowest overall impacts to wildlife of the four being considered.

Disadvantages:

- Trail users will be on the landfill perimeter road versus a more pleasing forested setting provided in other alignments.
- The new bridge over the North Slough adds considerable expense to this alignment. There may be impacts to fish and wildlife in the crossing area, particularly to federally listed juvenile salmonids. Further engineering/hydrological analysis will be required to address the potential for the bridge footings to exacerbate the movement of contaminants in groundwater in the vicinity.
- Periodic trail closures may occur if the landfill bank requires major repair work.

- Additional length of trail on the landfill raises the risk of vandalism and other management problems associated with protecting landfill infrastructure.
- This alignment does not provide a direct link to the Peninsula Crossing or Columbia Slough Trails near the North Portland Road bridge.

Cost Estimate*

North Landfill segment	\$1,941,123**
East Landfill segment	493,737
Landfill Connector segment	2,333,555
<u>Pier Park segment</u>	<u>1,413,836***</u>
Total Cost Estimate:	\$6.2 million

*Cost estimate for 8' wide asphalt trail with 2' gravel shoulders.

**Includes new North Slough bridge.

***Includes crossing Union Pacific rail lines between Chimney and Pier Park, does **not** include neighborhood on-street bike lanes and sidewalks.



1. Looking north from landfill towards southern end of Port of Portland trail.



2. Looking east on north landfill perimeter road.



3. View of north slough from landfill perimeter road.



4. View of Smith Lake from viewpoint along east perimeter road on landfill.



5. Heading west toward landfill entrance on southern perimeter landfill road.



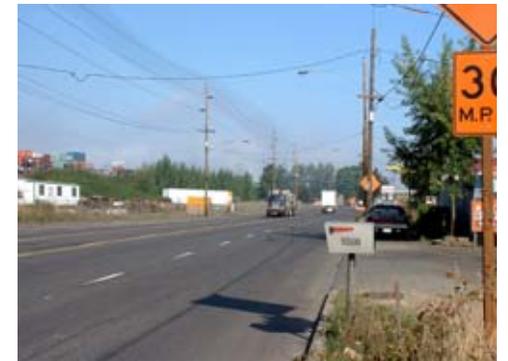
6. Looking south towards Forest Park from north side of landfill bridge.



7. Looking south towards Chimney Park near landfill office.



8. Columbia Blvd. crossing location at Chimney Park driveway.



9. Columbia Blvd.



10. In Chimney Park looking across railroad tracks to Pier Park.



11. Pier Park entry at N. Seneca Street.

Alternative 3: South Lake Shore Alignment

The South Lake Shore alignment crosses the North Slough, and follows the same route as the landfill alignment until it reaches the point where the landfill road curves west towards the bridge. Here there would be a junction, with one leg heading out of the landfill to Pier Park with connection to the Peninsula Crossing trail along unimproved bike lanes and sidewalks on either North Fessenden or Smith Streets. The other leg would head directly east, following the southern edge of Smith Lake before passing under the North Portland Road bridge and connecting with the Peninsula Crossing and Columbia Slough Trails on the other side of the bridge.

The main difference between this and previous routes is the new trail along the south shore of Smith Lake. This trail would require new clearing and ground disturbance. The eastern half of this segment would likely be located on an existing social trail used that serves as maintenance access for power lines.

Safety

The South Lake Shore segment is considered to be quite safe, given its location away from vehicle traffic. There is an easy grade route under the north side of the North Portland Road bridge, and a ready connection to the existing Peninsula Crossing and Columbia Slough Trails on the east side. The route is very isolated, with little visibility. Patrols will be important to monitor unauthorized uses.

Environmental

This trail poses high potential impacts to habitat and wildlife. These impacts relate to the trail passing through riparian woodland that includes a heron rookery, Bald Eagle nesting sites, encroachment on wetlands, and closeness to the Columbia Slough. The degree of risk of rookery and/or nest abandonment is uncertain. Disruption to wildlife that use the area to travel between the wetlands and Slough would be likely. Trail design, mitigation and management can play a vital role in keeping trail users on the pathway and out of sensitive areas.

The eastern half of this new trail would be placed along an existing social trail currently used by maintenance access for transmission lines; the other part of the trail may have portions that skirt the edge of wetlands. Some young trees would likely have to be removed to make way for this trail. This route also includes the impacts related to the new bridge crossing the North Slough as discussed in Alternative 2.

Capital Costs

This alignment is the second highest cost of the four alternatives. This alternative includes the development of new trail south of Smith Lake and an underpass beneath the North Portland Road bridge.

