Tesoro Savage
Vancouver Energy Distribution Terminal

PART 3 NATURAL ENVIRONMENT

Section 3.1 – Earth

WAC 463-60-302
Natural environment - Earth.

(1) The applicant shall provide detailed descriptions of the existing environment, project impacts, and mitigation measures for the following:

(a) Geology. The application shall include the results of a comprehensive geologic survey showing conditions at the site, the nature of foundation materials, and potential seismic activities.
(b) Soils. The application shall describe all procedures to be utilized to minimize erosion and other adverse consequences during the removal of vegetation, excavation of borrow pits, foundations and trenches, disposal of surplus materials, and construction of earth fills. The location of such activities shall be described and the quantities of material shall be indicated.
(c) Topography. The application shall include contour maps showing the original topography and any changes likely to occur as a result of energy facility construction and related activities. Contour maps showing proposed shoreline or channel changes shall also be furnished.
(d) Unique physical features. The application shall list any unusual or unique geologic or physical features in the project area or areas potentially affected by the project.
(e) Erosion/enlargement of land area (accretion). The application shall identify any potential for erosion, deposition, or change of any land surface, shoreline, beach, or submarine area due to construction activities, placement of permanent or temporary structures, or changes in drainage resulting from construction or placement of facilities associated with construction or operation of the proposed energy project.

(2) The application shall show that the proposed energy facility will comply with the state building code provisions for seismic hazards applicable at the proposed location.

(Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-302, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-302, filed 11/6/92, effective 12/7/92.)

Section 3.1 Earth

The following sections describe the geology, geologic hazards, soils, topography, unique physical features, and erosion/enlargement of land area at the project site. Existing conditions, potential impacts, and, where appropriate, mitigation measures are discussed below. This section provides additional background detail related to the geology of the site to support section 2.18 that addresses how the project will be protected from earthquakes and volcanic eruptions.

Site-specific measures have been identified to mitigate potential hazards. With standard and site-specific mitigation measures, impacts on the natural earth environment from the construction and operation of the Facility are expected to be minor.

3.1.1 Methodology

The assessment of the geology of the project study area was completed by first reviewing previously completed geotechnical studies on and near the proposed project site, followed by field explorations. Field explorations of subsurface materials and conditions included 25 borings and six cone penetration test probes. An experienced geotechnical engineer from GRI directed the drilling and maintained a detailed log of the materials and conditions disclosed during the course of the work. The results of the review of previously completed studies, field explorations, and mitigation recommendations will be included in the final geotechnical report anticipated to be completed in September 2013.

3.1.2 Geology

The site is situated in the Portland Basin area of the Willamette Lowland geomorphic province. The site is located on the North American continental tectonic plate near a convergent plate boundary with the Juan de Fuca oceanic tectonic plate. The offshore CSZ is the contact area of these two converging plates. The convergent tectonic forces have generated northwest-trending fault zones and crustal blocks (Orr and Orr 1999) resulting in areas of uplifted mountainous terrain and depressed structural basins.

The Portland Basin is a northwest-elongated structural basin bordered to the east by the foothills of the Cascade Mountains, to the west by the Tualatin Mountains, to the south by the Clackamas River, and to the north by the Lewis River (Evarts et al. 2009). The Portland Basin began to form about 20 million years ago with folding and uplift of Tertiary basement marine and volcanic rocks, and was subsequently filled with volcanic and sedimentary rocks. About 15 to 16 million years ago, flood-basalt flows of the Columbia River Basalt Group (CRBG) entered the basin through a broad Columbia River valley transecting the Cascade Range and emptying into the Pacific Ocean (Beeson et al. 1989). The CRBG consists of numerous dark gray to black, dense, crystalline basalt lava flows which cover approximately 63,000 square miles and extend to thicknesses greater than 6,000 feet. By 14 million years ago, the uplift of the Portland Hills diverted the Columbia River northward (Evart et al. 2009).

The Columbia River deposited up to 600 feet of fine-grained river and lake sediments that compose the Sandy River Mudstone into the subsiding Portland Basin (Trimble 1963). Sandy River Mudstone is poorly cemented siltstone, sandstone, and claystone. Overlaying the Sandy River Mudstone is up to 600 feet of consolidated and cemented sandstone and conglomerate of the Troutdale Formation (Tolan and Beeson 1984). The Troutdale Formation resulted from a high-energy braided river system (Evarts et al. 2009) that was eroded during the last ice age by

the ancestral Columbia and Willamette rivers and by catastrophic glacial outburst floods (Allen et al. 2009). Glacial outburst floodwaters from Montana washed across eastern Washington and through the Columbia River Gorge to spread out in the Portland Basin and pool to elevations of about 400 feet, depositing boulders, cobbles and gravel sediment grading to thick blankets of micaceous sand. This deposit is subdivided into two facies by Madin (1994) and Phillips (1987): a fine-grained facies (Qff) that consists of primarily coarse sand to silt and coarse-grained facies (Qfc) that consists of pebble to boulder gravel with a coarse sand to silt matrix. The sea level rose by about 300 feet after the last of the glacial outburst floods about 15,000 years ago, forming an estuary environment that extends far upstream in the Columbia River. These low energy environments rapidly filled with Holocene sandy alluvium and broad floodplains developed along the primary Columbia River channel (Peterson et al. 2011) (see Figure 3.1-1).

At the Facility, fill material, consisting primarily of sand and silt, was placed to modify the site for industrial use. Much of this material was derived from suction dredging techniques where Columbia River channel sand was piped on shore for dewatering and grading. This fill material mantles the project site and is common in the historically industrial developed areas in the vicinity.

3.1.2.1 Impacts

The primary impacts of the project on geologic conditions and materials at the site are on the foundation construction, excavation, grading, trenching, backfill, and compaction associated with site development. The impacts generally will be limited to shallow soil at the site as the proposed excavations, utilities, and structures generally will not exceed 20 feet in depth. However, the results of preliminary geotechnical investigation conducted at the site have determined that site improvements will be required to mitigate static and seismic settlement and lateral deformations.

3.1.2.2 Mitigation

The project will have no adverse impacts on geologic conditions at the site and mitigation is not considered necessary for impacts to geology. While the project will not adversely impact geologic conditions at the Facility, the project has been designed to meet all applicable requirements and codes based on the seismic and soil conditions of the site as described in further detail in sections 3.1.3 and 3.1.4 below.

3.1.3 Seismicity

As previously discussed in section 2.18 of this application, the project is located in a regional tectonic regime that is capable of producing earthquakes of magnitude (M) 9 or greater (Atwater 2005). The convergence of the Juan de Fuca and the North American tectonic plates results in folding and faulting of rocks where sudden movement along faults generate strong ground motions. The general lack of surface expressions of faults, faults buried under hundreds of feet of recent alluvial deposits, and the limited 150-year recorded history of earthquakes in the area make it difficult to estimate the occurrence, magnitude, and frequency of earthquakes. However, an estimate of the maximum plausible earthquake magnitude can be made based on several seismicity studies (Bott and Wong 1993; Mabey, Black, Madin et al. 1997; Mabey, Madin, and Palmer 1994; Mabey, Madin, Youd et al. 1993; Atwater and Hemphill-Haley 1997; Wong et al. 2000; Pratt et al. 2001; Palmer et al. 2004).

Available earthquake information indicates the potential seismic sources that may affect the site can be grouped into three independent categories: subduction zone earthquakes, intraplate earthquakes, and local crustal earthquakes (see Figure 3.1-2)

3.1.3.1 Subduction Zone Earthquakes

Large subduction zone earthquakes result from the sudden slip between the upper surface of the Juan de Fuca tectonic plate and the lower surface of the North American tectonic plate. Geological studies show that subduction zone earthquakes have occurred repeatedly in the past 7,000 years (Atwater et al. 1995; Clague 1997; Goldfinger 2003; and Kelsey et al. 2005), and geodetic studies (Hyndman and Wang 1995 and Savage et al. 2000) indicate rate of strain accumulation consistent with the assumption that the CSZ is locked beneath offshore northern California, Oregon, Washington, and southern British Columbia (Fluck et al. 1997 and Wang et al. 2001).

Published estimates of the probable maximum size of subduction zone events range from magnitude M8 or greater. Numerous detailed studies of coastal subsidence, tsunamis, and turbidites yield a wide range of recurrence intervals, but the most complete records (>4,000 years) indicate recurrence between 200 and 700 years with an average of approximately 300 years between earthquakes on the CSZ (Adams 1990; Atwater and Hemphill-Haley 1997; Witter 1999; Clague et al. 2000; Kelsey et al. 2002; Kelsey et al. 2005; Goldfinger et al. 2012; Witter et al. 2003). Historical evidence of tsunami inundation in Japan suggests that the last subduction zone earthquake occurred on January 26, 1700 (Mabey et al. 1993; Wong et al. 2000; Atwater et al. 2005; and Nelson et al. 1996). The 1700 earthquake most likely ruptured along virtually the entire length of the CSZ for almost 1,000 miles and was approximately between M8.7 and 9.2 (Atwater et al. 2005). Evidence for tsunami inundation of buried marshes along the Washington and Oregon coasts and stratigraphic evidence from the Cascadia margin support these recurrence intervals (Atwater et al. 2005; Kelsey et al. 2005; and Goldfinger et al. 2012).

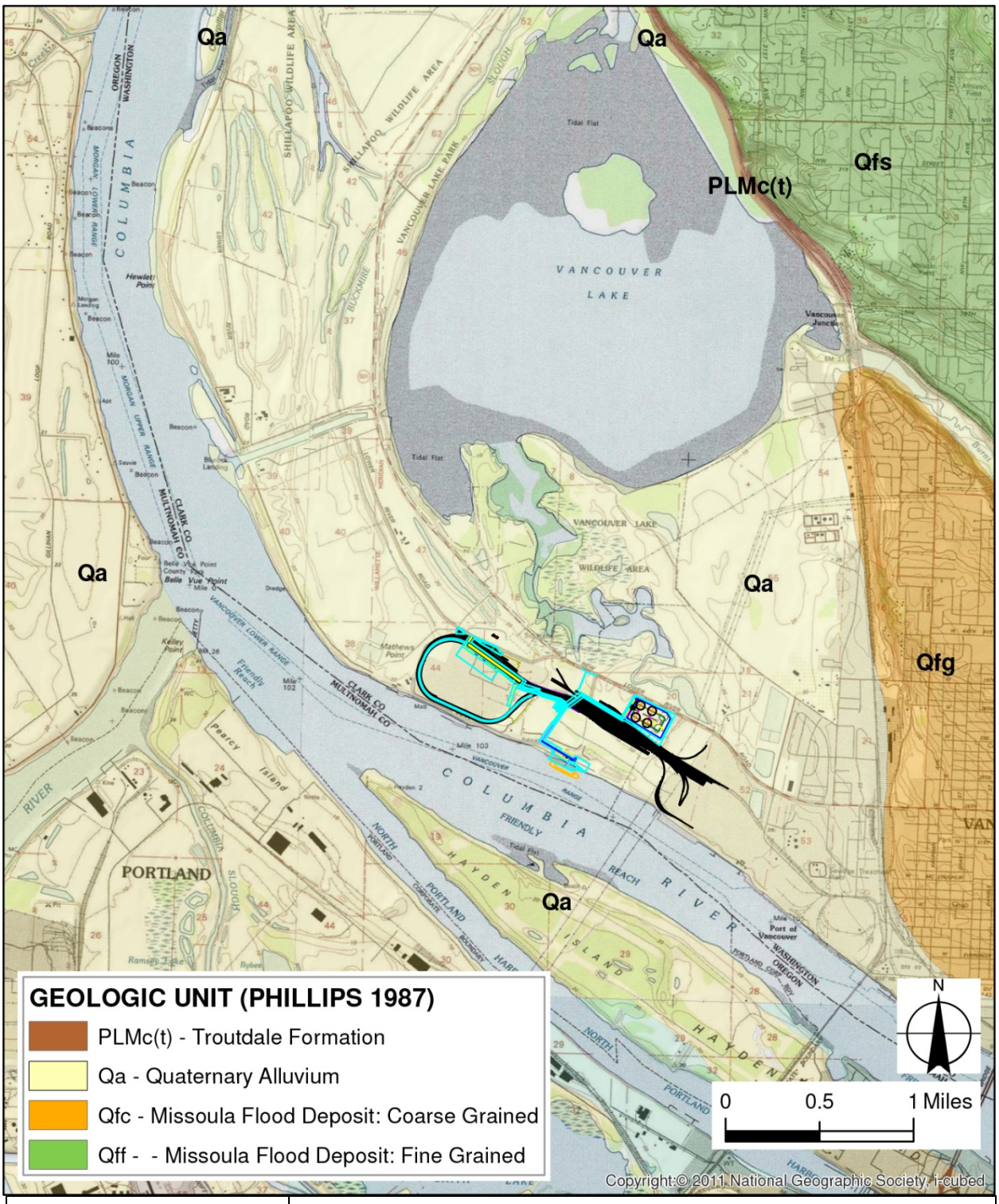

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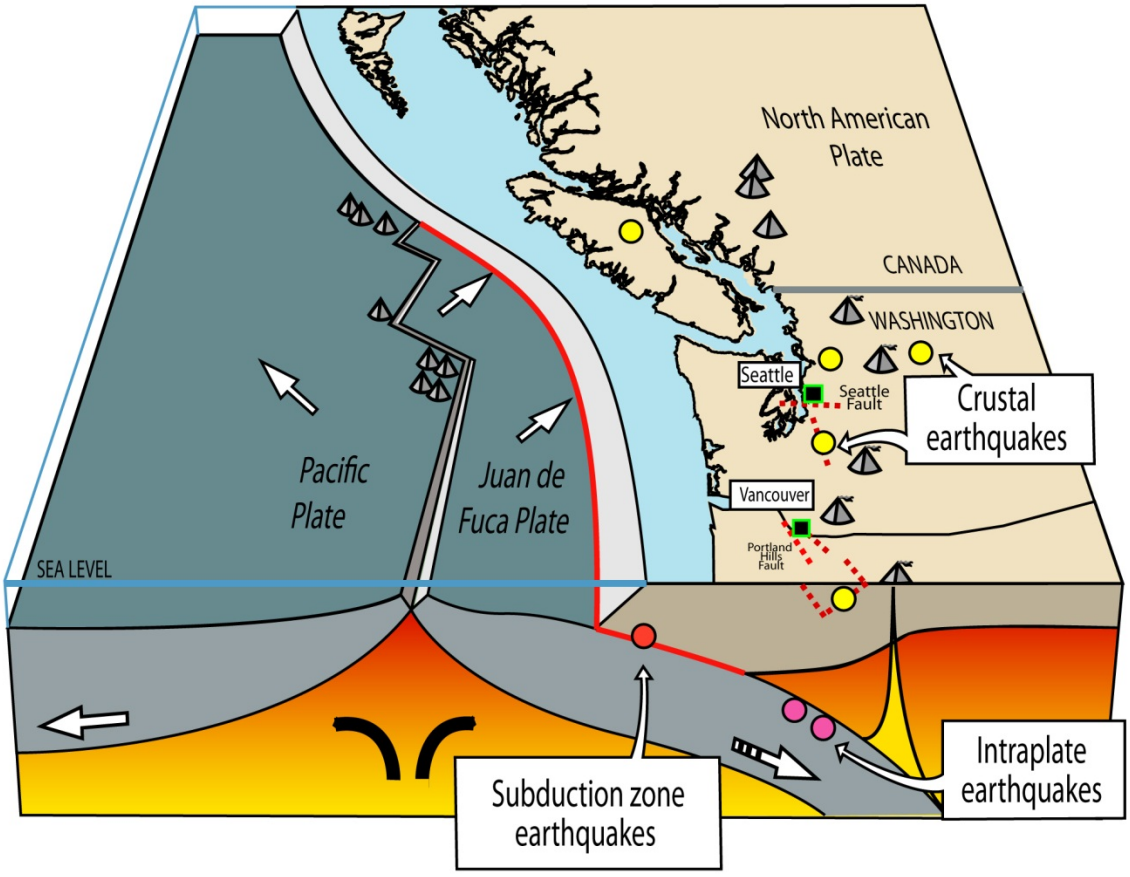
Figure 3.1-1. Site Geology



MODIFIED FROM USGS CASCADIA EARTHQUAKE SOURCES
(http://geomaps.wr.usgs.gov/pacnw/pacnweq/casceq.html)

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Figure 3.1-2. Tectonic Setting

3.1.3.2 Intraplate Earthquakes

Intraplate earthquakes result from the remains of the Juan de Fuca Plate fracturing as it dives beneath the North America Plate. Historical intraplate earthquakes near the project site have not been recorded. Puget Sound and northern California have recorded historical intraplate earthquakes. In the Puget Sound area, these moderate to large earthquakes are deep (25 to 37 miles) and over 124 miles from the deformation front of the subduction zone. Offshore, along the northern California coast, the earthquakes are shallower (less than 25 miles) and located near the deformation front. Estimates of the probable size, location, and frequency of subcrustal events in Southwest Washington are generally based on comparisons of the CSZ with active convergent plate margins in other parts of the world and on the historical seismic record for the region surrounding Puget Sound, where significant events known to have occurred within the subducting Juan de Fuca plate have been recorded. Significant intraplate earthquakes have occurred in the Pacific Northwest in 1949, 1965, and 2001. These M7.1, M6.5, and M6.8 earthquakes, respectively, have epicenters in the Puget Sound area approximately 124 miles from the project site. However, a M4.6 intraplate earthquake occurred northwest of Corvallis, Oregon in 1963 (Barnett et al. 2009); smaller (<M3.0) intraplate earthquakes occur in the Portland area (Mabey et al. 1994); and the Nisqually earthquake of 2001 (M6.8) was felt as far south as Salem, Oregon (Dewey et al. 2002).

Published estimates of the probable maximum size of these events range from magnitude M7.0 to 7.5. Published information regarding the location and geometry of the subducting zone indicates a focal depth of 31 miles is probable (Weaver and Shedlock 1989).

3.1.3.3 Crustal Earthquakes

Crustal earthquakes occur during the rupture of shallow faults of depths up to approximately 15 miles. The precise relationship between specific earthquakes and individual faults is not well understood, since few of the faults in the area are expressed at the ground surface, and the foci of the observed earthquakes have not been located with precision. The history of local seismic activity is commonly used as a basis for determining the size and frequency to be expected of local crustal events. Although the historical record of local earthquakes is relatively short (the earliest reported seismic event in the area occurred in 1920), it can serve as a guide for estimating the potential for seismic activity in the area.

Several shallow crustal faults are mapped within the vicinity of the project area; however, active crustal faults have not been mapped within the project site (Phillips 1987; Madin 1994; Mabey, Madin, Youd et al. 1993; Mabey, Madin, and Palmer 1994; Wong 2005; Personius et al. 2003; and Geomatrix Consultants 1995). Based on Quaternary (less than 1.6 million years before present) fault mapping conducted by the USGS in the vicinity of the project area, the East Bank Fault and Portland Hills Fault southwest of the project site and the Lacamas Lake Fault northeast of the project area are considered to be active (Phillip, 1987; Madin 1994; Personius et al. 2003). The locations of these faults relative to the project site are shown on Figure 3.1-3.

The maximum plausible magnitude for local shallow crustal earthquakes is anticipated to be approximately M6.5 to M7.1 (Mabey et al. 1993; Wong et al. 2000). The recurrence rate of maximum plausible magnitude crustal earthquakes within the project area is approximately 1,000 to 2,000 years (Bott and Wong 1993).