Multi-Use Potential

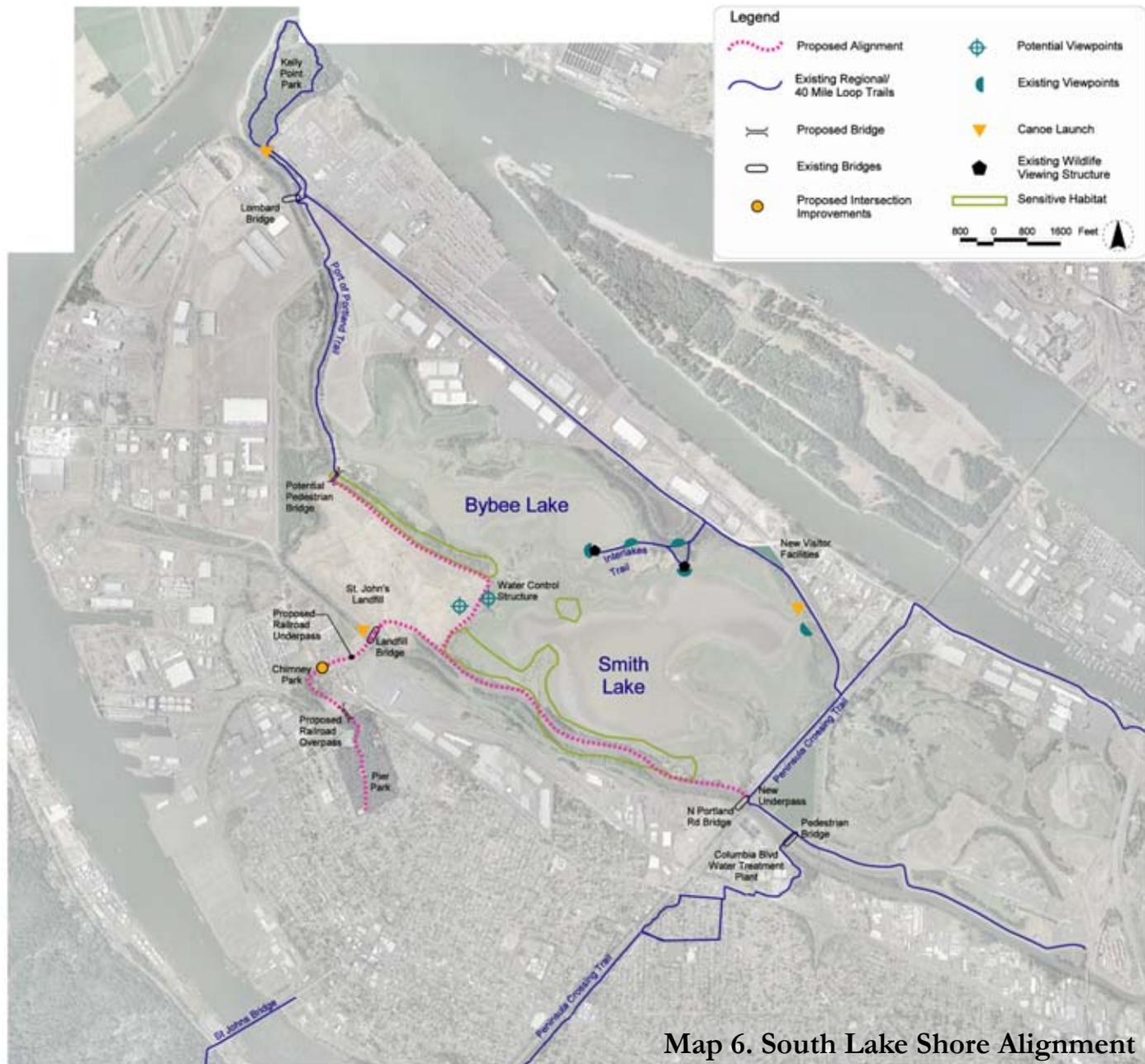
There is good multi-use potential for this trail between the end of the Port of Portland trail and Pier Park. It is not possible to determine trail surface (hard vs. soft) for the south lake shore portion of this alignment until formal consultation with regulatory agencies regarding trail design in the vicinity of nesting eagles. The *NRMP* originally suggested a soft surface pedestrian only trail along the South Lake Shore segment.

User experience

This alignment is primarily natural in character and aesthetically pleasing. It ties with Ash Groves for highest ranking of user experience. Good views of the Columbia Slough and the Natural Area are available the South Lake Shore segment, and a trail here would open a new area not presently accessible to the public. The partial view of the lake is becoming obscured as the forest regenerates and creates a dense woodland. New interpretive and environmental education opportunities are good based on the natural setting and off-road character.

Permitting

Multiple permits would be associated with this route. The biggest issues include wetland encroachment and the close proximity of much



of the trail to the Columbia Slough. Consultation with NOAA Fisheries will be needed to address federally listed juvenile salmonids in the Columbia Slough. Consultation with the US Fish and Wildlife Service (USFWS) required under Section 7 of the Endangered Species Act would be needed to address potential impacts to nesting Bald Eagles. There is a high potential that the USFWS will require construction of a trail through this area be at least 1/4-mile from the eagle nests, which may involve a boardwalk over a portion of Smith Lake.

Management

Patrolling and maintaining the isolated segment along the South Lake Shore will be more time consuming than patrolling the portions of the trail on landfill perimeter roads.

Trail Connectivity

Of the four alternatives, this route provides the most direct link between the Port of Portland trail and the Peninsula Crossing and Columbia Slough Trails east of the North Portland Road bridge.

Advantages:

- This route offers the most direct regional connection to the Peninsula Crossing and Columbia Slough Trails east of the North Portland Road bridge.
- It provides a high quality user experience along scenic parts of the landfill, and then through riparian woodlands, with excellent short-range views of the Columbia Slough.
- The route under the north end of the North Portland Road bridge is simple to engineer and connect to the existing Peninsula Crossing and Columbia Slough Trails.
- The replanted and naturally regenerating riparian woodland provides opportunities for mitigating some wildlife impacts by taking advantage of dense vegetation screening between the trail and Smith Lake.
- Half of the route along the south shore of the lake could be located on an existing social trail used infrequently for maintenance

of transmission lines.

Disadvantages

- Of the four alternatives, this route has the most federally listed endangered species (eagles and salmonids) at present.
- There is potential that federal agencies will require construction of a trail be at least 1/4-mile from nesting eagles or require seasonal closure of the trail for more than six months (generally between January and August).
- The South Lake Shore route crosses through three small parcels of private ownership, and will require some negotiation and possible expense of land or easement acquisition.
- Much of the trail is in a riparian zone, is very close to the Columbia Slough and could impact wildlife that crosses between the Slough and Smith Lake, as well as Endangered Species Act listed salmonids.
- There are probable encroachments and/or impacts to wetlands in some areas.
- The new bridge over the North Slough adds considerable expense to this alignment. There may be impacts to fish and wildlife in the crossing area, particularly to federally listed juvenile salmonids. Further engineering/hydrological analysis will be required to address the potential for the bridge footings to exacerbate the movement of contaminants in groundwater in the vicinity.
- Periodic trail closures may occur if the landfill bank requires major repair work.

Cost Estimate*

South Lake Shore segment:	\$ 987,345**
North Landfill segment	1,941,123***
East Landfill segment	493,737
Landfill Connector segment	2,333,555
<u>Pier Park segment</u>	<u>1,413,836****</u>
Total Cost Estimate:	\$7.1 million

*Cost estimate for 8' wide asphalt trail with 2' gravel shoulders. Does not include property or easement acquisitions.

**Does not include possible boardwalk to avoid eagle's nest.

***Includes new Slough bridge.

****Includes crossing Union Pacific rail lines between Chimney and Pier Park, does **not** include improvements to existing neighborhood on-street bike lanes, sidewalks and intersections.



1. Looking north from landfill towards southern end of Port of Portland trail.



2. Looking east on north landfill perimeter road.



3. View of north slough from landfill perimeter road.



4. View of Smith Lake from viewpoint along east perimeter road on landfill.



5. Near southeast corner of landfill looking east along south shore of Smith Lake.



6. Looking west toward landfill along cleared area between the lake and the slough.



7. View towards Columbia Slough.



8. Heading west toward landfill entrance on southern perimeter landfill road.



9. Looking south towards Forest Park from north side of landfill bridge.



10. Looking south towards Chimney Park near landfill office.



11. Columbia Blvd. crossing location at Chimney Park driveway.



12. Columbia Blvd.



13. In Chimney Park looking across railroad tracks to Pier Park.



14. Pier Park entry at N. Seneca Street.

Alternative 4: South Slough Alignment

The South Slough alignment follows the same route as the Landfill alignment for its first half, or up to the point where it crosses the existing landfill bridge. Once on the south side of the bridge this alignment splits in two directions. One leg travels due east along the south side of the Columbia Slough to the North Portland Road bridge. It crosses under and then over the bridge to tie into the existing Peninsula Crossing and Columbia Slough Trails. The other leg is the same as in Alternatives 2 and 3, traveling south from the landfill bridge, going under the railroad tracks, crossing Columbia Boulevard into Chimney and Pier Parks and through St. Johns neighborhood on unimproved bike lanes, intersections and sidewalks along North Fessenden or North Smith Streets to connect with the Peninsula Crossing Trail.

The distinguishing feature of this alignment is the development of a new trail route along the south side of the Columbia Slough, north of the Union Pacific railroad tracks and the Columbia Steel Castings complex.

Safety

The route along the south side of the Columbia Slough introduces some safety issues due to its close proximity to industrial traffic. Trail design will need to address security concerns of adjacent private property owners should this route be developed. The design of the trail crossing under and over the North Portland Road bridge requires further study and engineering. The narrow bridge sidewalks create a safety issue that may require a new wider sidewalk be added to the existing bridge.

Environmental

This trail poses the second fewest impacts or risks to habitat and wildlife of the four alternatives. These impacts include those associated with the new bridge over the North Slough, discussed in the previous two alternatives. In addition, the trail along the south side of the Co-

lumbia Slough may encroach on riparian habitat and the Wapato Wetlands.