Table 3.1-1.Possible Earthquake Sources

Earthquake Source	USGS Fault No.	Distance from Project Site (km)[a,c]	Magnitude Max (M)[a]	Length (km)[a]	Dip Angle [a,b,c]	Slip Rate (mm/yr)	Most Recent Deformation (years ago) [b,c]
Cascadia Subduction	781	100-200	9.0	1,100	9°-11°E	>5	300 yr
Intraplate	--	40-60	7.5	~1,000	>9°E	>5	>150 yr
Portland Hills Fault	877	6	6.6-7.1	49	70°SW	<0.2	<1.6 m.yr
East Bank Fault	876	4	6.8-7.1	29	70°NE	<0.2	<15 k.yr
Lacamas Lake Fault	880	11	6.5-6.9	24	>75° SW	<0.2	<750 k.yr

a Wong et al., 2000.
b Gregor et al., 2002.
c Personius et al., 2003, information is approximate.
km = kilometer
mm = millimeter
yr = year
m.yr = million years
k.yr = thousand years

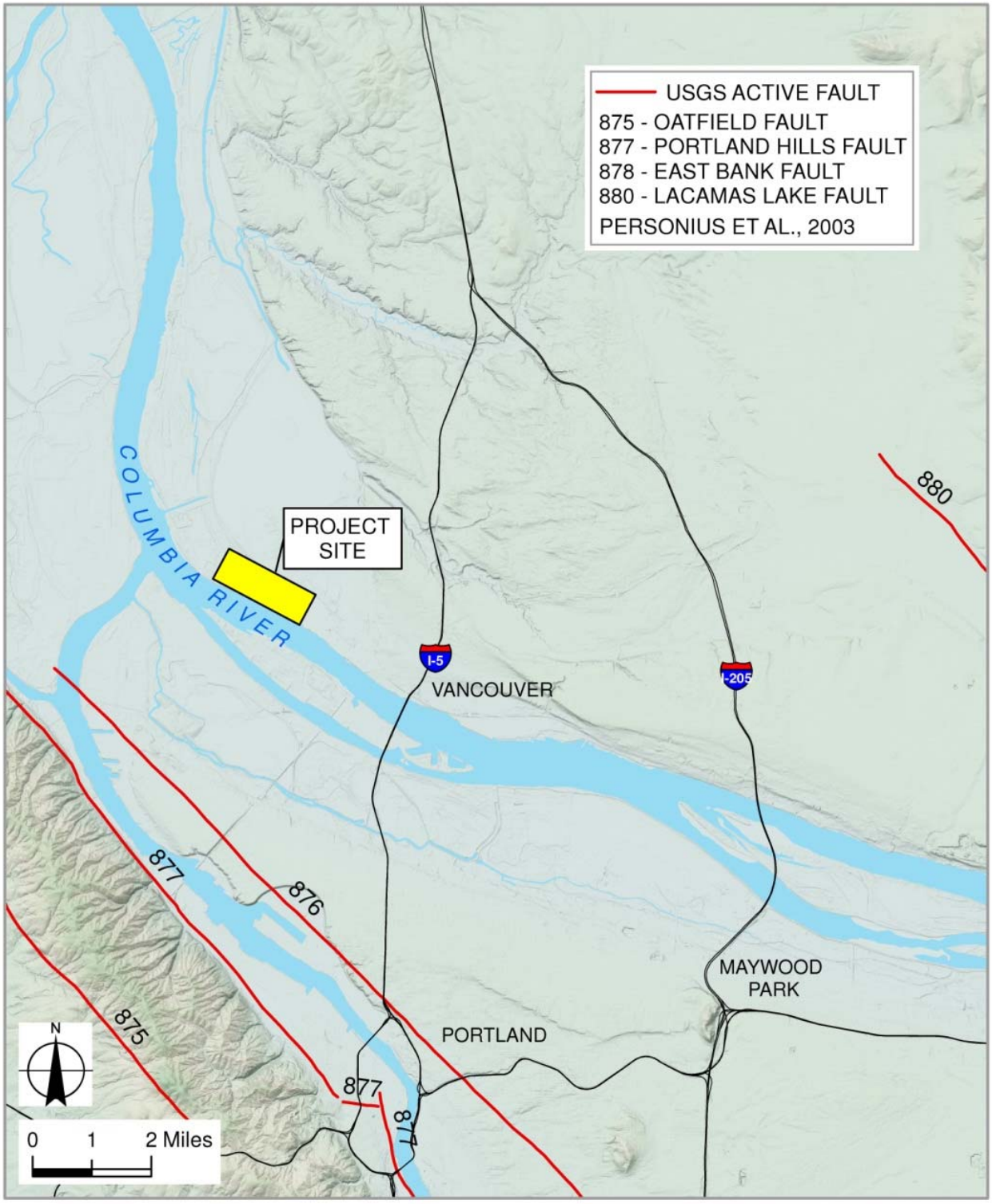
3.1.3.4 Volcanic Eruptions

As stated above in section 2.18.3, volcanoes in the region pose a variety of eruptive hazards. Volcanoes of the Cascade Mountains are found from northern California to British Columbia. Mount St. Helens and Mount Hood are located within 50 miles of the project, located to the northeast and southeast of the project site, respectively. Mount St. Helens is capable of producing eruptions of ash, lava flows, pyroclastic flows, and lahars (Wolfe and Pierson 1995). However, the site is upstream of drainages that extend from the flank of Mount St. Helens and would not be subject to pyroclastic flows or lahars.

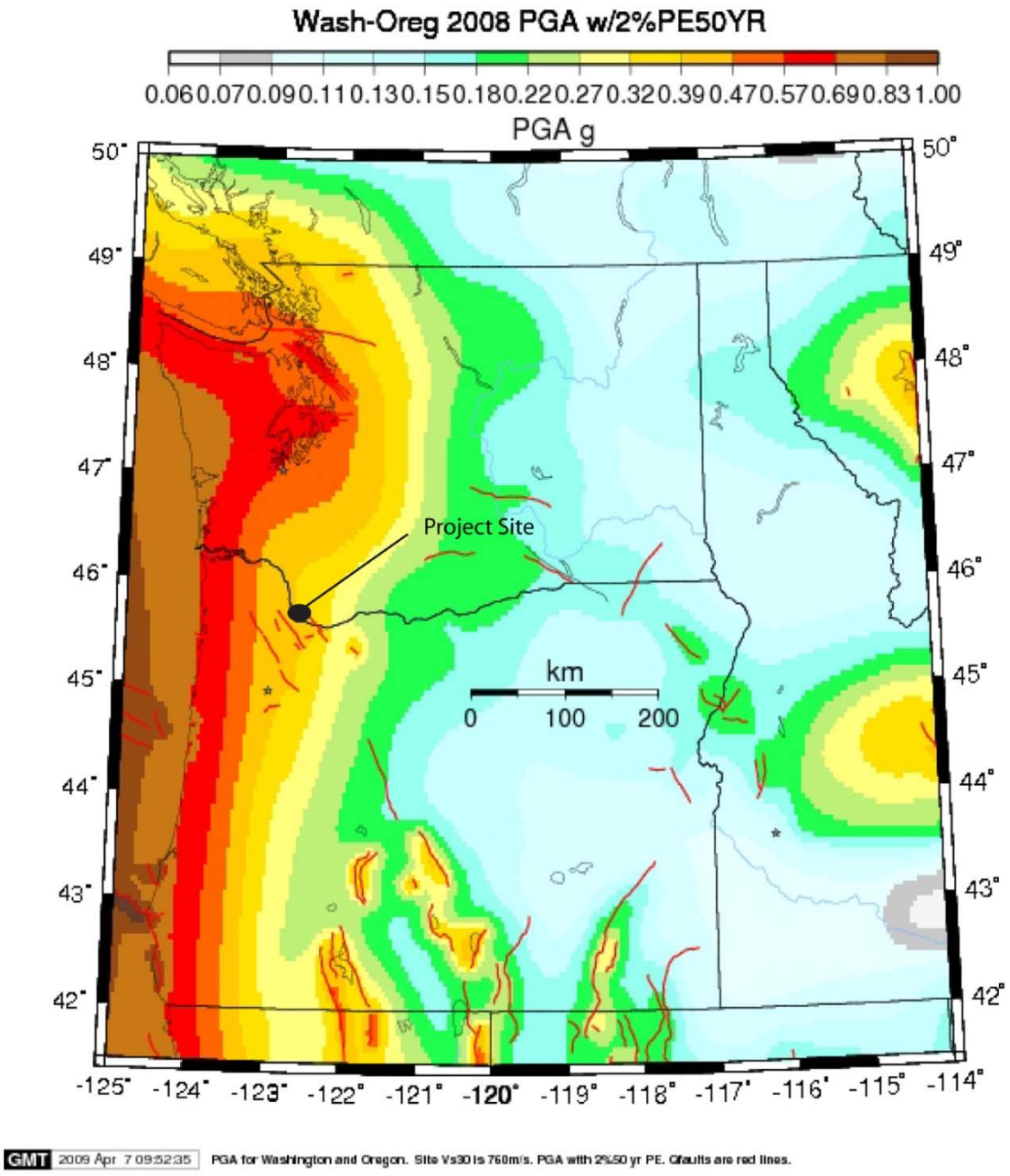
3.1.3.5 Impacts

The potential impacts of earthquakes and seismicity include fault rupture, ground motion, soil liquefaction, lateral spreading, and volcanic eruptions. Active faults have not been identified at the project site (see Figure 3.1-3). Surface fault rupture is not considered a potential impact. The potential ground motion during an earthquake event is generally represented by horizontal PGA estimated to range from 0.2 g (9.81m/s^2 [g-force]) to approximately 0.42 g in the vicinity of the project site (Figure 3.1-4). Ground motion can also cause soil to lose strength as the seismic waves allow the collapse of soil pore space. As pore space is decreased, pore water pressure increases and the liquefiable soil layers behave more like a viscous fluid during ground shaking. As a result, there is an increased risk of settlement and the loss of some bearing capacity for both shallow and deep foundations when soil liquefaction occurs. Structures can be adversely affected by liquefaction-induced settlement and reduced bearing capacity. Lateral spreading can occur during ground shaking as blocks of soil move horizontally toward unsupported banks such as the Columbia River. The site is located in a high liquefaction-susceptible soil area (Palmer et al. 2004) (Figure 3.1-5).

As illustrated in Figure 3.1-6, the USGS estimates that there is between a 0.01 and 0.02 percent annual probability that there would 4 inches or more of ash will be deposited at the site from eruptions throughout the Cascade Range, with the highest probability resulting from. Most Cascade Range contribution in the analysis is from Mount St. Helens (Wolfe and Pierson 1995). However, based on the distance and activity level of nearby volcanoes to the project site, there is a low potential for damaging volcanic processes to reach the project, and these events would be considered extremely rare.



BergerABAM	**Figure 3.1-3. Local Fault Map**



BergerABAM	**Figure 3.1-4. Ground Motion**

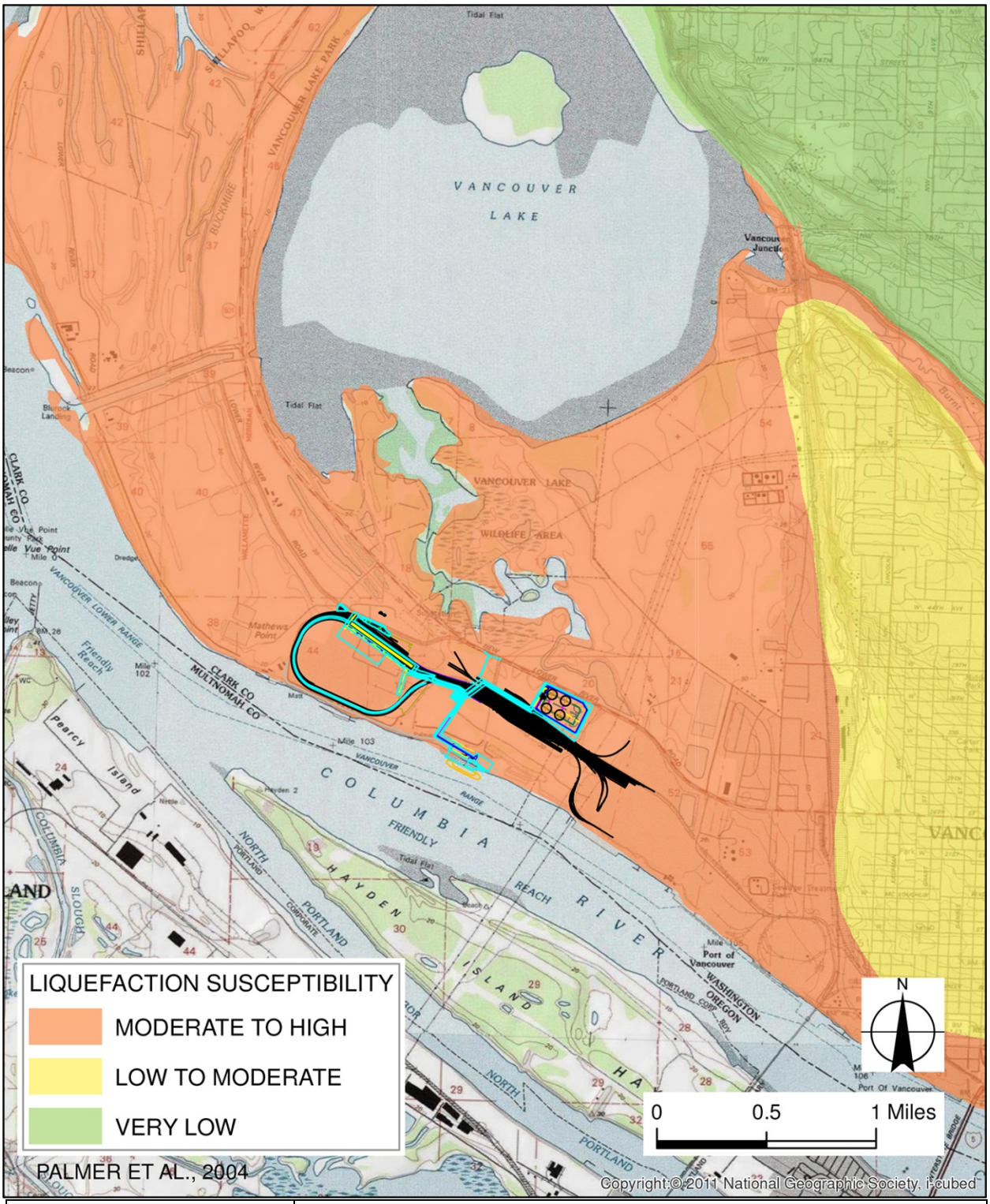


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Figure 3.1-5. Site Liquefaction Susceptibility

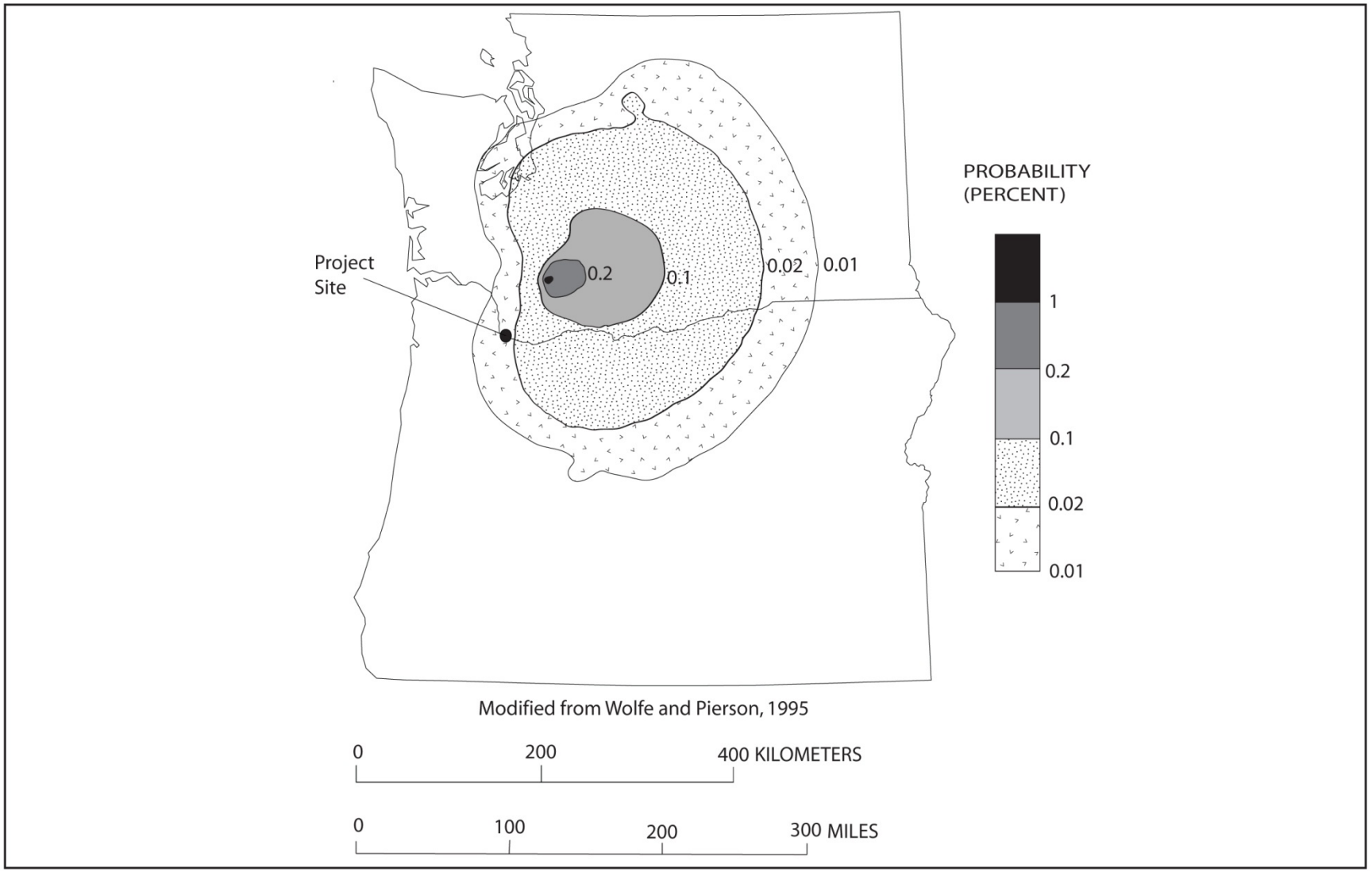

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Figure 3.1-6. Ash Accumulation

3.1.3.6 Mitigation

A geotechnical investigation completed for the project identified site-specific subsurface soil conditions and seismic hazards. Based on the subsurface conditions at the site, it is anticipated that site improvements will be required to mitigate static and seismic settlement and lateral deformations. Ground motion mitigation will adhere to local building codes and standard foundation design for the proposed Facility and associated buildings and pipelines. Liquefaction mitigation may include improving the condition of soils beneath the site to reduce the risk of settlement and large horizontal slope movements during an earthquake. Ground improvement could reduce the seismic lateral load on the dock foundations and reduce the risk of soil and debris sliding into the Columbia River.

Site improvement alternatives include the following;

- Ground improvement techniques such as vibro-replacement (stone columns), soil mixing, jet grouting, vibro-densification.
- Preloading or surcharging with temporary fill soils.
- Pile foundation systems.

Appropriate types of improvements will be selected during final design based on the specified performance criteria for the elements of the Facility. The proposed final design of the Facility will comply with the provisions of the building codes and requirements for seismic hazards that apply to the proposed location. These include the following;

- 2012 International Building Code (IBC), chapters 16, 17, 18, 19, 22 and 23
- ASCE 7-10 (Minimum Design Loads for Buildings and Other Structures), chapters 11, 12, 13, 14, 15, and 23
- ACI 318-11 (Building Code Requirements for Structural Concrete), Chapter 21 and Appendix D
- AISC Steel Construction Manual, 14th Edition, including AISC 360-10 (Specifications for Structural Steel Buildings), Part 2
- AISC Seismic Design Manual 2nd Edition, including AISC 341-10 (Seismic Provisions for Structural Steel Buildings), General Sections
- AF&PA SDPWS 2008 (AF&PA Special Design Provisions for Wind and Seismic), General Sections

The Washington State Building Code Act adopts by reference building and related codes that local jurisdictions must adopt and enforce. Titles 16 and 17 of the VMC establish these requirements in the City. It is anticipated that EFSEC will contract with the City for the review and issuance of permits under the required code provisions as well as for providing the required inspections and issuance of occupancy permits. The Applicant will submit the required building permit applications and all plans will be designed in compliance with the codes and requirements referred to above.