Capital Costs

This alignment is the highest cost of the four alternatives. New trail development south of the Columbia Slough will require fencing along adjacent privately and publicly owned industrial properties, and an underpass beneath and a new sidewalk on top of the North Portland Road bridge. Further design and engineering will be needed to determine the structural requirements and associated costs for sidewalk improvements to the bridge. In addition, there are unknown land or easement purchase costs associated with two privately owned parcels that occupy approximately $\frac{3}{4}$ of the route along the south side of the Columbia Slough.

Multi-Use Potential

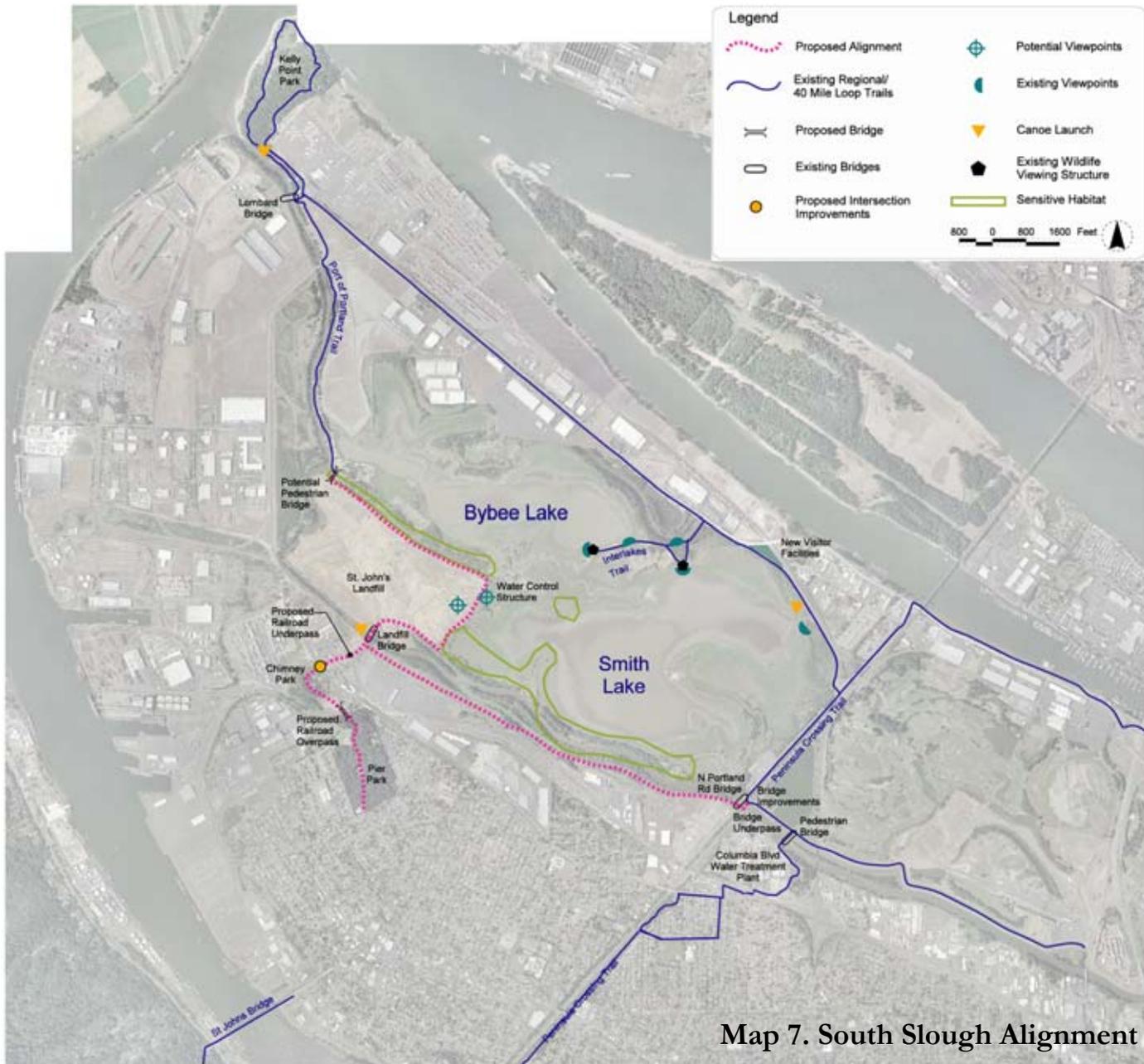
The potential here is very good, with mitigating factors. Improvements are necessary to the North Portland Road bridge to make the bicycle and pedestrian crossing safe.

User Experience

The route along the south of the Columbia Slough is primarily industrial in character. However, it does offer good views of the Slough, the Natural Area, and provides visual connection to the Wapato Wetlands, a unique and attractive feature not presently accessible to the public. New interpretive and environmental education opportunities are also possible, especially at the Wapato Wetlands. The crossing of the North Portland Road bridge, with its extensive truck traffic, may not be a very pleasant experience. Overall, this alternative ranks third of the four with regard to user experience.

Permitting

Multiple permits would be associated with the South Slough route. The biggest challenges are likely to be trail easement or ROW agreements



with the Union Pacific Railroad and Columbia Steel Castings. Some US Fish and Wildlife Service consultation is needed as well as NOAA Fisheries.

Management

Patrolling and maintaining the segment along the south bank of the Columbia Slough will be more time consuming than patrolling the portions of the trail on landfill perimeter roads.

Trail Connectivity

This route provides an improved direct link to the Peninsula Crossing and Columbia Slough Trails near the North Portland Road bridge.

Advantages:

- This route has low impacts to wildlife relative to two of the other alternatives. It avoids entering the Natural Area, including the Ash Groves and the south shore of Smith Lake, with its eagle nests and heron rookery, thus avoiding habitat fragmentation in those areas.
- The new South Slough route would provide a direct regional connection to the Peninsula Crossing and Columbia Slough Trails east of the North Portland Road bridge.
- This route, while largely industrial in character, does include views of the North and Columbia Sloughs, the Natural Area, and opens a view and interpretive opportunities at the “Wapato Wetland,” one of the most striking wetlands in the region.
- Federal Endangered Species Act permits are not likely to due this route’s distance back from the Columbia Slough.
- The City of Portland owns the parcel of land adjacent to the west side of the North Portland Road bridge and are willing partners in the development of a trail.

Disadvantages:

- This is the most expensive of all alternatives, requiring a new bridge to cross the Columbia Slough, land or easement pur-

chases south of the Columbia Slough, and potentially costly improvements to the North Portland Road Slough bridge.

- Engineering the trail under and then over the North Portland Road bridge is challenging and requires additional feasibility analysis.
- The south Slough portion of this alignment crosses two large private industrial properties, and will require negotiations and possible expense of land/easement acquisition.
- The user experience along the south side of the Columbia Slough would be more industrial and less natural than the portions of the South Lake Shore and Ash Groves alternatives through the Natural Area.
- The new bridge over the North Slough adds considerable expense to this alignment. There may be impacts to fish and wildlife in the crossing area, particularly to federally listed juvenile salmonids. Further engineering/hydrological analysis will be required to address the potential for the bridge footings to exacerbate the movement of contaminants in groundwater in the vicinity.
- Periodic trail closures may occur if the landfill bank requires major repair work.

Cost Estimate*

South Slough segment	\$1,486,635
North Landfill segment	1,941,123**
East Landfill segment	493,737
Landfill Connector segment	2,333,555
<u>Pier Park segment</u>	<u>1,413,836***</u>
Total Cost Estimate:	\$7.6 million

* Cost estimate for 8’ wide asphalt trail with 2’ gravel shoulders. Does not include property or easement acquisitions.

** Includes new Slough bridge

*** Includes crossing Union Pacific rail lines between Chimney and Pier Parks, does **not** include neighborhood on-street bike lanes and sidewalks.



1. Looking north from landfill towards southern end of Port of Portland trail.



2. Looking east on north landfill perimeter road.



3. View of north slough from landfill perimeter road.



4. View of Smith Lake from viewpoint along east perimeter road on landfill.



5. Heading west toward landfill entrance on southern perimeter landfill road.



6. Looking south towards Forest Park from north side of landfill bridge.



7. Looking east from south side of landfill bridge.



8. Looking east at Wapato Wetland; midway between landfill and N. Portland Road bridge.



9. Approaching end of alignment at N. Portland Road bridge.



10. Looking north from southern end of N. Portland Road Bridge.



11. Looking south towards Chimney Park near landfill office.



12. Columbia Blvd. crossing location at Chimney Park driveway.



13. Columbia Blvd.



14. In Chimney Park looking across railroad tracks to Pier Park.



15. Pier Park entry at N. Seneca Street.

Summary of Alignments

Table 3. summarizes and compares the development considerations unique to each alternative trail alignment. A similar table comparing the same development considerations for each individual segment is found in Appendix B.

Table 3: Alternative Alignment Comparison Table

Alignment	Segments* Included	Major Improvements	Length (miles)	Acquisition/ Easement/ Right-of-Way	Agency Approvals Needed	Capital Cost ¹	
						Hard Surface	Soft Surface
Ash Groves	AG, EL, LC, PP, NR2	Fencing, Modify Landfill Bridge, RR underpass & overpass, Col. Blvd. crossing On-street improvements	4.5	RR Easements PDOT	NOAA DSL/ACOE (if wetland fill) USFWS DEQ City of Portland – PDOT, Planning, Parks	\$4.3 million \$.96 million per mile	\$3.6 million \$.8 million per mile
Landfill	NL, EL, LC, PP	Slough Bridge, Fencing, modify Landfill Bridge, RR underpass & overpass, Col. Blvd. Crossing	2.8	RR Easements PDOT	DEQ City of Portland – PDOT, Planning	\$6.2 million \$2.2 million per mile	\$5.1 million \$1.8 million per mile
South Lake Shore	NL, EL, SL, LC, PP	Slough Bridge, Fencing, Modify Landfill Bridge, RR underpass & overpass, Col. Blvd. crossing	4.4	RR Easements PDOT SL segment crosses 2 private parcels	NOAA, DSL/ACOE (if wetland fill) USFWS DEQ ODOT City of Portland – PDOT, Planning	\$7.1 million \$1.6 million per mile	\$5.7 million \$1.3 million per mile
South Slough	NL, EL, SS, LC, PP	Slough Bridge, Fencing, Modify N. Portland Road Bridge, RR underpass & overpass, Col. Blvd. crossing	4.8	RR Easements PDOT SS Segment crosses 2 private & 1 public parcels	NOAA DSL/ACOE (if wetland fill) USFWS DEQ ODOT City of Portland – PDOT, Planning	\$7.6 million \$1.6 million per mile	\$6.1 million \$1.3 million per mile