3.1.4 Soils

Soil types in the vicinity of the site have been identified by the Natural Resource and Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) (McGee, 1972). The following soil types are found within the vicinity of the project site (Figure 3.1-7).

- **Fill Land (Fn) –** These are nearly level areas that have been filled artificially with earth, debris, or both, and then smoothed over. Large areas along the Columbia River waterfront have been filled in with sand and silt dredged from the river. These areas do not have any clearly defined soil characteristics.
- **Newberg Silt Loam 0 to 3 percent slopes (NbA) –** This soil occurs mainly along the Columbia River. It is loamy soil that developed mainly in recent alluvium derived from basic igneous parent material. This soil is well drained. It is easily tilled. Permeability is moderately rapid. Surface runoff is very slow, and there is little to no erosion hazard.
- **Newberg Silt Loam 3 to 8 percent slopes (NbB) –** This soil is on side slopes of natural levees on bottom lands along the Columbia River. The slopes are short and slightly convex or undulating. The soil is similar to Newberg silt loam, 0 to 3 percent slopes, except that surface runoff is slow, and the erosion hazard is slight.
- **Pilchuck fine sand, 0 to 8 percent slopes (PhB) –** This soil is on terraces along streams. It is subject to overflow and deposition during periods when the water level is high. This sandy soil formed in parent material of recent sandy alluvium deposited by streams. The slopes are generally undulating and in most places are less than 5 percent. This soil is somewhat excessively drained and rapidly permeable. Surface runoff is very slow. The hazard of erosion is normally slight unless there is flooding, at which time the erosion hazard is severe.
- **Sauvie silty clay loam, 0 to 8 percent slopes (SpB) –** This soil is on the broad tops of old natural levees on the bottom lands along the Columbia River. In most places, the slopes are smooth or gently undulating. This soil is somewhat poorly drained and has moderately slow permeability. Surface runoff is slow. The hazard of erosion is slight, except in some areas that are subject to flooding from the Columbia River, where scouring can be a severe erosion hazard. A high water table is common in winter and spring.
- **Sauvie silt loam, 0 to 3 percent slopes (SmA) –** This soil is on the broad tops of old natural levees on bottom lands along the Columbia River and in many of the depressional areas. The soil is moderately well drained, and there are fewer mottles in the profile. Surface runoff is very slow, and the hazard of erosion is slight.
- **Sauvie silt loam, 3 to 8 percent slopes (SmB) –** This soil is on the side slopes of the old natural levees on bottom lands along the Columbia River. Surface runoff is slow, and the erosion hazard is slight.

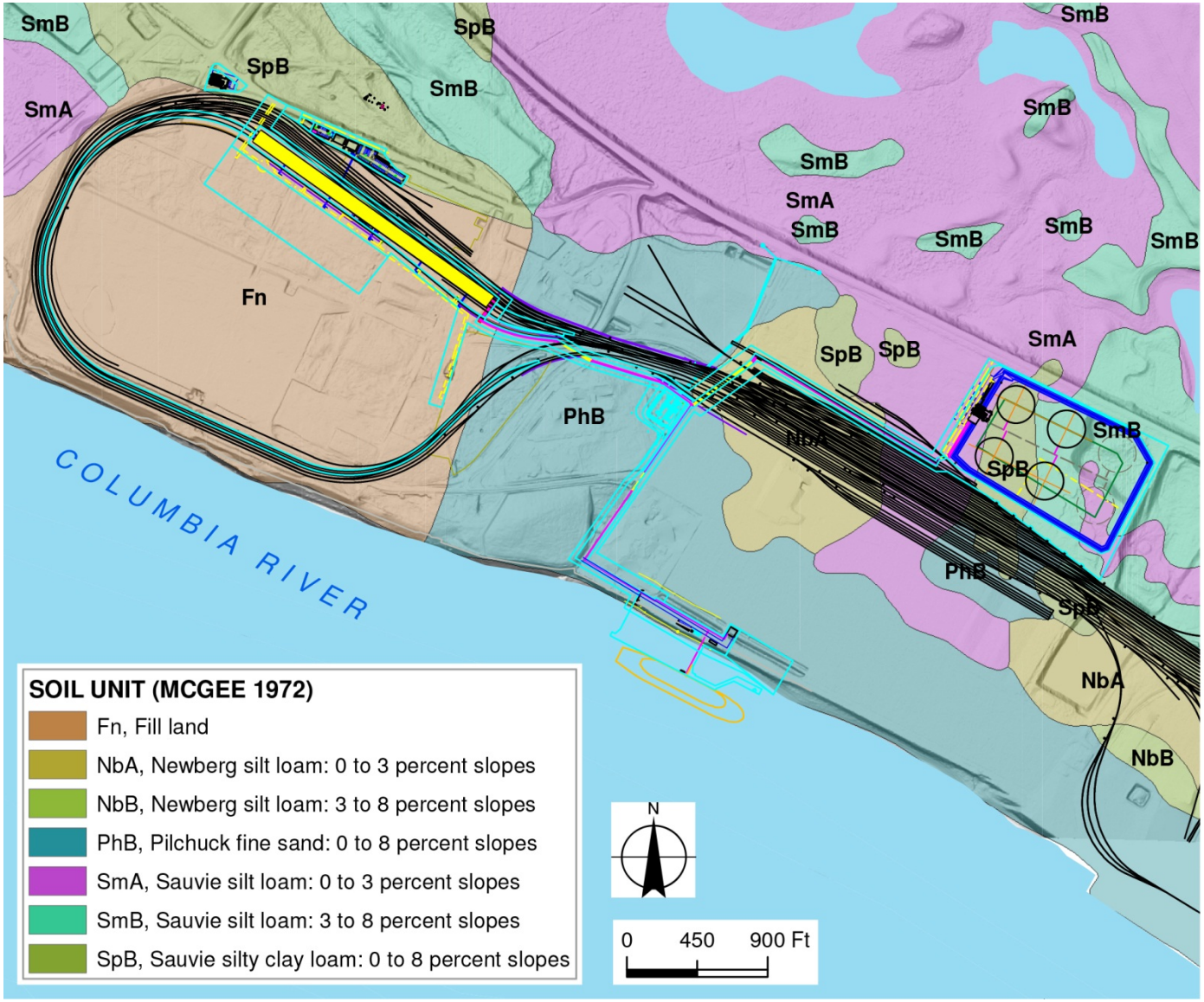

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Figure 3.1-7. Soil Map

3.1.4.1 Impacts

The impacts to soils consist of excavation and trenching for building and loop track foundations, associated piping, and utilities. Most soil at the site has been modified by the placement of fill, excavation and trenching for industrial facilities, and grading for roads and laydown yards. Site soils may need to be densified using ground improvement techniques. Solidification treatment such as soil mixing or jet grouting may be necessary for soils that are susceptible to settlement or liquefaction. Limited grading and/or placement of additional fill may be performed to obtain necessary grades. Because most soils on the site consist of fill or have been modified by prior industrial activities, no adverse impacts to soils are anticipated from the grading, excavation for foundations and piping, or ground improvement.

3.1.4.2 Mitigation

The site-specific geotechnical engineering investigation conducted for the project identified site improvement alternatives and methods of construction that will be employed. A qualified geotechnical engineer will monitor the fill placement during construction and conduct appropriate field tests to verify the proper compaction of the fill soils. Appropriate types of ground improvements will be selected during final design based on the specified performance criteria for the elements of the Facility.

3.1.5 Topography

The ground surface in the upland portion of the project area is relatively flat and ranges from about Elevation 28 to 35 feet (NAVD). The riverbank near the dock area slopes down from the top of the bank at about 2 horizontal to 1 vertical (27 degrees) to a more level beach area at low water level. A depression is present in the proposed tank farm area and also has side slopes of about 27 degrees.

3.1.5.1 Impacts

The proposed project includes changes in the topography of the site. The rail unloading area (Area 200) will require the excavation of two trenches approximately 1,800 feet long, 5 feet deep, and 10 feet wide for a volume of approximately 180,000 cubic feet. The proposed storage tanks (Area 300) will be located in the northeast corner of the site. A portion of this area includes a 4.5-acre depression that will need approximately up to 15 feet of additional fill to reach final grade. The Port previously received permits to conduct this work. Other areas of the site have been graded, filled, and generally modified from their original state over the past several decades. Impacts to the topography due to the construction of the project will include grading for access roads, excavation of unloading trenches, piping trenches, building foundations, and leveling the ground in the tank farm area. Based on the industrial zoning of the site and surrounding area, impacts to topography are not considered to be appreciable considering the heavily modified land.

3.1.5.2 Mitigation

The overall topography of the site will not be appreciably modified; therefore, no mitigation measures will be required.

3.1.6 Unique Physical Features

The project site is relatively flat, and was the location of historical industrial activities, and nearly all of the surface area of the site has been modified significantly. Therefore, unique physical features are not present at the site.

3.1.6.1 Impacts

Because there are no unique physical features, at the site, there will be no impacts to unique physical features.

3.1.6.2 Mitigation

No mitigation efforts are anticipated.

3.1.7 Erosion/Enlargement of Land Area (Accretion)

Erosion is the breakdown and transport of soils and bedrock by chemical and mechanical processes. The susceptibility of a soil to erosion is based on its properties, the ground slope; and the effects of rainfall, surface water, wind, and vegetation cover. These features are identified by NRCS and used in the determination of potential soil erosion susceptibility. As noted in section 3.1.4 above, the on-site soils have a low to slight erosion hazard, except in cases where flooding may occur. Erosion can occur along unprotected portions of the riverbank of the Columbia River, particularly during periods of elevated river levels. The riverbank slope at the docks is currently protected with riprap.

Enlargement of land area or accretion includes the deposition, or change of land surface, shoreline, beach, or submarine area due to project-related activities. The project does not include plans for increased land area. Excess soils may be generated due to removal of unsuitable soils during unloading trench excavation and piping trenches and placement of base coarse or structural fill. These soils may be disposed of off site at a suitable facility or reused at other locations on site where appropriate. Structural fill may also be necessary to level the ground surface in various areas of the site. In addition, material will be required for construction of the containment berm for the tank farm.

3.1.7.1 Impacts

Project activities, including excavation, grading and fill placement, and temporary stockpiling of excess soils for construction, may disturb soils resulting in a localized increase in soil erosion susceptibility. Proposed modifications of the marine terminal area will include in-water and over-water construction activities for the installation of mooring dolphins, dock platforms, walkways, and steel piles. In-water work may result in the disturbance of riverbed soils that could suspend soils within the water column and lead to increased turbidity. Other work activities proposed for Area 400 will occur above the OHWM and include the construction of the MVCU, control room, maintenance parking area, and transfer pipeline. Construction in these areas may disturb soils and could lead to potential soil erosion. The project will not significantly impact the potential for erosion along the riverbank.

3.1.7.2 Mitigation

The potential erosion impacts will be minimized through the use of erosion and sedimentation control measures outlined in the preliminary SWPPP (Appendix C) and as described in section 2.11 of this application, which states that construction activities will be sequenced and controlled to limit erosion. Clearing, excavation, and grading will be limited to the areas

necessary to construct the Facility. Interim surface protection measures, including dust control, straw matting, and erosion control blankets, will be required to prevent erosion. Final surface restoration will be completed within 14 days of an area's final disturbance. All construction practices will emphasize erosion control over sediment control. Temporary cutoff swales and ditches will be installed to route stormwater to the appropriate sediment trap and discharge location. As identified above in section 3.1.4, soils found on the site are classified as having little to no erosion hazard.

Section 3.2 – Air

WAC 463-60-312
Natural environment - Air.

The application shall provide detailed descriptions of the affected environment, project impacts, and mitigation measures for the following:

(1) Air quality. The application shall identify all pertinent air pollution control standards. The application shall contain adequate data showing air quality and meteorological conditions at the site. Meteorological data shall include, at least, adequate information about wind direction patterns, air stability, wind velocity patterns, precipitation, humidity, and temperature. The applicant shall describe the means to be utilized to assure compliance with applicable local, state, and federal air quality and emission standards.

(2) Odor. The application shall describe for the area affected all odors caused by construction or operation of the facility, and shall describe how these are to be minimized or eliminated.

(3) Climate. The application shall describe the extent to which facility operations may cause visible plumes, fogging, misting, icing, or impairment of visibility, and changes in ambient levels caused by all emitted pollutants.

(4) Climate change. The application shall describe impacts caused by greenhouse gases emissions and the mitigation measures proposed.

(5) Dust. The application shall describe for any area affected all dust sources created by construction or operation of the facility, and shall describe how these are to be minimized or eliminated.

(Statutory Authority: Chapter 80.50 RCW and RCW 80.50.040. 09-05-067, § 463-60-312, filed 2/13/09, effective 3/16/09. Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-312, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-312, filed 11/6/92, effective 12/7/92.)

Section 3.2 Air

3.2.1 Air Quality

Air quality in Washington is regulated by several agencies. In Vancouver, the Southwest Region Clean Air Agency (SWCAA) is the local authority for air quality permitting of industrial sources, and permits minor sources through the Air Contaminant Discharge Permit (ACDP) process. The Department of Ecology (Ecology) generally retains the authority for air quality permitting of major sources in attainment areas through the Prevention of Significant Deterioration (PSD) permit process. The United States Environmental Protection Agency (USEPA) also has a role in the PSD process and in ensuring all states have plans in place to maintain compliance with ambient air quality standards.

EFSEC has jurisdiction over projects such as the facility, including air quality preconstruction permitting. EFSEC has adopted virtually all of the air quality regulations established by Ecology that would otherwise apply to the facility. EFSEC and EPA will issue the preconstruction permits that allow construction of the facility to begin. Tesoro Savage must apply for an operating permit within a year of commencing operation of the facility.

The distinction between emissions and concentrations is important in the review of air quality issues. Emission regulations limit the amount of a particular air pollutant that can be emitted from a stack or facility (e.g., 10 pounds per hour [lbs/hr] of particulate matter). Ambient air quality standards limit concentrations of certain air pollutants (in parts per million [ppm] or millionths of a gram per cubic meter of air [$\mu g/m^3$]) in the outdoor (ambient) air.

The air quality dispersion modeling analysis summarized in Section 5.1 of this Application determined that worst-case emissions from the facility would result in ambient concentrations that comply with Washington and National Ambient Air Quality Standards (WAAQS and NAAQS) and Washington's toxic air pollutant (TAP) criteria. .

3.2.1.1 Emission Standards

USEPA has established performance standards for a number of air pollution sources in 40 CFR Part 60. These New Source Performance Standards (NSPS) represent a minimum level of control that is required for a new source. NSPSs that apply to the facility emission units include:

- Subpart Dc, Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units;
- Subpart Kb, Standards of Performance for Volatile Organic Liquid Storage Vessels;
- Subpart IIII--Standards of Performance for Stationary Compression Ignition Internal Combustion Engines; and
- Subpart A, General Provisions.

Emission limits imposed by these NSPS are discussed in more detail in Section 5.1.3.1.1. In general, NSPS limits are less stringent than the emission limits that result from applying Best Available Control Technology (BACT) and, therefore, are not particularly restrictive when BACT is required.

Under the provisions of Section 112 of the 1990 Clean Air Act Amendments, EPA is required to regulate emissions of a total of 187 HAPs from stationary sources. EPA does this by specific industry categories to tailor the controls to the major sources of emissions and the HAPs of

concern from that industry. As discussed in greater detail in Section 5.1.3.1.2, the following MACT standards apply to the facility:

- Part 61, Subpart M – National Emission Standards for Asbestos
- Part 63, Subpart ZZZZ -- National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines; and
- Subpart A, General Provisions.

As discussed in Section 5.1, Attachment 1, BACT is the best control technology that is feasible for a specific application, considering the economic, energy and environmental and other costs of each alternative. Chapter 173-460 also requires BACT for TAPs. Generally, the same technologies or operations that reduce criteria pollutants also reduce TAPs. For example, the use of combustion controls to optimize combustion also reduces both criteria and TAPs.

General standards for maximum emissions from air pollution sources are outlined in WAC 173-400-040. This section limits visible emissions to 20 percent opacity except for 3 minutes per hour; controls nuisance particulate fallout, fugitive dust, and odors; and limits SO_2 emissions to no more than 1,000 ppm (hourly average, 7 percent O_2, dry basis). WAC 173-400-050 identifies emission standards for combustion and incinerator units, and limits particulate matter emissions to 0.1 grains per dry standard cubic foot at 7 percent O_2.

SWCAA regulations mirror Ecology's emission limits from new sources. The SWCAA regulation's opacity standard limits the plume to 20 percent opacity except for 3 minutes of any hour. Particulate matter emissions are limited to 0.1 grains per dry standard cubic foot. Sulfur emissions, calculated as sulfur dioxide, are limited to 1,000 ppm. The facility will comply with all of the general emission standards established by Ecology and SWCAA.

3.2.1.2 Ambient Air Quality Standards

Ambient air quality standards have been established by USEPA and Ecology (Table 3.2-1). Some of the pollutants in Table 3.2-1 are subject to both "primary" and "secondary" NAAQS. Primary standards are designed to protect human health with a margin of safety. Secondary standards are established to protect the public welfare from any known or anticipated adverse effects associated with these pollutants, such as soiling, corrosion, or damage to vegetation.

Table 3.2-1. Ambient Air Quality Standards

Pollutant	National Ambient Air Quality Standards		Washington
	National Primary	National Secondary	
Total Suspended Particulate Annual Geo. Mean ($\mu g/m^3$) 24-hour Average ($\mu g/m3$) [b]			 60 150[a]
Inhalable Particulate (PM_{10}) Annual Arith. Mean ($\mu g/m^3$) 24-hour Average ($\mu g/m^3$) [b]	 150	 150	 50 150[b]
Fine Particulate ($PM_{2.5}$) Annual Arith. Mean ($\mu g/m^3$) [c] 24-hour Average ($\mu g/m^3$)[d]	 12 35	 12 35	
Sulfur Dioxide (SO_2) Annual Arith Mean ($\mu g/m^3$) 24-hour Average ($\mu g/m^3$)	 80 365		 52 365

Pollutant	National Ambient Air Quality Standards		Washington
	National Primary	National Secondary	
3-hour Average ($\mu g/m^3$)		1300	
1-hour Average ($\mu g/m^3$)	196[e]		655[f]
Carbon Monoxide (CO)			
8-hour Average ($\mu g/m^3$)	10,000		10,000
1-hour Average ($\mu g/m^3$)	40,000		40,000
Ozone (O_3)			
8-hour Average (ppm) [g]	0.075	0.075	0.075
Nitrogen Dioxide (NO_2)			
1-hour Average ($\mu g/m^3$)[h]	188		
Annual Arithmetic Average ($\mu g/m^3$)	100	100	100
Lead (Pb)			
Quarterly Average ($\mu g/m^3$)	0.15	0.15	

$\mu g/m^3$ = micrograms per cubic meter; **ppm** = parts per million

[a] Not to be exceeded on more than once per year.

[b] Based on the 99th percentile of 24-hr PM10 concentrations at each monitor.

[c] Based on the 3-year average of annual arithmetic mean PM2.5 concentrations.

[d] Based on the 3-year average of the 98th percentile of 24-hour PM2.5 concentrations at each monitor within an area.

[e] Based on the 3-year average of 99th percentile of daily maximum 1-hour averages

[f] A second hourly standard limits concentrations to 655 µg/m³, not to be exceeded more than once in a consecutive 7-day period.

[g] Based on the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration.

[h] Based on the 3-year average of the 98th percentile of daily maximum 1-hour averages

Annual standards never to be exceeded unless otherwise noted.

Short term standards not to be exceeded more than once per year unless otherwise noted.

Sources include: NAAQS (40 CFR 50), WAAQS (WAC 173-470, 474, and 475)

3.2.1.3 Toxic Air Pollutant Regulations

Washington regulates emissions of TAPs from new and modified air pollution sources (Chapter 173-460 WAC). This regulation establishes acceptable outdoor exposure levels (called Acceptable Source Impact Levels, or ASILs) for hundreds of substances. The ASILs were set conservatively to protect human health. The regulations also identify Small Quantity Emission Rates (SQERs). If the total emissions of a given pollutant are greater than its SQER, dispersion modeling is required to determine compliance with the ASILs.