* Segment Abbreviations:

AG = Ash Groves	LC = Landfill Connector
NL = North Landfill	PP = Pier Park
EL = East Landfill	NR1 = Neighborhood Route 1
SL = South Lake Shore	NR2 = Neighborhood Route 2
SS = South Slough	

1. Excludes Property Acquisition, Includes Design/Engineering/Permits

VII. TRAIL DESIGN

Factors that are considered in the design and placement of trails include the type of use, the setting and the expected volume of use. The trails in the Smith and Bybee Wetlands Natural Area would be designed to accommodate a typical mix of regional trail users including bicyclists and pedestrians.

To assure a safe and convenient recreational experience there are specific requirements for each user group. In addition, there are design elements that can help minimize impacts of trail development within sensitive areas.

Pedestrian Trail

Narrow soft surface trails are designed primarily for pedestrian use. The advantage of these gravel or earthen trails is that they require less clearing and grading to construct. They can tolerate a greater range of slopes, unless specifically designed for ADA accessibility. Overhead clearance heights of 7 feet mean that fewer low hanging branches need to be cleared. With no shoulder and a narrower width, these trails provide greater flexibility in terms of siting and route selection. Disturbance to the existing terrain is minimized and new planting can hug the pathway. Standard widths for soft-surface pedestrian-only trails range from four to eight feet. Figure 1 illustrates how a 4 foot soft-surface trail would fit into the Natural Area.

Multi-Use Trail

Providing trail access for both pedestrians and bicyclists, multi-use trails are generally wider asphalt paved trails. A variety of specific design requirements due to higher travel speeds, maximum grade limitations and surfacing determine the route options for bicyclists. Longer sight and stopping distances are mandatory for safety. Multi-use trails range in width from 8 to 14 feet wide in the Portland metropolitan region. These trails have a higher clearance of 8 feet overhead and generally have a 2-foot shoulder on either side. The shoulder provides additional space for passing or moving aside, and is especially needed with an 8-foot wide path with two-way travel. The reinforced gravel

shoulder also provides structural support for the edge of the asphalt. Lower grades of 2% to 3% are desired, with grades not exceeding 4% to 5%. Sight distance requirements are longer than in pedestrian trails at a distance of 150' each way. With the broader width and shoulders, and requirement for lower slopes, the clearing and grading needs for constructing a multi-use pathway are far greater than those for building a pedestrian pathway. How a multi-use pathway would fit on the landfill perimeter roads is illustrated in Figures 4 and 5.

Landscape Mitigation

There has been much discussion about how to fit a trail into a sensitive area and avoid, minimize or mitigate any disturbance. There are ways to insert a trail into a landscape and minimize the amount of construction disturbance. Provided below are some specific options for the alternative alignments, as well as best practices for trail design construction and use:

Ash Groves

- Field locate trail to avoid removal of large ash trees, as well as to keep construction from disturbing root zones. This will preserve the trees and habitat they provide for bats and other wildlife.
- Identify turtle nesting areas prior to design phase and maintain recommended buffers.
- Locate trail on or adjacent to existing social trail in Ash Groves segment.
- Elevate trail or provide boardwalks where needed to maintain access to North Slough for turtles and other small wildlife. See Figure 3.
- Provide erosion control measures where needed including where trail connects with water control structure.
- Design trail to keep users on pathway and out of sensitive areas.

Landfill

- Provide a low vegetated barrier along east side of landfill to discourage off-trail wandering into Natural Area.
- Install fencing and gates to keep trail users on landfill perimeter roads and off landfill.

South Lakeshore

- Maintain recommended buffers (per consultation with permitting agencies) for heron and Bald Eagle nest sites.
- Keep trail above wetland zone along lake shore using boardwalks (as required per consultation with permitting agencies).
- Avoid removal of ash trees.
- Locate trail on or adjacent to existing social trail.
- Design trail to keep users on pathway and out of sensitive areas.

South Slough

- Design trail to discourage off-trail travel into Wapato Wetlands.
- Provide spur trail and viewing platform to provide visual access to wetlands.

Best Practices for Trails

- Work to avoid and minimize impacts to sensitive areas where practicable.
- Avoid tree removal with careful trail routing.
- Avoid impacts to water bodies, wetlands and seeps; maintain or establish recommended buffers; and use boardwalks or bog bridges (where appropriate) to cross wet areas.
- Modify design to provide wildlife passage at wildlife crossings.
- Prohibit bicycle use in sensitive areas. Enforce this design with gates or other structures to physically restrict their use.
- Keep trails to a minimum and narrower in sensitive areas.
- Site trails along already disturbed areas including social trails

and maintenance vehicle paths.

- Locate thorny plant material or boulders to reinforce trail boundary, close inappropriate social trails and discourage off-trail travel.
- Remove weedy non-native plants within 10 feet on either side of the trail, revegetate with native plants and restore disturbed areas with native plants.
- Plant taller native shrubs to create buffers to screen the trail from sensitive habitat areas.
- Provide spur trails and viewing blinds to provide visual access at specified locations to minimize impacts to wildlife.
- Use appropriate trail construction techniques and materials to minimize impact to habitat.
- Use Metro's Green Trails recommendations for preventing erosion, providing bioswales.



Figure 1. Soft Surface Pedestrian Trail in Natural Area

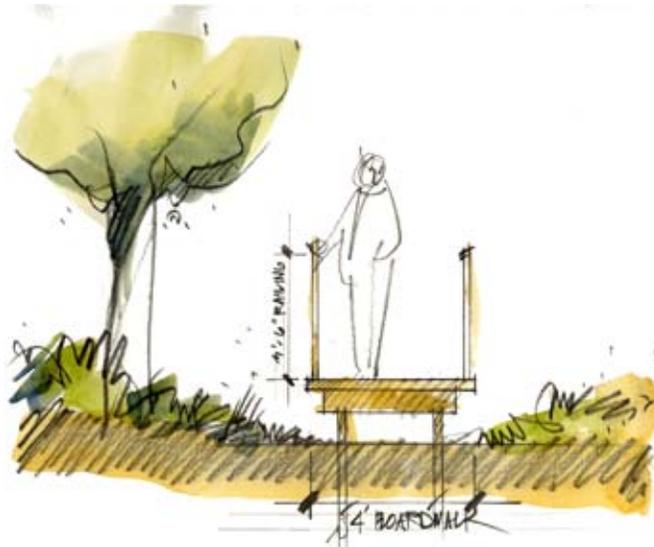


Figure 2. Boardwalk in Wildlife/Sensitive/Wet Areas



Figure 3. Paved Multi-Use Trail in Natural Area

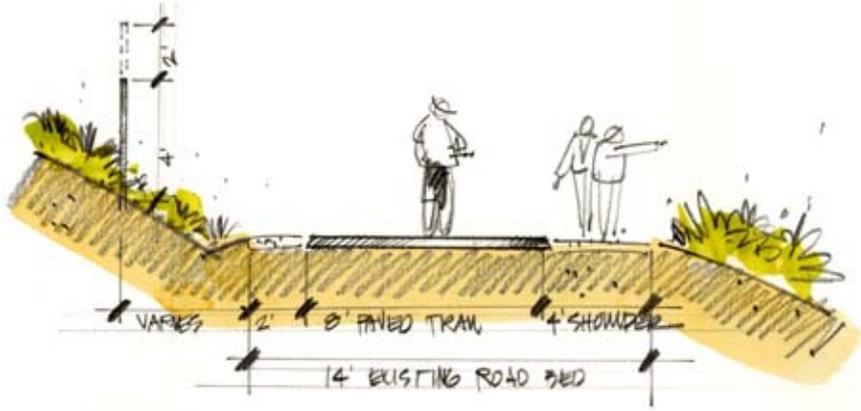


Figure 4. Paved Multi-Use Trail in Landfill on 14' Road Bed

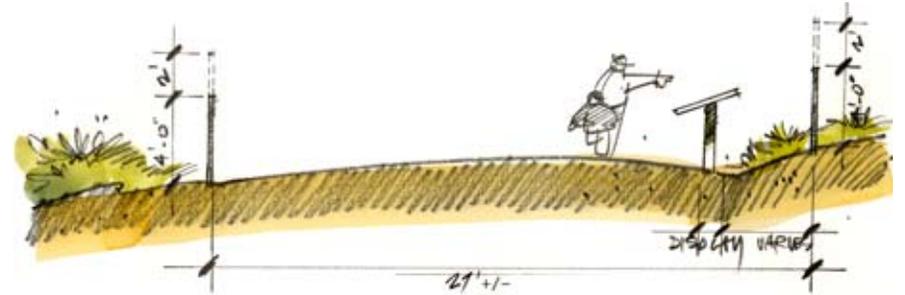


Figure 6. Viewpoint on Landfill Cap

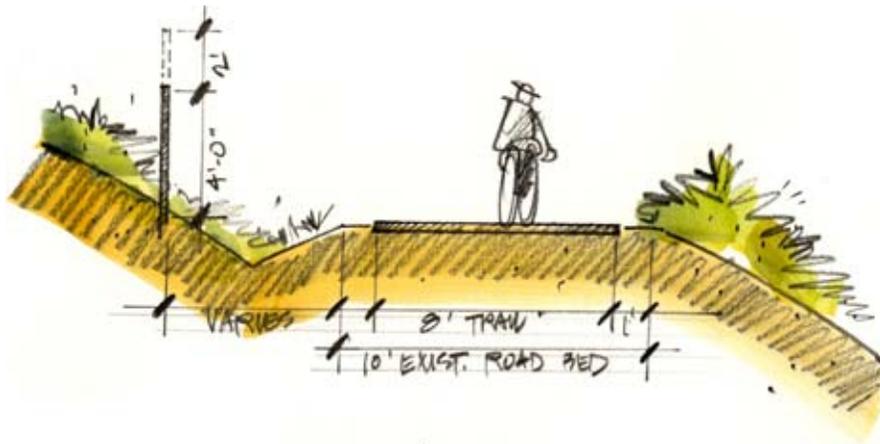


Figure 5. Paved Multi-Use Trail in Landfill on 10' Road Bed

The existing landfill perimeter road varies in width between 8' and 14'—Figures 4 and 5 show the trail set into the road in the widest and narrowest circumstances.

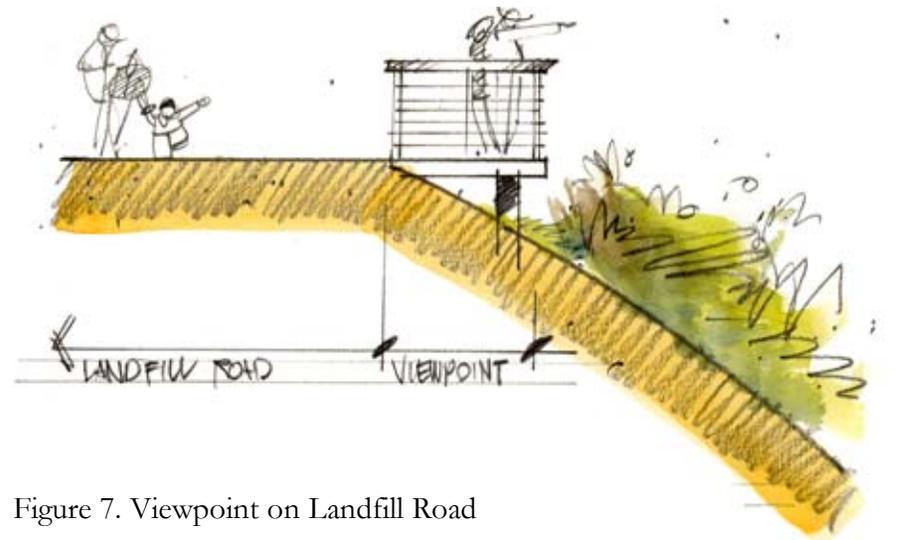


Figure 7. Viewpoint on Landfill Road

VIII. STAKEHOLDER/PUBLIC INPUT

There is a well-documented history of citizen interest and public policy favoring the linkage of nearby neighborhoods, parks and trails with the Smith and Bybee Wetlands Natural Area. While there has been a common interest of trail advocates and trail providers to complete this missing link in the regional trail system, the parties have not been able to reach an agreement on a specific alignment.