If ASILs are exceeded, the Applicant must reduce project emissions or submit a health risk assessment demonstrating that toxic air pollutant emissions from the source are sufficiently low to protect human health.

3.2.1.4 Notice of Construction and Application for Approval

WAC 173-400-110 requires a NOC application for the construction of new air contaminant sources in Washington. SWCAA maintains a similar regulation (SWCAA 400-109) for new or modified sources in its jurisdiction. The NOC application provides a description of the facility and an inventory of pollutant emissions and controls. The reviewing agency, EFSEC, considers whether BACT has been employed and evaluates ambient concentrations resulting from these emissions to ensure compliance with ambient air quality standards. Pollutant emissions not governed by the PSD permit process are addressed in an Order of Approval that results from the

NOC application. In the case of the Facility, all pollutants except greenhouse gases are addressed in the NOC application.

3.2.1.5 Prevention of Significant Deterioration (PSD)

For the Facility, EFSEC and USEPA administer the PSD permit process. The PSD regulations were established by USEPA to ensure that new or expanded major stationary sources that emit Clean Air Act-regulated pollutants above a significance rate do not cause air quality in areas that currently meet the standards (i.e., attainment areas) to deteriorate significantly. These regulations require the application of BACT, and set PSD increments, which limit the increases in SO_2, NO_2 and PM concentrations that may be produced by a new source. Increments have been established for three land classifications. The most stringent increments apply to Class I areas, which include wilderness areas and national parks. The vicinity of the site is designated Class II, where less stringent PSD increments apply. There are no Class III areas in Washington so those increments are not pertinent to this analysis.

The Facility will be subject to PSD regulations because it will emit more than 100,000 tons per year of greenhouse gases (see Table 5.1-12). Once subject to the PSD process, emissions of other regulated pollutants that exceed specific significant emission rates must be evaluated. However, facility-wide emissions of all regulated air pollutants other than greenhouse gases are less than the significant emission rates established in the PSD regulations. Consequently, only greenhouse gas emissions are subject to review in the PSD process.

Together, the minor and major source air quality permits will include monitoring, record-keeping, and reporting conditions sufficient to ensure compliance with permit conditions and other emission standards.

3.2.1.6 Existing Air Quality

Ecology and USEPA designate regions as being "attainment" or "nonattainment" areas for particular air pollutants based on monitoring information collected over a period of years. Attainment status is therefore a measure of whether air quality in an area complies with the health-based ambient air quality standards displayed in Table 3.2-1.

The Facility is located in a region considered to be in attainment for all criteria pollutants, but it remains subject to maintenance plans that ensure continued compliance with ozone and carbon monoxide ambient standards

Existing air quality conditions at the project site can be inferred from several sources of information. First, conditions can be estimated from measurements collected by Ecology and the Oregon Department of Environmental Quality air quality monitoring networks. Current and archived air quality data are accessible from the EPA AirData website.[7] The 2012 AirData database files for several monitoring sites near to the project site were accessed to characterize background air quality. The maximum values reported from these sites represent the conservatively highest background air quality values in the region because monitoring sites are often specifically selected to identify the highest regional pollutant concentrations. Air quality values for each pollutant were estimated using measurements from the following monitors:

[7] U.S. EPA AirData website archive of monitoring data. http://www.epa.gov/airquality/airdata/

- CO: SE Lafayette, Portland, Oregon, EPA AQS Site No. 41-051-0080 (about 10 miles SE of the project site), 2012 maximum and second highest maximum values.
- NO_2: SE Lafayette, Portland, Oregon 2011 Annual mean , 2012 1-hour maximum and 98th percentile daily maximums.[8]
- O_3: Sauvie Island, Oregon, EPA AQS Site No. 41-009-0004 (about 8 miles north-northwest of the project site), 2011 8-hour maximum and fourth highest 8-hour maximum.
- $PM_{2.5}$: Fourth Plain Boulevard East, Vancouver, Washington, EPA AQS Site No. 53-011-0013 (about 10 miles east of the project site), 2012 24-hour maximum and 98th percentile concentrations, annual average estimated using annual average of 1-hour values.
- PM_{10}: N. Roselawn Emerson Playfield, Portland, Oregon, EPA AQS Site No. 41-051-0246 (about 7 miles southeast of the project site), 2012 24-hour average maximum value and 98th percentile 24-hour average value, annual average estimated using annual average of 24-hour values.
- SO_2: SE Lafayette, Portland, Oregon, EPA AQS Site No. 41-051-0080, 2012 maximum and 99th-percentile 1-, 3-, and 24-hour values. Annual average estimated using annual average of 1-hour values.

Background concentrations can also be estimated using a tool provided by Ecology. Ecology provides the 2009-2011 "design values" for background air quality throughout the state using the output from the AIRPACT-3 regional air quality model, with adjustments from assimilated monitor data. The tool is a product of the Northwest International Air Quality Environmental Science and Technology Consortium and is used to support air permitting and regulation in the State.[9] Use of this database may provide a more accurate estimate of the actual background air quality at the project site than the conservative measurements from the monitoring network. Design values were collected in July 2013 using the tool for project site coordinates (46.643 Lat., -122.705 Long.).

[8] Reported in Oregon Dept. of Environ. Quality (2012): 2011 Oregon Air Quality Data Summaries, DEQ 11-AQ-021

[9] NW-Airquest "design values" tool website: http://lar.wsu.edu/nw-airquest/index.html

The background air quality values estimated from these sources of information are listed in Table 3.2-2.

Table 3.2-2. Background Air Quality

Pollutant	Averaging Time	State Monitoring Network Max. Value	State Monitoring Network Regulatory Value[1]	Design Value
CO	1-hour	3.8 ppm	3.1 ppm (2nd high)	2.065 ppm
	8-hour	2.3 ppm	2.2 ppm (2nd high)	1.276 ppm
NO_2	1-hour	59 ppb	36 ppb (98th percentile)	37 ppb
	Annual	9 ppb	9 ppb	7 ppb
O_3	1-hour	0.068 ppm	0.064 ppm (4th high)	NA
	8-hour	0.057 ppm	0.053 ppm (4th high)	0.056 ppb
$PM_{2.5}$	24-hour	31.2 µg/m^3	20.5 µg/m^3 (98th percentile)	20 µg/m^3
	Annual	7.0 µg/m^3	NA	5.8 µg/m^3
PM_{10}	24-hour	36 µg/m^3	34 µg/m^3 (98th percentile)	31 µg/m^3
	Annual	13 µg/m^3	NA	NA
SO_2	1-hour	9.8 ppb	4.9 ppb (99th percentile)	9.5 ppb
	3-hour	7.0 ppb	2.7 ppb (99th percentile)	7.1 ppb
	24-hour	2.5 ppb	1.7 ppb (99th percentile)	3.6 ppb
	Annual	1.5 ppb	NA	3 ppb

NA: not available/applicable

[1] Values that are applicable for comparison to the NAAQS

3.2.1.7 Meteorology and Climate

The evaluation of air pollutant emissions associated with the facility requires meteorological data to characterize dispersion conditions near the site. The dispersion modeling techniques used to simulate transport and diffusion require hourly meteorological data, including wind speed, wind direction, temperature, atmospheric stability class, and mixing height.

A five-year meteorological dataset of hourly-averaged meteorological variables was developed for the air quality modeling study summarized in Section 5.1.4 and is sufficient to summarize the local wind climate at the project site. The 5-year dataset was produced using the AERMOD meteorological preprocessor AERMET utilizing meteorological data from the Vancouver Airport / Pearson Airfield (KVUO), located about 4 miles east of the project site also located on the north bank of the Columbia River. A "wind-rose" plot of the 2008-2012 wind speed and direction measured with a cup-anemometer at 10-meters elevation at KVUO is illustrated in Figure 3.2-1. Surface winds are heavily influenced by local topography, aligning west-southwest to east-northeast along the Columbia River. Hourly-averaged winds were classified as calm (<1 knot) roughly 5.72 percent of the time and the average wind velocity was 2.32 meters per second. The maximum hourly-averaged windspeed was 21.5 knots from the west-southwest occurring March 15, 2009.

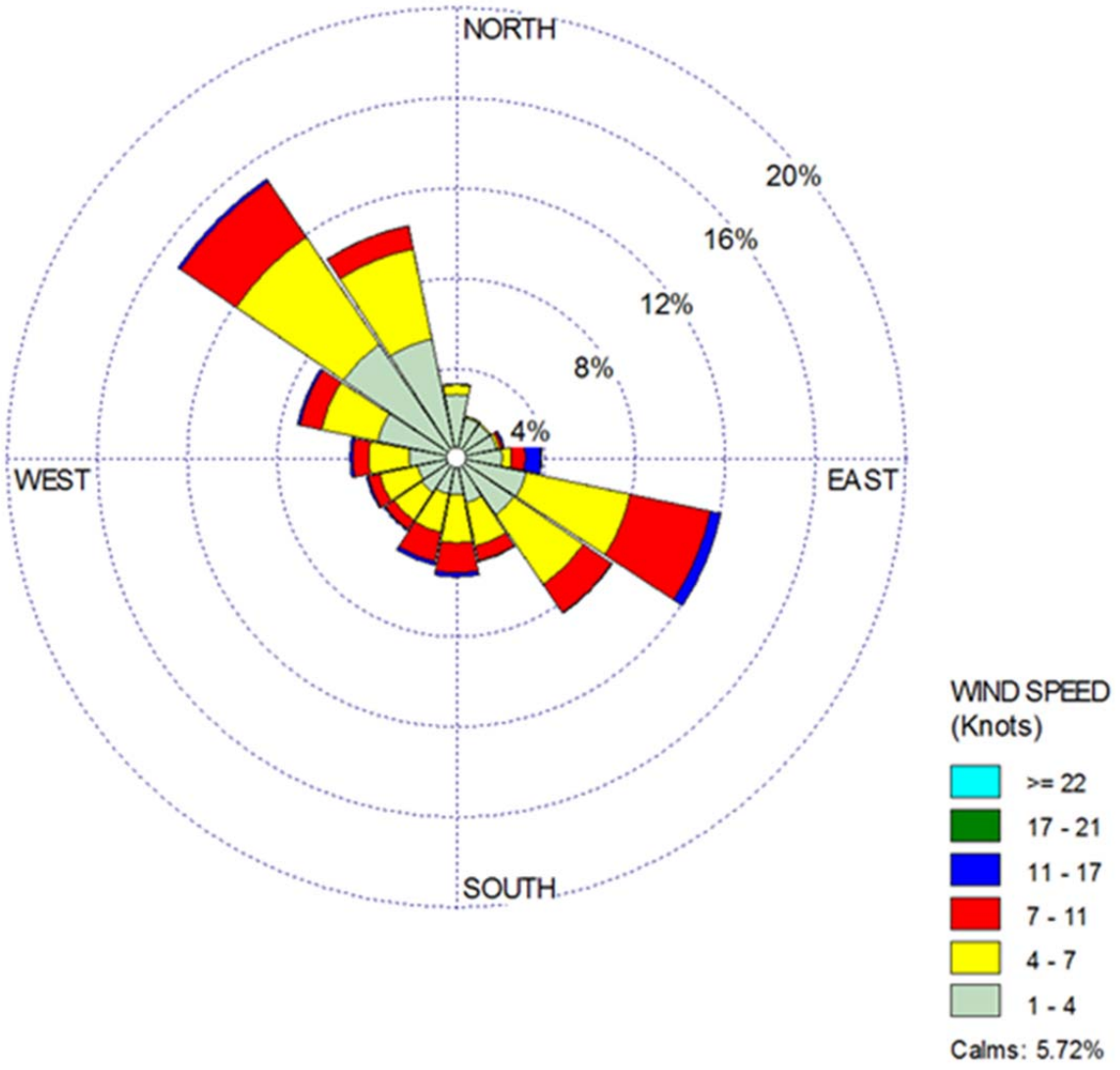

Figure 3.2-1. Pearson Field Airport Windrose (2008-2012)

Atmospheric stability has traditionally been classified using the Pasquill-Gifford (P-G) system ranging from class "A" (very unstable) to class "F" (very stable). The categories indicate the level of thermal stratification within the atmospheric boundary layer, which determines the vertical advection of air and pollutants. Unstable conditions typically result in greater vertical dispersion of pollutants while stable conditions can lead to stagnation by limiting vertical dispersion. The P-G classification system is summarized in Table 3.2-3. The 5-year meteorological dataset produced with AERMET does not include an estimate of atmospheric stability classification. However, stability can be inferred through the Monin-Obukhov scaling length (L): a measure used to define the buoyancy characteristics within the atmospheric surface layer. The range of L corresponding to each stability class is also included in Table 3.2-3.

Table 3.2-3. Atmospheric Stability

Class	Condition	L range (m)	General description and plume behavior	Project site % of time[1]
A	Very unstable	-20 < L < 0	Significant daytime heating, looping plumes	14
B	Unstable	-200 < L < -20	Daytime with heating, some plume looping	21
C	Slightly unstable	-400 < L < -200	Daytime	10
D	Neutral	|L| > 400	Cloudy and/or windy periods	5
E	Slightly stable	20 < L <400	Nights and dusk, some stagnation	31
F	Very stable	0 < 20	Cold clear nights and mornings, strong stagnation	16

1Analysis of 5-year (2008-2012) dataset utilizing Vancouver-Pearson airfield (KVUO) met. tower data

Temperature and precipitation measurement records from the "Vancouver 4 NNE" agricultural meteorological station were accessed to analyze the climate at the project site. This station is located about 4 miles northeast of the project site and has been collecting measurements since 1856. The monthly climate summary, based on 157 years of data, is included in Table 3.2-5.[10] The maximum temperature ever recorded at the site was 106° F on July 30, 2009 and minimum temperature recorded was -8.0° F in 1909. The site averages about 40 inches of rainfall and 6.5 inches of snow a year, with most of the precipitation occurring during the winter months.

A 17-year dataset of relative humidity and dewpoint temperature collected at the Portland Int. Airport ASOS meteorological station was retrieved from the National Weather Service archives to analyze these variables. Higher concentrations of water vapor typically occur in autumn and spring months when warm-conveyer-belt winds associated with mid-latitude cyclones advect warm tropical air into the region. Peak dewpoints higher than 60° generally occur in summer during periods of warm advection from the south and dewpoints near 70° can occur in rare periods of monsoonal advection. Lowest concentrations of water vapor generally occur in mid-winter or mid-summer months during periods of offshore flow. The lowest humidity is observed in winter during rare periods of modified-arctic air outflow through the Columbia Gorge. Cold, dry continental air with very low dewpoints advects out of Canada and leaks through the Gorge as a strong gap wind.

[10] Data provided by the U.S. Western Regional Climate Center, Reno, NV www.wrcc.dri.edu

Table 3.2-4. Project Site Temperature and Precipitation Climatological Averages[1]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	44.8	49.8	55.2	61.2	67.3	72.5	78.9	79.2	73.9	63.6	52.3	45.9	62.1
Average Min. Temperature (F)	32.5	34.3	37.3	40.5	45.5	50.4	53.7	53.4	49.1	43.3	38.0	34.1	42.7
Average Total Precipitation (in.)	5.76	4.39	3.83	2.73	2.28	1.68	0.62	0.85	1.80	3.20	6.03	6.45	39.62
Average Total SnowFall (in.)	3.8	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.0	6.5

[1]Based on 158-year climate record from Vancouver 4 NNE Met. Co-op station (458773)

3.2.1.8 Air Quality Modeling Analysis

A dispersion modeling analysis was conducted for the project based on the emission rates described in Section 5.1.2 of this Application using the five years of meteorological data described above. Full details of the analysis are outlined in Section 5.1.4. Computer-based dispersion modeling techniques were applied to simulate the dispersion of criteria pollutant and TAP emissions from the facility to assess compliance with NAAQS, WAAQS, and Ecology's ASILs for those TAPs that exceed the SQER. The dispersion modeling techniques that were employed in the analysis follow USEPA regulatory guidelines (40 CFR Part 51, Appendix W).

Compliance with ambient air quality standards may be conservatively assessed by summing the highest model-predicted concentrations attributable to facility and maximum measured (existing) concentrations to represent other sources of emissions. The influence of background sources is based on the air quality monitoring data discussed in Section 3.2.1.6 and as summarized in Table 3.2-2.

Total predicted concentrations are compared to the WAAQS and NAAQS in Table 3.2-5. The analysis indicates that when maximum predicted concentrations are added to the highest monitored values, total concentrations comply with Washington and National ambient air quality standards.

Table 3.2-5. Comparison of Cumulative Concentrations with Ambient Air Quality Standards

Pollutant	Averaging Period	Maximum Modeled Concentration	Measured Background Concentration	Maximum Total Concentration	NAAQS	WAAQS
		($\mu g/m^3$)				
NO_2	1-hour	19.5	70	89.1	188	-
	Annual	0.8	13	14.0	100	100
SO_2	1-hour	28.6	25	53.5	196	655
	3-hour	19.5	19	38.1	1300	-
	24-hour	10.8	9	20.2	-	262
	Annual	0.3	8	8.1	-	52
PM_{10}	24-hour	8.8	31	39.8	150	150
	Annual	0.1	13	13.1	-	50
$PM_{2.5}$	24-hour	8.8	20	28.8	35	-

Pollutant	Averaging Period	Maximum Modeled Concentration	Measured Background Concentration	Maximum Total Concentration	NAAQS	WAAQS
		($\mu g/m^3$)				
	Annual	0.1	6	5.9	15	-
CO	1-hour	87.5	2364	2451.9	40,000	40,000
	8-hour	50.5	1461	1511.5	10,000	10,000

1)Note:
Although it is assumed that all PM10 emissions are PM2.5, predicted concentration differ because of the difference in the statistics used to determine compliance with the standard.

The dispersion modeling analysis of the eight TAPs emitted at rates exceeding the SQERs was conducted in the same manner as for the criteria pollutants. TAP emissions estimates for the facility are discussed in Section 5.1.2.2 of the Application and comparison to SQERs is presented in Table 5.1-14.

Maximum TAP concentrations attributable to the facility are compared with Ecology ASILs in Table 3.2-6. Predicted maximum concentrations are less than the Ecology ASILs for all TAPs that are emitted at rates exceeding the SQERs.

Table 3.2-6. Maximum Predicted TAP Concentrations

CAS #	Compound	Maximum Predicted Concentration (ug/m3)	ASIL (ug/m3)
10102-44-0	Nitrogen dioxide	19.5	470
7446-09-5	Sulfur dioxide	28.6	660
57-97-6	7,12-Dimethylbenz(a)anthracene	1.20E-06	1.41E-05
7440-38-2	Arsenic	1.50E-05	3.03E-04
71-43-2	Benzene	2.36E-02	3.45E-02
7440-43-9	Cadmium	8.26E-05	2.38E-04
18540-29-9	Chromium, (hexavalent)	4.19E-06	6.67E-06
N/A	Diesel Engine Particulate	1.45E-03	3.33E-03

3.2.2 Odor

Background odor can likely be attributed to natural sources, diesel-fueled vehicles, and industrial activities in the vicinity of the project site. The site is located along the Columbia River, which may be a source of odors associated with marine activity. Heavy industrial use of adjacent sites may also contribute to the existing odor at the project site.

Construction of the facility would include some activities that would generate odors. If oil based paints are applied to structures or equipment at the site, paint odors may be perceptible nearby. Some of the site would be paved with asphalt, and asphalt fumes may be perceptible for a short period during the paving operation. These impacts are anticipated to be slight and of short duration.

The project as planned will not result in any significant release of offensive odors into the surrounding region. Sulfurous gases (such as H_2S) and petroleum hydrocarbon vapors vented

from vessels are to be routed through the vapor containment system to a vapor combustor. The vapor combustor will reduce sulfurous compounds to SO_2 gas and convert most hydrocarbons to odorless carbon dioxide. The detection threshold of SO_2 is below the SO_2 NAAQS, and the local ambient air quality modeling analysis summarized in Section 5 demonstrates that this threshold will not be exceeded at any time.