An important goal of this trails study has been to achieve consensus among key stakeholder groups on the facts and findings. Metro sought public input throughout the study process by convening a Technical Working Group, conducting a public workshop and tour, meeting with stakeholders and providing a project website. Appendix D contains public involvement materials produced during the project.

Technical Working Group

Representatives from key stakeholder groups were invited to participate on a Technical Working Group. The group included representatives from the St. Johns Neighborhood Association, 40-Mile Loop Land Trust, Smith and Bybee Wetlands Management Committee, Friends of Smith and Bybee Lakes, Portland Parks and Recreation Department, Metro Solid Waste and Recycling Department and Metro Regional Parks and Greenspaces Department. The group met five times over a 12-month period to discuss and seek consensus on project information developed by the project consultants.

Public Workshop and Tour

Approximately 50 citizens attended a public workshop to review alternative alignments and provide their input on the study findings.

Following public release of the feasibility study a public tour was offered to view the proposed alignments.

Stakeholder Meetings

Project staff made presentations on the study findings to the groups and committees listed below:

- Columbia Slough Watershed Council
- North Portland Neighborhood Chairs
- St. John's Neighborhood Association
- Metro Council Work Session
- 40-Mile Loop Land Trust
- Friends of Smith and Bybee Lakes
- Smith and Bybee Wetlands Management Committee

Project Outreach

Metro's web site was an effective tool in engaging citizens in the project as well. Many citizens visited the website to learn about the project and approximately a dozen provided comment for the public record through the project website. Metro also participated in an event for the grand opening of the New Columbia housing development near the Natural Area to inform new residents about the trail options. Approximately 30 citizens stopped by to view the exhibits.

This chapter to be completed when Council makes their final decision.

IX. NEXT STEPS

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