Slight minor odor impacts due to road and rail diesel traffic may occur but will more than likely not be discernible from the background traffic odor impacts in the area.

3.2.3 Climate, Visible Plumes, Fogging, Misting, and Icing

There are no cooling towers proposed for construction at the facility. Except for infrequent and short visible water vapor plumes from the boilers, no visible plumes are expected from the facility emissions units. Consequently, no off-site fogging, misting, or icing is expected.

3.2.4 Climate Change

Although most scientists concur that anthropogenic global emissions of greenhouse gases are affecting climate, there are no analytical tools or established procedures for evaluating climate impacts from individual projects.

Ecology estimates 2010 state-wide greenhouse gas emissions were 95.1 million metric tons (CVO_{2e}).[11] As indicated in Section 2.12, the facility has the potential to emit 136,000 metric tons of greenhouse gases (CO2e) annually. The facility greenhouse gas emissions are approximately 0.14 percent of the state greenhouse gas emissions. Consequently, the incremental effect of the project on global climate change is insignificant.

3.2.5 Dust

Because the site is flat, there would be very little grading of the site prior to construction. Therefore, dust generated by excavation and grading would be short term. Dust from access roads would be controlled by applying gravel or paving the access road and watering as necessary.

After the facility is completed and operational, virtually no dust would be generated on site.

3.2.6 Mitigation

- To control dust during construction, water would be applied as necessary. Site access and travel roads would be graveled or paved.
- BACT would be incorporated into the facility design and implemented to minimize air pollution emissions.

[11] Washington Department of Ecology, December 2012. Washington State Greenhouse Gas Emissions Inventory (1990-2010). Publication no.12–02-034.

Section 3.3 – Water

WAC 463-60-322
Natural environment - Water.

(1) The application shall provide detailed descriptions of the affected natural water environment, project impacts and proposed mitigation measures, and shall demonstrate that facility construction and/or operational discharges will be compatible with and meet state water quality standards.

(2) Surface water movement/quality/quantity. The application shall set forth all background water quality data pertinent to the site, and hydrographic study data and analysis of the receiving waters within one-half mile of any proposed discharge location with regard to: Bottom configuration; minimum, average, and maximum water depths and velocities; water temperature and salinity profiles; anticipated effluent distribution, dilution, and plume characteristics under all discharge conditions; and other relevant characteristics which could influence the impact of any wastes discharged thereto.

(3) Runoff/absorption. The application shall describe how surface water runoff and erosion are to be controlled during construction and operation, how runoff can be reintroduced to the ground for return to the groundwater supply, and to assure compliance with state water quality standards.

(4) Floods. The application shall describe potential for flooding, identify the five, fifty, and one hundred-year flood boundaries, and describe possible flood impacts at the site, as well as possible flood-related impacts both upstream and downstream of the proposed facility as a result of construction and operation of the facility and all protective measures to prevent possible flood damage to the site and facility.

(5) Groundwater movement/quantity/quality. The application shall describe the existing groundwater movement, quality, and quantity on and near the site, and in the vicinity of any points of water withdrawal associated with water supply to the project. The application shall describe any changes in surface and groundwater movement, quantity, quality or supply uses which might result from project construction or operation and from groundwater withdrawals associated with water supply for the project, and shall provide mitigation for adverse impacts that have been identified.

(6) Public water supplies. The application shall provide a detailed description of any public water supplies which may be used or affected by the project during construction or operation of the facility.

(Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-322, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-322, filed 11/6/92, effective 12/7/92.)

Section 3.3 Water

The Facility will connect to the City's existing water distribution network and construct necessary water service connections to receive potable water, process water, and emergency fire suppression water.

3.3.1 Surface Water Resources (Movement/Quality/Quantity)

The project site is generally flat and includes a total vertical relief of 12 feet (MacKay Sposito dated July 17, 2013). As described in section 3.5.3.1, a significant complex of wetlands, associated with the southern end of Vancouver Lake, is located to the north of the project site, but is functionally separated from the site by SR 501. Approximately 148 acres of wetlands providing water quality functions are located to the northwest of the project site. The Parcel 1A wetland is located to the east of the Facility and is separated from it by a private access road. The Parcel 2 wetland mitigation site is located north of Area 200 and is separated from the site by a private Port road. The project site is bounded by the Columbia River directly to the south.

With the exception of the Columbia River, there are no wetlands, streams or other jurisdictional surface water conveyances at the site. No other water features, such as ditches or wet areas, have been noted on site. Site soils consist of artificial fill material, typically consisting of sand and silt. Much of this surface material was derived from suction dredging, when Columbia River channel sand was piped on shore for dewatering and grading. Most of the project site has been filled, paved, and/or capped in association with previous development and cleanup activities, thereby providing significant stabilization of surface soils.

Manmade surface water conveyance features at the site consist of an existing sediment pond located southwest of the proposed Area 200 unloading and office area. The sediment pond is a temporary construction feature and will be filled in the near future since the Terminal 5 site has been largely stabilized following grading, rail, and roadway construction projects, both ongoing and constructed within the past few years. Excess surface water currently flows through shallow concentrated flow to the existing underground stormwater conveyance pipelines and through the Terminal 5 West water quality ponds before discharging to the Columbia River through an existing outfall.

The USGS Oregon Water Science Center reports an average annual rainfall of 38.9 inches at the Simmons Rain Gage Weather Station No. 139 at 16001 North Simmons Road in Portland. Over the 41.5-acre site, the volume of precipitation will total approximately 135 acre-feet per year.

3.3.1.1 Impacts to Surface Water

As noted above, except for the Columbia River, no natural surface water features exist at the site; therefore, no impacts will occur to surface water features as a result of the construction and operation of the Facility. Construction will occur in and over the Columbia River as part of the proposed dock improvements described in section 2.3. Impacts of the proposed in-water construction are described in section 3.4. The only other naturally occurring surface water features within a half-mile of the site consist of the wetland complex associated with the southern edge of Vancouver Lake. These wetlands are not hydraulically connected to surface water at the site, and are physically separated from the site by SR 501. Stormwater will be managed on site in accordance with local and state regulations and, therefore, impact to surface water is mitigated through the use of on-site stormwater management BMPs as discussed in

section 2.11. The Port manages three stormwater treatment ponds within a half-mile of the site: the Terminal 5 water quality ponds, Terminal 4 water quality ponds, and Parcel 8 water quality pond. Discharges from the site will be contributed only to Terminal 5 ponds and discharges will be treated to basic water quality standards in accordance with the discharge requirements of the Port and the Port's NPDES Municipal Phase II Stormwater General Permit as discussed in section 2.11.

As noted above, the site topography is relatively flat and already developed; minimal surface grading will be necessary to prepare the site for construction activities and no surface soils or natural vegetation will be stripped. Ground-moving activities will focus on excavating soils in Area 200 for the construction of the piping trenches associated with the rail unloading area, tank foundations, soil improvement facilities, and the installation of the administrative and support buildings. Excavated soils, if determined suitable by testing, will be used as fill for the construction of the containment berm in Area 300.

Protecting surface water during construction will focus on erosion control resulting from the interaction of surface water conditions with active ground disturbances. A site-specific construction SWPPP will be developed and implemented. A preliminary construction SWPPP is included in this Application in Appendix C; this preliminary SWPPP was developed based on the preliminary design in place when this Application was submitted. A final construction SWPPP will be submitted for review and approval before any facility-related ground disturbance begins. The SWPPP details specific applications in which BMPs will be installed to prevent and mitigate any construction-related impacts to surface water. Construction-related BMPs are further identified in the SWPPP.

Stormwater from the Facility site is currently collected, treated, and released to the Columbia River through existing outfalls permitted under existing NPDES permits. A complete description of the existing stormwater systems in place is provided in section 2.11 of this Application and in the preliminary stormwater report in Appendix F. This project will reduce the amount of impervious surface coverage and convert a portion of the existing pollution-generating impervious area to non-pollution-generating roof areas. All stormwater and wastewater discharges are connected to existing permitted collection and treatment systems and outfalls as described in sections 2.9 and 2.11 of this Application.

Stormwater will be discharged from the site in accordance with the existing NPDES permits which dictate effluent water quality. On-site stormwater management techniques and BMPs will increase the level of treatment, convert existing polluting generating surfaces to non-polluting surfaces and reduce the quantity of stormwater discharged from the site. The Applicant is discharging to existing collection systems owned by the Port. Actual outfall water quality, and discharge rates will be impacted by other tenants, the Port, and operations and maintenance of the downstream conveyance systems.

Mitigation Measures

A permanent stormwater management system will be constructed to serve the Facility; this system will be constructed during site grading and construction of the Facility surface and subsurface elements. The permanent stormwater management system is described in section 2.11.2, and is designed in accordance with VMC 14.024, 14.025, and 14.026 and Ecology's administrative codes for stormwater and spill prevention, preparedness, and response and the

Ecology stormwater manual. The final design and stormwater report will be prepared and submitted for approval by EFSEC prior to construction.

Surface water quality will be protected through the use of the BMPs designed and constructed in accordance with Ecology's stormwater manual. BMPs, such as oil water separators, hydrodynamic separation, particulate filters, biofiltration swales, and permanent vegetation, will be used in the permanent Facility installation to protect surface water. Once all permanent stormwater BMPs are in place, operations-related impacts to surface water will be minimized through the use of operational BMPs and operational procedures.

The most serious risk – although it is unlikely with the mitigation measures in place – to surface water quality will be an accidental crude oil release during an exceptionally high rainfall event. Numerous spill prevention and control systems have been included in the design of the Facility (see section 2.10). Containment rail drip pans, pumps, and containment sump tanks will be provided for the rail unloading area; the capacity of the containment systems will be sufficient to contain and store the entire volume of a single rail car staged within the unloading building. The tank farm will be surrounded by a containment berm 6 feet high with a full impervious liner capable of containing 110 percent of the largest tank and a 100-year 24-hour rainfall event. Spill, containment will be designed to meet or exceed API, EPA, NFPA, City and other applicable requirements. Tank monitoring, inspection, and testing will be in accordance with API 653, the industry standard for the inspection of aboveground petroleum storage tanks.

The transmission pipeline will be constructed of welded steel pipe, designed specifically for oil conveyance. Safety measures built into the design include thickened pipe walls, pipeline expansion for thermal and/or seismic movement, pressure and temperature sensors, and emergency shutoff valves. The pipeline will largely be constructed aboveground, on concrete foundations, with the exception of a few portions that will be constructed underground to accommodate existing rail and road crossings. The above-grade portion of the pipeline will be subject to visual inspection for leaks and double-walled pipe will be used underground with monitoring to detect any leaks, see Sections 2.10, 2.11 and Appendices B.2 and C for additional spill control and prevention measures.

Spill containment measures along the pipeline alignment (Area 500) will comply with 40 CFR 112.7 by providing secondary containment, inspections, and contingency planning. The most likely spill events are small releases of less than 5 gallons resulting from nicks, corrosion pinholes, or gasket seal failures. An example of secondary containment that can address these discharges is to confirm or retrofit all stormwater inlets within the contributory drainage area of the pipeline alignment with spill control devices to contain small oil leaks or spills.

All facility piping systems and storage tanks will be hydrostatically tested prior to being placed into operation. Hydrostatic test water for the pipeline will be acquired from the City's water system. Test water will be discharged to existing storm drain conveyance systems in accordance with the stormwater permit issued for the project.

BMPs have been described in the preliminary SWPPP included in Appendix C of this Application, and will be finalized based on the final Facility design and submitted to EFSEC for review prior to construction. Flow control, controlling the rate at which stormwater is released to surface waters from the site, is not required for the Facility because all site stormwater runoff will be conveyed to the Columbia River through a manmade non-erodible conveyance system. The Columbia River is listed as a flow-control-exempt receiving water per section 2.5.7 and

Appendix I-E volume 1 of the Ecology stormwater manual. A comprehensive strategy for spill prevention and control will also be implemented as described in detail in section 2.10 of this Application.

With the mitigation measures in place, stormwater discharges from the Facility will meet state and local water quality standards.

3.3.2 Runoff/Absorption

3.3.2.1 Existing Runoff/Absorption Conditions

As discussed in section 3.3.1.1, site soils are filled, paved, and/or capped in association with previous development and cleanup activities. Existing runoff largely flows to existing manmade conveyances, pipelines, and treatment units. Based on the nature of the existing development on the site and the industrial nature of the existing sites, it is assumed that stormwater currently does not infiltrate.

Stormwater runoff from the Marine Terminal (Area 500) is part of an existing 25-acre drainage basin that is treated through two water quality bio-swales and then flows into two infiltration swales.

3.3.2.2 Impacts to Runoff/Absorption

The site is currently considered to be fully impervious. Construction will improve this existing condition by converting approximately 2.21 acres of impervious area to landscaping and approximately 10.78 acres from pollution-generating impervious to non-pollution-generating roof area. Landscaping and screening will be constructed in accordance with the City's requirements, primarily where Facility elements are situated adjacent to frontage areas along SR 501. Landscaping and stormwater areas will be constructed to allow infiltration where possible.

Currently the MVCU is proposed to impact a portion of the treatment bio-swale described above in 3.3.2.1. The impact to the existing treatment facility will be mitigated by installing a filter strip to treat the proportional amount of impacted land area. Runoff contributing to the infiltration facilities will be maintained. Proposed mitigation will add additional treatment facilities increasing the water quality prior to infiltration.

The Facility as proposed will decrease the total amount of impervious surfaces and add additional impervious areas and treatment facilities. Overall, natural absorption and infiltration from the Facility will be increased.

Construction stormwater will be managed in accordance with the conditions of the State General Construction Stormwater Permit. Construction stormwater BMPs will be utilized to control erosion and sediments on the site. Additional detail on construction BMPs are included in the preliminary SWPPP located in Appendix C. Selected construction stormwater BMPs will provide water treatment and will discharge stormwater to the existing on-site conveyance systems. Construction stormwater will not be routed to infiltration facilities.

3.3.2.3 Mitigation Measures

The designed BMPs are expected to minimize erosion and control sedimentation. Construction-phase erosion and sedimentation control BMPs, as described in sections 2.11 and 5.3 of this Application, will be implemented to mitigate the impacts of soil disturbance. Permanent

operations-phase runoff control and water quality treatment will be implemented to mitigate any impacts from the project.

3.3.3 Floodplains

3.3.3.1 Existing Conditions

Portions of the site are within the 100-year floodplain and floodway of the Columbia River. The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps #53011C0363D and 364D include the project area. The maps indicate that most of the area is located in Zone X and outside the Special Flood Hazard Area representing the 100-year floodplain. The 100-year flood elevation is designated as 30 feet NAVD 88 and extends generally to the top of the bank along berths 13 and 14 in Area 400. In addition, an isolated floodplain is located in Area 300, as shown on FEMA Map Number 53011C0364D, and in a portion of Area 500. Figures 3.3-1 and 3.3-2 indicate the mapped floodplain. The Port filled Area 300 as authorized by City permit GRD2012-00025 and the area is now above the 100-year flood elevation. The floodplain within Area 500 is completely surrounded by land above the 100-year flood elevation, which separates it from overland flooding from the Columbia River or Vancouver Lake.

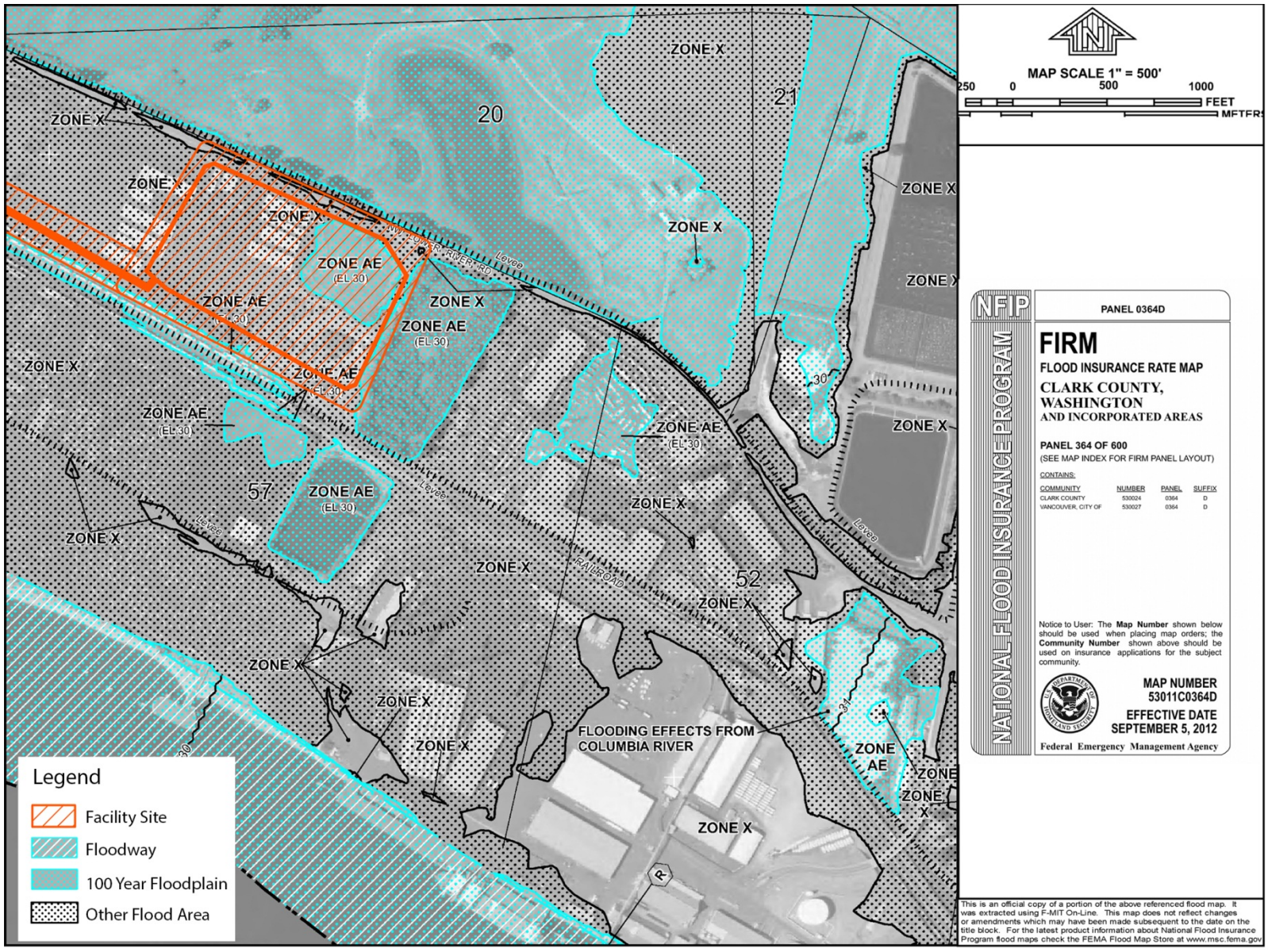

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Figure 3.3-1. Mapped Floodplains - West

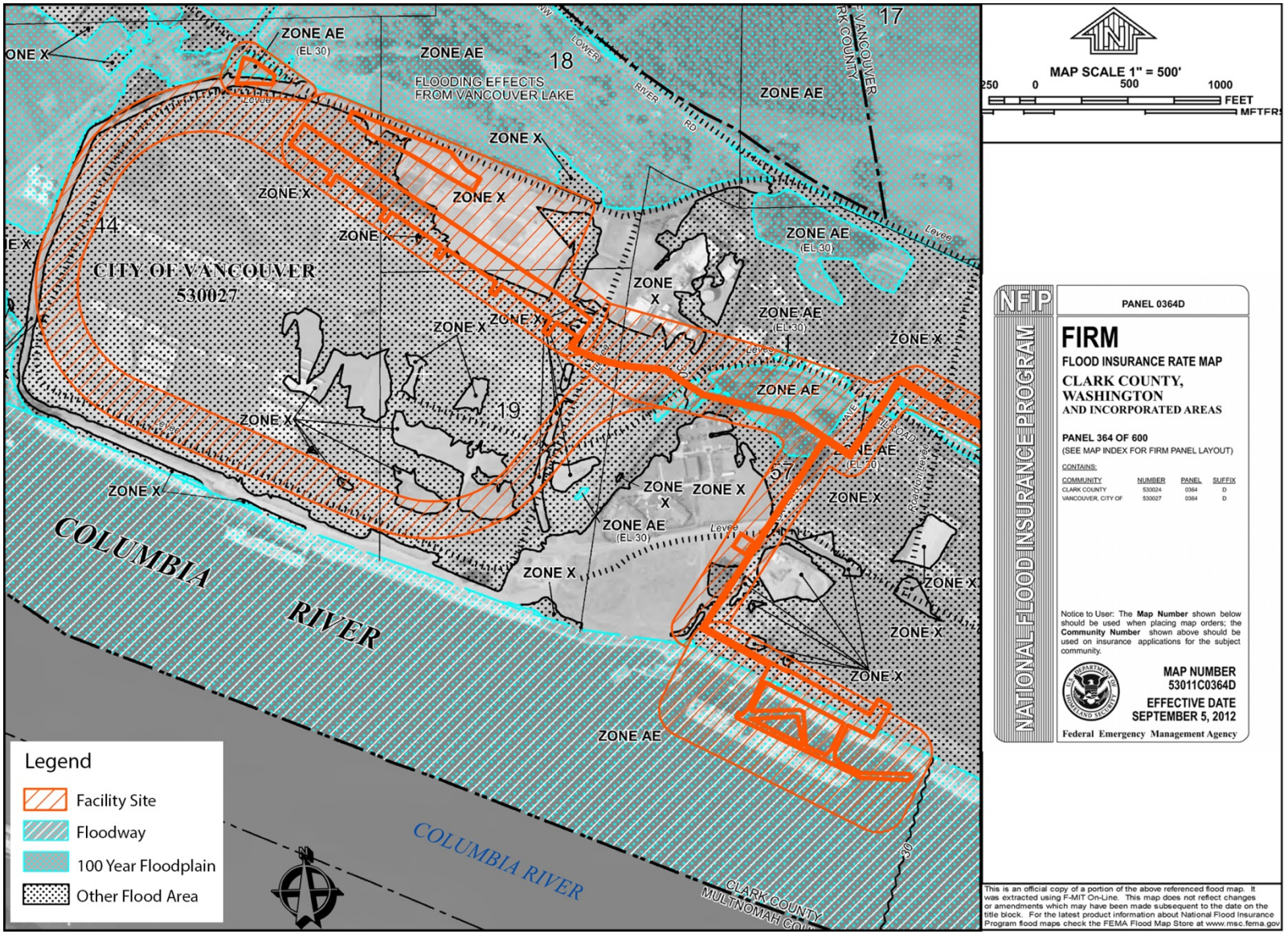

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Figure 3.3-2. Mapped Floodplains - East

3.3.3.2 Potential for Flooding and Protective Measures

Portions of the proposed pipeline route and improvements at existing berths 13 and 14 will be located within the 100-year floodplain. No fill is proposed within the 100-year floodplain, and there will be no potential to affect upstream or downstream properties through increases to the base flood elevation.

Where the pipeline route lies in the floodplain, the pipeline will be elevated aboveground. Because the floodplain is isolated from overland flows from the Columbia River it will not be subject to flowing water and no risk from floods is anticipated for this element. Regardless, the pipeline will be designed by a professional engineer to withstand potential impacts from flooding.

Berths 13 and 14 in Area 400 are existing pile-supported structures located in the Columbia River. The existing and planned improvements will be located with deck elevations above the 100-year flood elevation and have been (or will be) designed by a professional engineer to withstand the forces imposed by flooding conditions.

All or portions of the proposed structures located in Area 400 will be located in the 100-year floodplain. These include a dock transformer pad, control room/E-house and fire pump and foam building. These structures will be elevated so that the floor is at least 1 foot above the base flood elevation. They will also be anchored to resist movement and designed with utilities and other connections that are designed to withstand flood events consistent with the requirements of VMC 20.740.120 Frequently Flooded Areas.

3.3.4 Groundwater Resources

The hydrogeologic setting controls the availability, quantity, and quality of groundwater resources at the project site. This section presents an overview of the hydrogeologic units, potential impacts from the project, and mitigation options.

A hydrogeologic unit is any geologic unit that controls groundwater occurrence or the movement of groundwater based on the hydrologic properties of the material. Within the Portland Basin, eight hydrogeologic units have been identified (Swanson et al. 1993). These units are further subdivided based on regionally continuous contacts between units of different textures and hydrologic characteristics into two sedimentary subsystems (Upper Sedimentary Subsystem and Lower Sedimentary Subsystem) and an older rock subsystem. The very productive Upper Sedimentary Subsystem contains most water supply wells and is the primary aquifer system for drinking water. The Upper Sedimentary Subsystem is composed of unconsolidated material associated with Quaternary alluvium deposits, catastrophic flood deposits, and the Troutdale Formation. These units are composed of coarse-grained materials, predominantly sands and gravels, and are permeable and productive.

The relatively flat groundwater surface and flow direction along the banks of the Columbia River are influenced by tidal fluctuations, precipitation events, supply well pumping, and upstream dam releases. The effect of the relatively flat groundwater surface and the hydraulic connection of the aquifer to the Columbia River results in diurnal fluctuations of groundwater flow direction at the site. The aquifer response to river stage is slightly offset near the bank and decreases with distance from the river. When the river stage increases with high tide, groundwater flow direction is from the river into the aquifer. Conversely, when the river stage decreases with low

tide, groundwater flow direction is from the aquifer into the Columbia River. However, net groundwater flow is from the aquifer to the Columbia River.

Within the Facility site, groundwater quality has been impacted by the historical industrial operations that have occurred. Alcoa owned and operated an aluminum smelter and fabrication facility at the project site for approximately 55 years. Alcoa conducted a cleanup of the site and limited groundwater contamination is currently found within the site. The COCs identified at the site by Ecology include VOCs, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), cyanide, fluoride, and petroleum hydrocarbons. Multiple site investigations into the nature and extent of contamination at the site indicate that groundwater contamination occurred as a result of waste disposal activities on the site. The groundwater contamination detected in the vicinity of the East Landfill area includes trichloroethene above state and federally designated human health-based risk levels. The current cleanup action includes monitored natural attenuation that will continue until groundwater cleanup standards are achieved.

The site and surrounding areas are within the City's water service boundary. The City receives its water from the Orchards, Troutdale, and Sandy River Mudstone aquifers. The EPA designated the aquifers used by the City for drinking water as a sole-source aquifer in July 2006 (EPA 2006). The aquifer will continue to be the source of water supply as demands increase. The City has designated the entire area within the City's boundaries as a CARA, as specified by its Water Resources Protection Ordinance (VMC 14.26). The project site falls within this boundary. The ordinance requires minimum standards to protect critical aquifers, establishes compliance standards for business and industry to manage hazardous materials, and creates special protection areas around City wellheads. Section 3.3.5 discusses the City water supply and well locations.

3.3.4.1 Impacts

Municipally supplied water obtained from the City is planned to be the source of water for the site. The water will be obtained from the existing City water system; no new groundwater wells will be constructed to serve the Facility, either at the site or elsewhere. Therefore, there are no anticipated adverse impacts to existing ground water sources resulting from City supply of potable, process and emergency fire suppression water.

Some foundations and utility and pipeline excavations for the project may require dewatering of the excavations during the construction process. Groundwater extraction during construction will result in the temporary drawdown of groundwater in the areas immediately surrounding the work site. Because the excavations are shallow (the majority under 5 feet) the extraction of groundwater will have a negligible long-term effect on groundwater abundance and availability. Because of the presence of contaminated groundwater on the site, there is the potential that contaminated groundwater may be extracted during construction dewatering.

Groundwater that is pumped out of the excavations will be stored on site in mobile water tanks and analyzed and managed in accordance with local, state and federal regulations prior to reuse, infiltration or disposal. If conditions and water quality allow bypass of the mobile water tanks may occur. Potential options for management of groundwater from the excavations will depend on the chemical and physical qualities of the water and are expected to include:

- Discharge to surface areas for infiltration.

- Discharge to the stormwater system if the water meets the quality criteria per the construction stormwater permit issued for the project (see section 5.3).
- Discharge to the City's sanitary sewer if contaminants are present at concentrations that meet the City's criteria as regulated in the VMC 14.10.080.
- Collection and offsite disposal by a licensed commercial facility if contaminants are present at concentrations greater than the criteria for discharge to the sanitary or stormwater systems.

It is unlikely that the project's water withdrawals related to construction activities will have a direct effect on groundwater quantity, quality, and flow direction in the immediate area below the proposed facilities. Therefore, impacts to groundwater resources are considered negligible.

3.3.4.2 Mitigation

Disposal will be conducted in accordance with the stormwater permit issued for the project. If dewatering wells are necessary, well points used for construction dewatering will be completed in accordance with WAC 173-160 Minimum Standards for Construction and Maintenance of Wells. If groundwater extracted for construction dewatering is directed to the City's sanitary sewer it will be disposed in accordance with VMC 14.12 Discharge of Industrial Wastes to the Industrial Wastewater Pretreatment Facility.

3.3.5 Public Water Supplies

As stated above, the City receives its water from the Orchards, Troutdale, and Sandy River Mudstone aquifers. The City's water rights total 108 MGD. Current maximum day demands are approximately 55 MGD. Current source development efforts by the City allow the City to provide a current capacity without storage of 80.6 MGD. There is 24.5 million gallons of storage within the City's water supply and an additional two emergency interties with Clark Public Utilities (CPU).

The City uses its sources and reservoirs to satisfy all of the water demands on its system. The present municipal water supply has an additional 25.6 MGD of capacity above its current maximum day demand.

3.3.5.1 Proposed Water Usage

Water consumption at the Facility is anticipated to result in a maximum day demand of approximately 60 gpm. Water consumption consists of approximately 78,900 gpd of process water, and 8,500 gpd of domestic potable water, and 2,200 gpd of irrigation water during a maximum day demand. Additional information related to Facility water use is included in section 2.6 of this Application. The City has reviewed estimated water demands and provided a letter (Appendix E) confirming adequate source and distribution capacity to meet the water demands of the Facility.

3.3.5.2 Water Supply During Construction

Construction water will be purchased from the City; the uses include spraying roads for dust control, concrete curing, hydrostatic testing, miscellaneous construction support, and restroom facilities for an estimated construction and support crew of 250 people. The water demand during construction is conservatively estimated at 20,000 gallons per day, with a peak demand of approximately 500 gallons per minute. Water will be provided to the site through existing pipeline systems. The contractor will coordinate with the City for construction water and all

applicable regulations requiring backflow devices and metering of construction water. Additional information related to construction water is included in section 2.6 of this Application.

In addition to the average daily needs during construction, a minimum of 20 million gallons of water will be required for hydrostatic testing and flushing of the pipeline and tank facilities. Testing and commissioning will be sequenced to minimize the use of water for a single test. To the maximum extent possible, commissioning water will be utilized in multiple facilities to reduce water consumption. Water used for flushing and testing the tank and pipeline facilities will be treated and discharged to onsite stormwater facilities according to the discharge limits required in the State Construction General Stormwater Permit.

3.3.5.3 Future Conditions

The water demand for the Facility is assumed to be constant from year to year. The water use figures presented in the Application for site certification represent full build-out.

3.3.5.4 Impacts to Public Water Supplies

Based on the City's current excess source capacity described above in 3.3.5 of 25.6 MGD and excess water right of 53 mgd, the proposed Facility impact of approximately 87,400 gpd represents 0.3 percent of the available capacity. City-wide long-term growth is not anticipated to be affected by the water demands of this project.

A wellhead protection map is included in the preliminary stormwater report in Appendix F. The project is not located within a wellhead special protection area, defined by the City in VMC 14.26 as a 1,900-foot diameter around a City- or CPU-owned drinking water well. The closest City well to the project site is Water Station #3 located near Washington and 41st Street approximately 1.9 miles to the northeast of Area 300. The Port well #2 is located approximately 1.3 miles southeast of Area 300 near the United Grain Terminal. CPU maintains the South Lake Wellfield approximately 1.5 miles northeast of Area 300 near the intersection of Fruit Valley Road and NW 61st Street.

3.3.5.5 Mitigation Measures

Mitigation for the use of and impact on the public water system includes payment of system development charges, connection fees, and utility rates. These fees and rates are to support capital and operating expenses of the water system.

3.3.6 Private Water Supplies

The Clark County GIS wellhead protection mapping system was used to determine the existence of any wells in the vicinity of the Facility. This research identified five wells within 1 mile of the site. Two of the wells are classified as a Group B Public Water System. One is classified as a Group A Public Water System. The remaining two are classified as an unclassified Water System. All wells were identified as drilled wells. Where depth information was available, the two wells located east of the site were drilled at depths of 40 to 50 feet, while the wells to the west were drilled at depths of 130 to 135 feet. There is an additional Port well (PW-20) located at Terminal 5, which has been used in the past for water needs during construction projects at Terminal 5. This well yields a flow of between 600 and 1,500 gallons per minute.

3.3.6.1 Impacts

The Facility will purchase its water supply from the City. The development of new water sources or wells is not required for this Facility. Relative to the existing system demands and total City water rights, the project is not anticipated to have an effect upon the private water supplies in the vicinity of the project site.

Section 3.4 – Habitat, Vegetation, Fish, and Wildlife

WAC 463-60-332
Natural environment - Habitat, vegetation, fish and wildlife.

The application shall describe all existing habitat types, vegetation, wetlands, fish, wildlife, and in-stream flows on and near the project site which might reasonably be affected by construction, operation, decommissioning, or abandonment of the energy facility and any associated facilities. For purposes of this section, the term "project site" refers to the site for which site certification is being requested, and the location of any associated facilities or their right of way corridors, if applicable. The application shall contain the following information:

(1) Assessment of existing habitats and their use. The application shall include a habitat assessment report prepared by a qualified professional. The report shall contain, but not be limited to, the following information: (a) A detailed description of habitats and species present on and adjacent to the project site, including identification of habitats and species present, relative cover, density, distribution, and health and vigor; (b) Identification of any species of local importance, priority species, or endangered, threatened, or candidate species that have a primary association with habitat on or adjacent to the project site; (c) A discussion of any federal, state, or local special management recommendations, including department of fish and wildlife habitat management recommendations, that have been developed for species or habitats located on or adjacent to the project area;

(2) Identification of energy facility impacts. The application shall include a detailed discussion of temporary, permanent, direct and indirect impacts on habitat, species present and their use of the habitat during construction, operation and decommissioning of the energy facility. Impacts shall be quantified in terms of habitat acreage affected, and numbers of individuals affected, threatened or removed. The discussion of impacts shall also include: (a) Impacts to water quality, stream hydrology and in-stream flows; (b) Impacts due to introduction, spread, and establishment of noxious or nonnative species; (c) Impacts and changes to species communities adjacent to the project site; (d) Impacts to fish and wildlife migration routes; (e) Impacts to any species of local importance, priority species, or endangered, threatened, or candidate species; (f) Impacts due to any activities that may otherwise confuse, deter, disrupt or threaten fish or wildlife; (g) An assessment of risk of collision of avian species with any project structures, during day and night, migration periods, and inclement weather; (h) An assessment for the potential of impacts of hazardous or toxic materials spills on habitats and wildlife.

(3) Mitigation plan. The application shall include a detailed discussion of mitigation measures, including avoidance, minimization of impacts, and mitigation through compensation or preservation and restoration of existing habitats and species, proposed to compensate for the

impacts that have been identified. The mitigation plan shall also: (a) Be based on sound science; (b) Address all best management practices to be employed and setbacks to be established; (c) Address how cumulative impacts associated with the energy facility will be avoided or minimized; (d) Demonstrate how the mitigation measures will achieve equivalent or greater habitat quality, value and function for those habitats being impacted, as well as for habitats being enhanced, created or protected through mitigation actions; (e) Identify and quantify level of compensation for impacts to, or losses of, existing species due to project impacts and mitigation measures, including benefits that would occur to existing and new species due to implementation of the mitigation measures; (f) Address how mitigation measures considered have taken into consideration the probability of success of full and adequate implementation of the mitigation plan; (g) Identify future use of any manmade ponds or structures created through construction and operation of the facility or associated mitigation measures, and associated beneficial or detrimental impacts to habitats, fish and wildlife; (h) Discuss the schedule for implementation of the mitigation plan, prior to, during, and post construction and operation; (i) Discuss ongoing management practices that will protect habitat and species, including proposed monitoring and maintenance programs; (j) Mitigation plans should give priority to proven mitigation methods. Experimental mitigation techniques and mitigation banking may be considered by the council on a case-by-case basis. Proposals for experimental mitigation techniques and mitigation banking must be supported with analyses demonstrating that compensation will meet or exceed requirements giving consideration to the uncertainty of experimental techniques, and that banking credits meet all applicable state requirements.

(4) Guidelines review. The application shall give due consideration to any project-type specific guidelines established by state and federal agencies for assessment of existing habitat, assessment of impacts, and development of mitigation plans. The application shall describe how such guidelines are satisfied. For example, wind generation proposals shall consider Washington state department of fish and wildlife Wind Power Guidelines, August 2003, or as hereafter amended. Other types of energy facilities shall consider department of fish and wildlife Policy M-5002, dated January 18, 1999, or as hereafter amended.

(5) Federal approvals. The application shall list any federal approvals required for habitat, vegetation, fish and wildlife impacts and mitigation, status of such approvals, and federal agency contacts responsible for review.

(Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-332, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-332, filed 11/6/92, effective 12/7/92.)

Section 3.4 Habitat, Vegetation, Fish, and Wildlife

The purpose of this section is to document the habitat, vegetation, fish, and wildlife resources that could be affected by the construction, operation, decommissioning, or abandonment of the proposed project. A biological resources report, which provides additional detail about biological resources present in the vicinity of the project, including detailed habitat descriptions, species life histories, and impacts assessments, is included as an appendix to this application (Appendix H.1).

Figure 3.4-1 is an overview of the biological resources in the study area and of the important habitat areas and features that are referred to in this section. Because mappable biological resources (habitat types, wetlands, surface waters) at the project site are limited, this analysis did not include detailed mapping of biological resources.

3.4.1 Methodology

3.4.1.1 Study Area

The assessment of biological resources examined the project study area, defined as all of the areas that could be affected directly or indirectly by the proposed project, and was conducted at three scales.

Project Site

Most of the analysis is focused at the project site scale, where effects to biological resources have the greatest potential to occur. The project site is limited to the proposed physical footprint of the project. Ground-disturbing activities associated with project construction will occur in the area within the project footprint, and may result in impacts to biological resources.

Project Vicinity

The project vicinity includes parcels adjacent to the proposed project site as well as biologically important features within approximately 1 mile of the site. Examples of features included within the project vicinity biological area of potential effect (BAPE) include the wetland complexes associated with Vancouver Lake and the Shillapoo National Wildlife Refuge (NWR), the CRWMB, the Port's Parcel 1A and Parcel 2 wetland mitigation sites, and wetlands and agricultural habitats on Port Parcel 3. Biological resources present within the project vicinity would not be impacted directly by the proposed project, but may be subject to indirect effects associated such as elevated noise from construction or operation, or by issues related to water quality.

Project Shipping Prism

Finally, the analysis included a third scale – the project's shipping prism, defined as the area in which effects associated with increased shipping could occur. This BAPE includes the entirety of the Lower Columbia River downstream of the site, as well as marine habitat off the coasts of Washington, Oregon, and California, out to the extent of the Exclusive Economic Zone (EEZ), a distance of 200 miles offshore. Biological resources that are outside the immediate project site and vicinity could be affected by the effects associated with increased shipping traffic such as potential for ship wake stranding of fish, bank erosion from ship propeller (prop) wash, transport of exotic species, ballast water issues, and/or direct injury as a result of ship strikes (potentially including marine mammals.

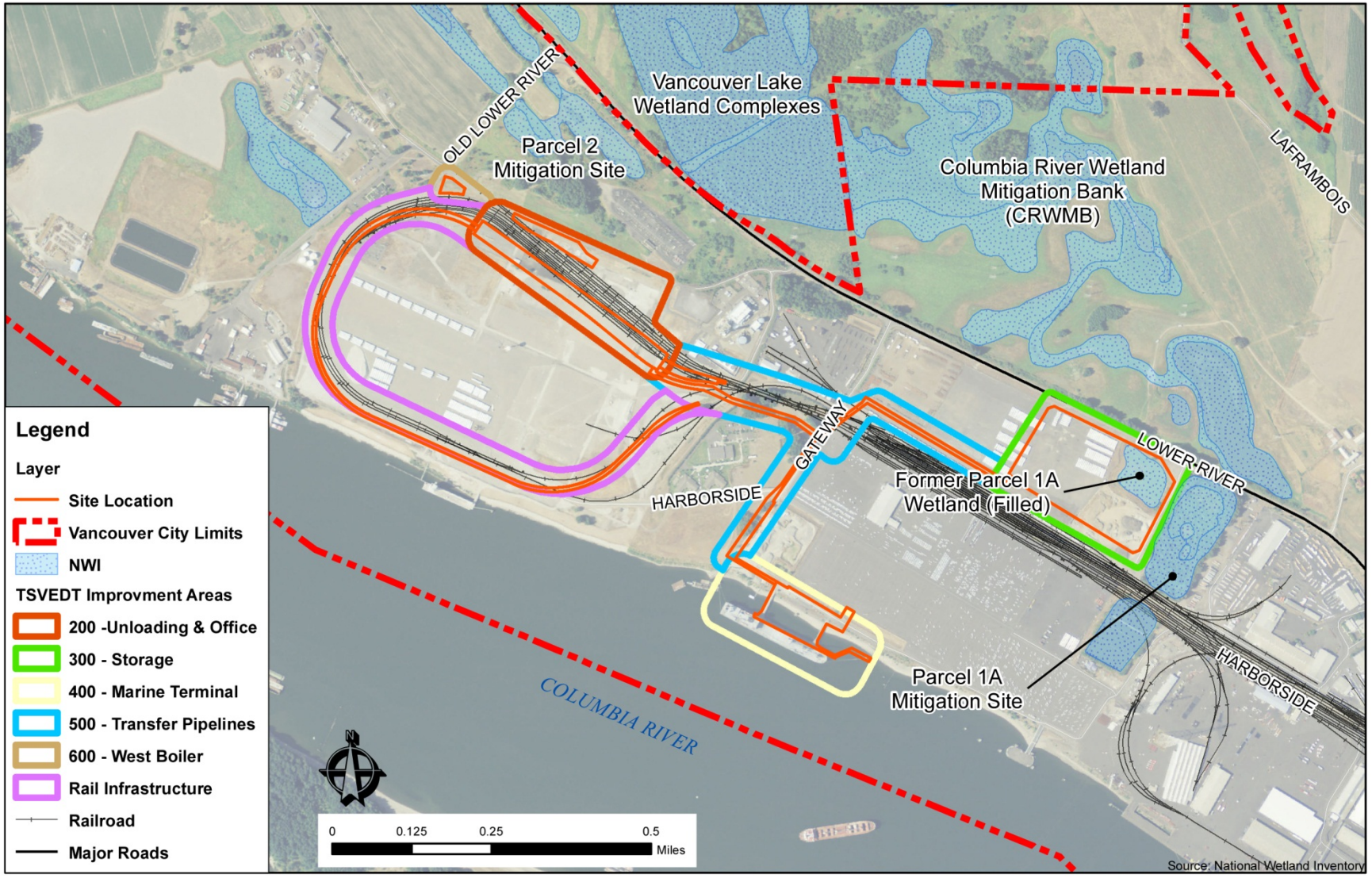

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Figure 3.4-1. Biological Resource Overview

3.4.1.2 Methodology

Project scientists coordinated with regulatory agency biologists, conducted a review of existing literature and reference material, and conducted field investigations at the project site.

Information regarding the potential presence of special status plant species was obtained from the USFWS web site (USFWS 2013), and from a review of the Washington Natural Heritage Program (WNHP) database (WNHP 2013a). A list of species documented as occurring within the project vicinity, or with the potential to occur, was generated based on the potential presence or absence of appropriate habitat for each species.

Information regarding the potential presence of special status fish and wildlife species was obtained from the USFWS web site (USFWS 2013) and the NMFS web site (NMFS 2013) on June 27, 2013. Additional information came from data provided by WDFW's two on-line databases, Priority Habitat and Species (PHS) on the Web (WDFW 2013a) and Salmonscape (WDFW 2013b), as well as from the 2008 PHS list (WDFW 2008).

Information regarding the potential presence of wetlands at the project site included reviews of National Wetlands Inventory (NWI) (USFWS 1989) and soils data (NRCS 2013) and review of recent and historic permitting documentation.

Biologists from BergerABAM visited the site on May 28 and June 27, 2013 to delineate the OHWM of the Columbia River, conduct a riparian habitat assessment and tree inventory, and assess terrestrial site conditions throughout the project site.

3.4.2 Habitat and Vegetation

Habitat and vegetation resources are addressed together in this section of the document, as habitat function and suitability is largely dictated by the species composition of the vegetation community. This section describes the habitat types that are present at the project site and within the vicinity and shipping prism and the special status plant species that have the potential to occur within the project site or vicinity. The shipping prism does not provide habitat for any special status plant species, and there are no special status plant species known to occur within the shipping prism, and therefore an analysis of impacts to special status plants in the shipping prism is not necessary.

3.4.2.1 Existing Conditions

Habitat and Vegetation

Project Site – Terrestrial vegetation and wildlife habitat at the project site is of limited quality and quantity. As a result of past development and cleanup activities, there is very little vegetation or wildlife habitat present on the upland portions of the site. Most of the project site has been filled, paved, and/or capped in association with previous development and cleanup activities. Terrestrial habitat at the project site can be described according to the following subcategories.

- *Unvegetated Industrial* – The unvegetated industrial habitat type comprises most of the project site, and consists of unvegetated areas that are completely developed with industrial infrastructure such as buildings, rail lines, roads, and other paved and graveled surfaces. These areas are devoid, or nearly devoid, of vegetation and largely impervious. They provide little to no wildlife habitat function.

- *Ruderal Upland Grass/Forb* – Upland vegetation within the ruderal upland grass/forb habitat type is primarily limited to small patches of grasses and a mix of native and non-native weedy herbaceous species including colonial bentgrass (*Agrostis capillaris*), rabbitfoot clover (*Trifolium arvense*), white sweet clover (*Melilotus alba*), and Canada thistle (*Cirsium arvense*). [12] These areas provide very little vegetation or wildlife habitat function, as they are small, isolated patches of vegetation with little potential or opportunity to provide significant function.
- *Riparian* – The extent of riparian habitat within the project site is very limited, as the bank drops steeply from the upland portion of the property down to the river, and the upland extent of functional riparian habitat is limited by existing impervious surfaces. The riparian area within the proposed project site is mostly devoid of vegetation, with the exception of scattered trees and vegetation below the top of the bank. Impervious surfaces include existing roadways, material laydown areas, compacted soil, access trestles, and stormwater facilities. Vegetation within the functional portion of the riparian habitat at the site consists primarily of small-diameter black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), willows (*Salix* spp.), non-native false indigo bush (*Amorpha fruticosa*), and Himalayan blackberry (*Rubus armeniacus*). The bank is armored with riprap, and above the riprap, there is a narrow band of ruderal grass/forb habitat.

  The terrestrial portion of the riparian buffer most likely provides a small amount of habitat for wildlife species that can tolerate a wide range of habitat conditions and are conditioned to living in industrialized environments (e.g., ground squirrels, rabbits, opossum, raccoons, coyote, and common rodent species). In addition to these terrestrial mammals, the riparian buffer likely provides a small amount of seasonal foraging habitat for resident and migratory songbirds and shorebirds, as well as raptors.

  Riparian habitats are defined by WDFW as a priority habitat for the important hydrologic, water quality, and habitat functions they provide (WDFW 2008). However, due to the highly altered nature of the riparian habitat at the site (i.e. riprap armored bank, minimal riparian vegetation, lack of structural complexity), riparian habitat at the project site does not provide any significant hydrologic, water quality or habitat functions.
- *Upland Cottonwood Stands* – Small upland stands of black cottonwood are present on the County Jail Work Center (Jail Work Center) property adjacent to the project site. These are small stands dominated almost exclusively by a closed canopy black cottonwood overstory, with occasional Oregon ash (*Fraxinus latifolia*) and limited understory vegetation. These stands are isolated from other forested areas in the vicinity by industrial infrastructure including rail tracks, roads, fences, and other paved surfaces. The isolated nature of these stands limits their habitat function and values. However, they do likely provide refuge and foraging habitat for migratory songbirds and small mammals as well as perching and nesting habitat for raptors.

[12] Definition of ruderal: Weedy vegetation growing on compacted, plowed, or otherwise disturbed ground and showing a preference for this type of habitat. Source: http://www.biology-online.org/dictionary/Ruderal

Project Vicinity – While there is little habitat present at the project site, there are several areas of relatively higher quality habitat adjacent to the project site, and within the immediate vicinity. These include emergent and forested wetland and forested habitats, and agricultural lands.

- *Wetlands* – The project site is located within the Vancouver Lake Lowlands, an area historically subject to seasonal flooding from Vancouver Lake and the Columbia River. Human activities, including dam construction, floodplain fills, diking, and streambank armoring, have significantly altered the hydrology of the Columbia River. These activities also resulted in a significant reduction in the quantity and quality of wetland habitats in the Vancouver Lake Lowlands. However, there are still significant portions of the Vancouver Lake Lowlands that remain influenced by seasonal inundation and high groundwater tables, and these wetland habitats provide important water quality, hydrology, and habitat function. The highest quality forested and emergent wetland habitat in the project vicinity is associated with the southern end of Vancouver Lake. The CRWMB, an approximately 154-acre wetland mitigation bank established in 2010, is located at the southern extent of this wetland complex. These wetlands provide high quality seasonally inundated habitats that most closely resemble the original hydrologic and wetland habitat functions of the Vancouver Lake Lowlands.

  There are also two wetland mitigation sites in the vicinity of the project site. These sites were created and/or enhanced from upland sites, as compensatory mitigation for wetland impacts. The Parcel 1A wetland mitigation site, located immediately east of Parcel 1A, was created in 1994. The site is an approximately 7.9-acre depressional, palustrine, forested wetland, vegetated with mature black cottonwood trees and a variety of native shrubs and herbaceous species. The fifth and final year of monitoring was conducted in 2001 (David Evans and Associates 2001). This site is owned and maintained by the Port.

  The Parcel 2 wetland mitigation site, also owned and maintained by the Port, is an approximately 16.4-acre mitigation site, situated on an approximately 31.3-acre parcel north of the existing Terminal 5 site. The mitigation site was established in 2000, and received final regulatory approval and release from further monitoring obligation from USACE in 2007. The site is currently a mosaic of forested, scrub-shrub, and emergent vegetation.

  Several emergent wetlands also exist on Port parcels 3, 4, and 5, west of the Terminal 5 site. Because of their limited structural diversity, these wetlands primarily provide water quality functions but likely also provide some wildlife habitat functions.

  Freshwater wetlands are a WDFW priority habitat, and they provide important habitat functions in addition to water quality and hydrologic functions. Wetlands can provide habitat for several species of waterfowl (i.e., mallard ducks, pintail, wigeon, merganser, gadwalls, green-winged teal, Canada goose, and snow goose), great blue heron, sandhill crane, and a variety of migratory songbird species. Mammals typically found in wetland habitats in the vicinity include beaver, raccoon, and coyote. Various reptile and amphibian species are frequently encountered as well.

- *Riparian* – Riparian habitats throughout most of this industrial reach of the Columbia River are heavily armored, with little native vegetation and little habitat function. While most of the shoreline within the Port is armored, some shoreline areas contain sandy banks, scattered rock, and large woody debris. According to the natural resources inventory management plan completed for the Port in 2004, the shoreline area located at Berth 10 (east of the Facility)

consists of sandy shorelines with willows and cottonwoods colonizing portions of the riprap bank (Vigil Agrimis, Inc. and Herrera Environmental Consulting 2004). This stretch of sandy shoreline provides higher levels of habitat functions compared to the armored shorelines within the Port. In addition, there is an existing aquatic habitat enhancement site approximately 350 feet downstream of the Berth 14 trestle and the Port plans to place large woody debris upstream of the project site as part of the mitigation efforts for the WVFA project.

- *Upland Cottonwood Stands* – Several upland stands of black cottonwood are present throughout the immediate project vicinity. These are small stands dominated almost exclusively by black cottonwood and Oregon ash, typically with limited understory vegetation. These stands are frequently located near wetland and aquatic habitats and, as such, likely provide higher quality habitat than the upland cottonwood stands at the project site. The stands near wetland and aquatic habitats provide refuge and foraging habitat for migratory songbirds and small mammals, perching and nesting habitat for raptors, and cover and foraging habitat for upland mammals.
- *Agricultural Lands* – The Port's Parcel 3, located east and northeast of the Terminal 5 site, is leased for agricultural activities. Parcel 3, an approximately 517-acre parcel, is used mostly for row crops and pasture for horses and cattle. A few remnant sloughs, oriented roughly parallel to the Columbia River, are present in the eastern portion of the parcel, and the northernmost of these sloughs is hydrologically connected to the Parcel 2 wetland mitigation site. A cottonwood-dominated riparian forest borders the river, inland from a sandy beach and levee. Several emergent wetlands have been delineated on this parcel. These lands provide significant foraging habitat for geese and sandhill cranes as well as for other migratory birds and for a variety of small mammal species.

Project Shipping Prism – There are no terrestrial vegetation or terrestrial habitat resources present in the Project Shipping Prism.

Special Status Plant Species

This section evaluates the potential for special status plant species to occur within the project study area. Special-status species are defined for purposes of this report as those identified for protection under federal or state laws. They are listed under the federal Endangered Species Act of 1973 (ESA); plant species identified as endangered, threatened or sensitive by the Washington Natural Heritage Program (WNHP); and species identified as PHS, species of concern, or species of greatest conservation need (SGCN) by WDFW.

At the federal level, a listing of species of concern is for advisory and management purposes only, as there may be insufficient information to support listing. The category of threatened is applied to plants that are likely to become endangered within the near future if factors contributing to their population decline or habitat degradation or loss continue. Plants listed as federally threatened or endangered are protected under the ESA, which is administered by the USFWS.

State-listed threatened or endangered plant species are not protected by state legislation or regulation, but are listed as threatened or endangered to assist with agency management and decision-making. Although the WNHP places a management priority on the preservation of high-quality native plant communities, no such communities exist on the property.

A review of the WNHP database did not identify any documented occurrences of any special status plant species within the township/range/sections in which the project site is located (WNHP 2013a). No special status plant species have been documented at the project site and it does not provide suitable habitat for any special status plant species. The project vicinity does provide several higher-functioning wetland, riparian, and aquatic habitats as well as upland and riparian forested habitats that may provide potentially suitable habitat for one or more special status plant species, but plants within these habitats would be unaffected by the proposed project.

Table 3.4-1 summarizes the special status plant species known to, or with the potential to, occur at the project site or within the vicinity based on an evaluation of the presence or absence of species-appropriate habitat at the project site and vicinity scales.

Although a number of protected species plants have the potential to occur in the vicinity of the project, project site conditions do not provide any suitable habitat for any of the species listed.

Table 3.4-1. Special Status Plant Species and Their Potential to Occur within the Project Site or Vicinity

Species	Federal	State	Potential for Occurrence	
	ESA Listing Status[1]	State Listing Status[2]	Project Site	Project Vicinity
Oregon Bolandra (*Bolandra oregana*)	None	SC	Low – no suitable habitat on site	Low – riparian species requiring deep shade
Dense Sedge (*Carex densa*)	None	ST	Low – no suitable habitat on site	Low – peripheral species of intertidal marshlands
Golden Paintbrush (*Castilleja levisecta*)	FT	SE	Low – no suitable habitat on site	Low – rare species of open grasslands in Puget trough on glacial outwash
Tall Bugbane (*Cimicifuga elata*)	FSC	SS	Low – no suitable habitat on site	Low – understory species of lowland forests
Few-Flowered Collinsia (*Collinsia sparsiflora* var. *brucea*)	None	SS	Low – no suitable habitat on site	Low - thin soils over basalt on a variety of slopes in Columbia Gorge.
Clackamas Corydalis (*Corydalis aquae-gelidae*)	FSC	SS	Low – no suitable habitat on site	Low – mid-elevation riparian species of hemlock and fir forests.
Oregon Coyote-Thistle (*Eryngium petiolatum*)	None	ST	Low – no suitable habitat on site	Moderate – rare species of wet prairies and low ground
Western Wahoo (*Euonymus occidentalis*)	None	ST	Low – no suitable habitat on site	Low – shaded forest understory species
Western Sweetvetch (*Hedysarum occidentale*)	None	ST	Low – no suitable habitat on site	Low – high elevation species
Water Howellia (Howellia aquatilis)	FT	ST	Low – no suitable habitat on site	Moderate – aquatic species of small vernal ponds
Nuttall's Quillwort (Isoetes nuttallii)	None	SS	Low – no suitable habitat on site	Low – Terrestrial species of wet ground, seeps, and in mud near vernal pools.
Smooth Goldfields (*Lasthenia glaberrima*)	None	SE	Low – no suitable habitat on site	Moderate – rare species of wet stream banks and vernal pools.
Torrey's Peavine (*Lathyrus torreyi*)	FSC	FT	Low – no suitable habitat on site	Low – open areas within Douglas fir dominated sites
Bradshaw's Lomatium (*Lomatium bradshawi*i)	FE	SE	Low – no suitable habitat on site	Moderate – wet, seasonally flooded prairies and grasslands near creeks and small rivers.
Branching Montia (*Montia diffusa*)	Non	SS	Low – no suitable habitat on site	Low – moist Douglas-fir forests
California Broomrape (*Orobanche californica ssp. grayana*)	None	X	Low – no suitable habitat on site	Low – Thought to be extirpated from WA.

Species	Federal	State	Potential for Occurrence	
	ESA Listing Status[1]	State Listing Status[2]	Project Site	Project Vicinity
Western Yellow Oxalis (*Oxalis suksdorfii*)	None	ST	Low – no suitable habitat on site	Low - meadows and moist woods, rare in Clark County
Western False Dragonhead (*Physostegia parviflora*)	None	SS	Low – no suitable habitat on site	Low – wet to mesic prairies, damp thickets, and banks of streams and ponds
Wheeler's Bluegrass (*Poa nervosa*)	None	SS	Low – no suitable habitat on site	Low - rock outcrops, cliff crevices, and occasionally in talus
Great Polemonium (*Polemonium carneum*)	None	ST	Low – no suitable habitat on site	Low - woody thickets, open and moist forests, prairie edges, roadsides, fence lines
Idaho Gooseberry (*Ribes oxyacanthoides* ssp. *irriguum*)	None	ST	Low – no suitable habitat on site	Low – streams and canyons in eastern Washington.
Soft-leaved willow (*Salix sessilifolia*)	None	SS	Low – no suitable habitat on site	Moderate – Variety of lowland riparian habitats
Hairy-Stemmed Checkermallow (*Sidalcea hirtipes*)	None	ST	Low – no suitable habitat on site	Moderate – prairie fragments along fencerows and openings along drainages
Western Ladies Tresses (*Spiranthes porrifolia*)	None	SS	Low – no suitable habitat on site	Moderate – Wet meadows, along streams, in bogs, and on seeps. Have previously been found on the Port's Parcel 3
Hall's Aster (*Symphyotrichum hallii*)	None	ST	Low – no suitable habitat on site	Moderate – dry to moist prairies in valleys and plains.
Small-Flowered Trillium (*Trillium parviflorum*)	None	SS	Low – no suitable habitat on site	Moderate – moist forested habitats dominated by hardwoods
California Compassplant (*Wyethia angustifolia*)	None	SS	Low – no suitable habitat on site	Moderate – grasslands, meadows, and other open habitats

1. ESA Classifications: FE = federal endangered; FT = federal threatened low – no suitable habitat on site; FSC = species of concern; FP = federal proposed; FC = federal candidate.
2. State Status: SE = state endangered; ST = State threatened; SS = State Sensitive; X = possibly extinct or extirpated;
Source: WNHP 2012

3.4.2.2 Impacts

Construction

The primary effect to terrestrial habitat and vegetation at the project site will be the direct, permanent removal of vegetation during construction of the terrestrial components of the project. There is very little terrestrial vegetation or wildlife habitat present at the project site. Most of the site has been filled, paved, and/or capped in association with previous development and cleanup activities. What little natural vegetation is present is small and isolated, and/or significantly disturbed from its natural condition. As such, construction of the proposed project will have little direct impact to terrestrial vegetation and wildlife habitat.

Construction of the upland portion of the project will occur almost exclusively within the unvegetated industrial habitat type. This vegetation type provides little or no wildlife habitat function, and direct permanent impacts to this vegetation will not result in any impacts to vegetation or habitat resources.

Approximately 42,000 square feet of ruderal upland grass/forb habitat will be permanently impacted by construction in Area 200 related to the office building and Area 500 related to portions of the pipeline. These areas provide very little habitat function because of their isolated and disturbed nature. Impacts to ruderal upland grass/forb habitat will not result in any significant impacts to vegetation or habitat resources.

Construction of portions of the pipeline will result in direct permanent impact to approximately 6,300 square feet of a small, isolated upland cottonwood stand north of the Jail Work Center. This stand contains approximately 273 trees, 171 of which are permitted for removal from 1.1 acres of the stand for the construction of the proposed construction of a CPU substation adjacent to that location (BergerABAM, 2012). These areas are primarily grass and weedy herbaceous vegetation, with approximately 25 cottonwood and pine trees. These trees provide only moderate habitat function because of their isolated nature and previously approved development.

While the proposed pipeline will pass through a portion of the riparian area, this will occur primarily in an unvegetated portion of the riparian area. Construction of the pipeline will result in the removal of approximately 4,250 square feet of ruderal upland grass/forb habitat near the marine terminal in Area 400, although no high quality vegetation will be removed and riparian function will not be affected. Vegetation within the riparian area consists primarily of small-diameter black cottonwood (*Populus trichocarpa*) and willows (*Salix* spp.), and non-native false indigo bush (*Amorpha fruticosa*), and Himalayan blackberry (*Rubus armeniacus*). No riparian trees or vegetation will be removed, and no impacts to bank margin habitat are anticipated.

The proposed project would not result in any significant temporary impacts to vegetation or habitat resources.

Construction of the proposed project would not result in any direct or indirect impacts to vegetation or terrestrial habitat resources at either the project vicinity scale, nor within the shipping prism. Construction-related impacts to vegetation will be limited to the direct, permanent impacts to on-site vegetation associated with project construction. In general, construction of the proposed project will have only minor effects to terrestrial vegetation and wildlife habitat.

Operation

Terrestrial vegetation and wildlife habitats will not be affected significantly by any potential water quality impacts associated with operation of the proposed project. Terrestrial habitats that would remain at the project site post-construction could potentially be affected by an increased potential for spills or leaks. A spill to surface water would not be likely to affect terrestrial vegetation or wildlife habitats.

At the project vicinity and project shipping prism scales, terrestrial habitat and vegetation resources are unlikely to be affected by the proposed project. These terrestrial resources would not be directly or indirectly affected by any aspect of operations.

3.4.2.3 Mitigation Measures

The project will implement several impact minimization measures and BMPs to minimize the potential for impacts to terrestrial habitats and vegetation.

Direct Habitat Modification

The proposed project has been designed to avoid and/or minimize impacts to biological resources to the greatest extent possible. The upland facilities associated with the project have been located on developed portions of an existing industrial site, which in its current state provides very little habitat function and very little native vegetation. By siting the project in a developed location, impacts to native terrestrial habitats and native species of vegetation, including special status species, have been avoided.

Ground disturbance and vegetation removal will be limited to the amount necessary to construct the project, and construction fencing will be used to protect existing vegetation to be retained. The project will install urban landscaping including trees and shrubs in Areas 200 and 300. These landscaped areas will provide wildlife habitat typical in an urban environment.

These impact minimization measures and BMPs fully mitigate for the direct habitat modification effects associated with the project.

Operational Water Quality Impacts

Terrestrial habitats at the project site could potentially be affected by an increased potential for spills or leaks.

Operations at the site will be governed by an SPCC plan (Appendix B.2), which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

These impact minimization measures and BMPs fully mitigate for the operational water quality effects associated with the project.

3.4.3 Fish

3.4.3.1 Existing Conditions

Baseline Habitat Conditions

In general, the environmental baseline conditions for fish habitat within the reach of the Columbia River that flows through the project site are typical of those associated with an urbanized and industrial reach of the Columbia River. At the watershed scale, the natural fluvial processes of the river have been altered dramatically. The main channel of the river is maintained as a navigation channel for deep draft shipping traffic, limiting the potential for any dynamic migration of the river thalweg. In addition, dam construction and streambank armoring throughout the watershed have limited floodplain connectivity and greatly reduced the quantity and quality of available backwater and off-channel habitats.

Project Site – At the project site scale, the entire streambank has been armored with riprap, and the entire portion of the site that is above OHWM has been isolated from the historic floodplain. A narrow band of vegetation, primarily small-diameter black cottonwood, willows, and non-native false indigo bush and Himalayan blackberry, is established in and immediately above the riprapped slope. Above this vegetated habitat, there is a narrow band of ruderal grass/forb habitat. The low quality and quantity of riparian habitat at the site provides very little aquatic habitat function.

Water quality conditions at the site are generally appropriate for aquatic life. While this reach of the Columbia River within the action area is not identified on the Ecology 2008 303(d) list for elevated water temperatures (Ecology 2008), data published by the USGS in 2012 indicate that summer water temperatures downstream of Bonneville Dam routinely exceed 70°F (Tanner et al. 2012). These temperatures are higher than the water quality criterion for temperature than would likely apply in the project area. The reach of the lower Columbia River in the vicinity of the project site also has several areas listed on the 2008 Ecology 303(d) list for chemical- and nutrient-related contamination (Ecology 2008).

Project Vicinity – At the project vicinity scale, in-stream habitat complexity is limited, and there is no overhanging vegetation. As part of the WVFA project, some large woody debris will be installed along the shoreline of Terminal 4 just upriver from the project site. Sediments at the project site are predominantly fine-grained, which is the natural condition for the lower reaches of a large river. No substrate present is adequate for salmonid spawning. Below the riprapped streambank, there is an area of gradual transition to deep water that provides some shallow water nearshore habitat, which many juvenile species of fish prefer. However, the lack of any riparian vegetative cover and limited in-stream structural diversity limits the function of this nearshore habitat.

Project Shipping Prism – At the scale of the project's shipping prism, the Lower Columbia River and adjacent marine habitats provide high quality habitat for all life stages of Pacific salmon and other anadromous fish, as well as for other freshwater and marine species.

In general, the reach of the Columbia River that is within the project site, vicinity, and shipping prism, provides aquatic habitat conditions suitable as a migratory corridor for several species of native Columbia River fish including several native salmonids, trout, sturgeon, lamprey, minnows, and eulachon. Several non-native fish species are also present throughout the Lower

Columbia River. Several of these non-native species are present in numbers that may affect native fish populations.

Special Status Fish Species

The portion of the Columbia River that is within the project site, vicinity, and shipping prism represents documented and/or potentially suitable habitat for several special-status fish species, including species and critical habitats listed or proposed for listing under the federal ESA (NMFS 2013, USFWS 2013), Washington state-listed species, and WDFW priority species and SGCN (WDFW 2008). In addition, the Columbia River has been designated critical habitat for 13 ESU/DPS of Columbia River salmon, steelhead, and bull trout, and has been proposed for designation for Lower Columbia River coho salmon.

Information regarding the documented or potential presence of special status fish species was obtained from species lists maintained by USFWS (USFWS 2013) and NMFS (NMFS 2013) and data from WDFW's two on-line databases, PHS on the Web (WDFW 2013a) and Salmonscape (WDFW 2013b).

The biological resources report (Appendix H.1) lists the special status fish species known to, or with the potential to, occur at the project site, within the vicinity, and/or within the project's shipping prism. The report discusses each species' life history, listing status, and potential to occur within the project site or vicinity based on an evaluation of the presence or absence of appropriate habitat for it at the project site and vicinity scales. Table 3.4-2 summarizes this information.

3.4.3.2 Impacts

Construction

Construction of the in-water and overwater portions of the proposed dock improvements has the potential to directly and permanently affect fish habitat at the project site through direct modification of aquatic habitats associated with the new pile footprints and a new overwater structure. Fish habitat both at the project site and within the project vicinity also could be temporarily affected by the potential for temporarily reduced water quality conditions during construction and the generation of temporarily elevated levels of underwater and terrestrial noise during pile installation. At the scale of the shipping prism, fish and fish habitat would not be directly or indirectly affected by project construction.

Table 3.4-2. Special-status Fish Species and Their Potential to Occur within the Project Area

Species	ESU/DPS[1]	Federal		State			Potential for Occurrence	
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site and Vicinity	Project Shipping Prism
Salmon and Trout								
Bull trout (*Salvelinus confluentus*)	Columbia River DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
Chinook salmon (*Oncorhynchus tshawytscha*)	Lower Columbia River ESU	FT	Designated	SC	1, 2, 3	N	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
	Upper Willamette River ESU	FT	Designated	SC	1, 2, 3	N	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
	Upper Columbia River spring-run ESU	FE	Designated	SC	1, 2, 3	N	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
	Snake River spring/ summer-run ESU	FT	Designated	SC	1, 2, 3	N	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
	Snake River fall-run ESU	FT	Designated	SC	1, 2, 3	N	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
Chum salmon (*Oncorhynchus keta*)	Columbia River ESU	FT	Designated	SC	1, 2, 3	N	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
Coho salmon (Oncorhynchus kisutch)	Lower Columbia River ESU	FT	Proposed	SC	1 ,2, 3	N	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
Sockeye salmon (Oncorhynchus nerka)	Snake River ESU	FE	Designated	SC	1, 2, 3	N	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.

Species	ESU/DPS[1]	Federal		State			Potential for Occurrence	
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site and Vicinity	Project Shipping Prism
Steelhead (Oncorhynchus mykiss)	Lower Columbia River DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
	Upper Willamette River DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
	Middle Columbia River DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
	Upper Columbia River DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
	Snake River Basin DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
Coastal Resident/Sea-run Cutthroat Trout (*Oncorhynchus clarkii clarkii*)	Southwest Washington ESU	FSC	N/A	None	3	N	Columbia River is documented migratory corridor	Columbia River and adjacent marine waters are documented habitat
Pink salmon (*Oncorhynchus gorbuscha*)	N/A	None	N/A	None	2, 3	N	Columbia River is documented migratory corridor	Columbia River and adjacent marine waters are documented habitat
Sturgeon								
Green Sturgeon (*Acipenser medirostris*)	Southern DPS	FT	Designated	None	1, 2, 3	Y	Columbia River is documented migratory corridor and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.
White sturgeon (*Acipenser transmontanus*)	N/A	None	N/A	None	2, 3	N	Columbia River is documented migratory corridor	Columbia River and adjacent marine waters are documented habitat
Lamprey								
Pacific Lamprey (*Lampetra tridentata*)	N/A	FSC	N/A	None	3	Y	Columbia River is documented habitat for all life stages	Columbia River and adjacent marine waters are documented habitat
River Lamprey	N/A	FSC	N/A	SC	1	Y	Columbia River is documented habitat for all life stages	Columbia River and adjacent marine waters are documented habitat

Species	ESU/DPS[1]	Federal		State			Potential for Occurrence	
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site and Vicinity	Project Shipping Prism
Minnow								
Leopard Dace (*Rhinichthys falcatus*)	N/A	None	N/A	SC	1	Y	Historic observations in mainstem Columbia River. May provide suitable habitat.	Historic observations in mainstem Columbia River. May provide suitable habitat.
Smelt								
Pacific Eulachon (*Thaleichthys pacificus*)	Southern DPS	FT	Designated	SC	1, 2, 3	Y	Columbia River is documented habitat and designated critical habitat.	Columbia River and adjacent marine waters are documented habitat and designated critical habitat.

1 ESU = Evolutionarily Significant Unit; DPS = Distinct Population Segment

2 ESA Classifications: FE = federal endangered; FT = federal threatened; FSC = species of concern; FP = federal proposed; FC = federal candidate.

3 Washington Species of Concern Classifications: SE = state endangered; ST = state threatened; SS = state sensitive; SC = state candidate.

4 WDFW PHS Listing Criteria: Criterion 1 = State-listed and Candidate Species; Criterion 2 = Vulnerable Aggregations; Criterion 3 = Species of Recreational, Commercial, or Tribal Importance.

5 SGCN – As defined in WDFW's Comprehensive Wildlife Conservation Strategy (CWCS) (WDFW 2005).

Direct Habitat Modification – The project will not result in any net increase in permanent impacts below the OHWM of the Columbia River (Appendix H.2 JARPA). Removal of existing overwater structures and piles will offset the additional overwater coverage and pile placement associated with the project. Approximately 395 square feet of new benthic habitat impacts will be associated with the installation of seventy-six 24- and 36-inch steel piles for the mooring dolphins and walkways, but this impact will be offset by the proposed removal of 56 steel piles restoring 92 square feet of benthic habitat at the project site and the removal of timber piles at (approximately 220) at the Port's Terminal 2 area restoring approximately 305 square feet of benthic habitat.

In addition to permanent piles, temporary piles are expected to be used during construction to support the guides that will position and align the permanent piles and for the concrete formwork. It is estimated that up to approximately 40 temporary piles may be required. These temporary piles will be 18- to 24-inch-diameter open-ended steel pipe or H-piles and will be installed with a vibratory hammer. The temporary piles will result in approximately 126 square feet of temporary impact to benthic habitat. These piles will only be placed for short period of time (on the order of hours or days) and any temporary loss of productivity will be minor and the area is expected to rapidly recolonize following removal.

Additionally, the project will result in a net reduction of approximately 295 square feet of solid overwater coverage and a net increase of approximately 785 square feet of grated overwater coverage associated with walkways. The removal of overwater coverage in excess of the amount placed by 295 square feet and the location of this removal in shallow water compensate for the small increase in grated structures.

The aquatic portion of the project site provides habitat for a number of native fish species, including the 14 special status species identified in section 3.4-2. Nearshore habitats in particular (those less than approximately 20 feet deep) provide suitable migratory and foraging habitat for juvenile salmonids and trout, lamprey, minnows, eulachon, and other native fish species. Deep-water habitats provide these functions to a lesser degree, along with suitable migratory and foraging habitat for sturgeon.

The project will not result in an increase in impacts to benthic habitat or overwater coverage and therefore impacts to fish habitat at the project site are not expected to result in any significant effect on the quality or function of the habitat. The impacts of both new benthic habitat and new overwater coverage will be offset by the removal of existing piles and overwater structure. Because the project will not result in a net increase in impact to either benthic habitat or overwater coverage, no significant impact is expected to the quality or function of habitat for special status fish species or to any designated or proposed critical habitats for them.

Temporary Water Quality Impacts – As with any construction project, there is a potential for leaks and/or spills from construction equipment. The proposed overwater work creates the potential for construction debris to enter the waterway. Equipment and storage containers associated with the proposed project also create slight potential for leaks and spills of fuel, hydraulic fluids, lubricants, and other chemicals.

The proposed project also has the potential to disturb sediments and increase turbidity temporarily at the project site during pile installation and removal activities. Increased levels of turbidity could have temporary negative impacts on aquatic habitats and, if any special-status fish species are present during the time of construction, could affect them directly.

These potential temporary water quality impacts have the potential to affect fish habitat function and special status fish species both at the project site and within the project vicinity, by reducing water quality, reducing visibility and increasing potential exposure to predators, and reducing habitat suitability for prey species. These effects would be temporary, and conditions would return to baseline conditions following completion of construction. At the scale of the project shipping prism, fish and fish habitat would not be affected by any temporary water quality impacts associated with construction, as these effects would be localized to the project vicinity.

During the in-water work period (anticipated to be October 1 to February 28), outmigrating juveniles and migrating adult salmon, steelhead, and bull trout could be present within the action area, as could migrating adult Pacific eulachon. Larval and juvenile eulachon are not expected to be present during the in-water work period. Similarly, green sturgeon will not be exposed to any direct effects of temporarily decreased water quality, as they are not expected to be present within the project vicinity during the in-water work period.

Special status salmon, steelhead, bull trout, and Pacific eulachon, if present, likely will be migrating through the project site and vicinity, and are not expected to be present for any significant period. Habitat suitability for adult and juvenile salmonids, steelhead, bull trout, and adult Pacific eulachon is limited at the site, and provides little function aside from a suitable migratory corridor. Fish are expected to move rapidly through the site and vicinity. Exposure to temporarily decreased water quality conditions, including temporarily elevated turbidity levels and/or potential debris contamination, is expected to be limited, and effects to fish habitat and special status fish species will be minor.

Designated and proposed critical habitats within the action area also may experience temporarily increased levels of turbidity during the proposed action. The geographic extent and duration of any potential short-term increases in sedimentation or turbidity are expected to be limited, and are not expected to exceed baseline sedimentation conditions measurably. Any temporarily elevated sedimentation levels will not result in any significant effect to any PCE of designated or proposed critical habitat for any species.

Temporary Construction Noise – The proposed project has the potential to result in temporarily elevated terrestrial and underwater noise levels at the project site and within the project vicinity during pile driving activities.

Elevated underwater noise, particularly percussive sounds such as those generated during impact pile driving, has the potential to affect fish in several ways. The effects can range from the alteration of behavior to physical injury or mortality, depending on the intensity and characteristics of the sound, the distance and location of the fish in the water column relative to the sound source, the size and mass of the fish, and the fish's anatomical characteristics (Hastings and Popper 2005). The effects of temporarily elevated noise levels can range from mild disturbance to severe auditory damage or death.

The project will require the installation of approximately 76, 24- and 36-inch-diameter steel pipe piles below the OHWM of the Columbia River. Pile driving will be completed using a vibratory hammer to drive all of the permanent structural piles to the extent practicable as well as all of the approximately 40 temporary piles. Following vibratory driving to refusal (the point at which the pile will no longer advance with the vibratory hammer), the project will use an impact hammer to drive piles to their final tip elevations. As well, an impact hammer will be needed to proof the structural piles. Proofing is the process of striking piles with an impact hammer to verify their

load-bearing capacity. As part of impact minimization, a vibratory hammer will be used to remove approximately 56 piles from below the OHWM of the river at the marine terminal area and an additional 220 timber piles from the Port's Terminal 2. Pile removal is not expected to generate levels of underwater noise that will result in significant effects to fish habitat or species.

The zone of influence for underwater noise has been determined using the practical spreading loss model, currently recognized by both USFWS and NMFS as the best method to determine underwater noise attenuation rates, assumes a 4.5-decibel (dB) reduction per doubling of distance (WSDOT 2013). The baseline underwater noise level in the portion of the Columbia River that is within the action area is conservatively assumed to be approximately 120 dB_{RMS}[13] (WSDOT 2012), although actual background underwater noise levels may be higher, given the amount of industrial shipping traffic. The impact pile installation of 24- and 36-inch diameter piles (with a bubble curtain providing 5 dB of noise attenuation) has the potential to generate temporary underwater noise levels of approximately 202 dB_{PEAK}, 189 dB_{RMS}, and 173 dB_{SEL} (CALTRANS 2009). To obtain pile capacity, it is anticipated that each pile will require approximately 1,000 blows with an impact hammer. An installation rate of 4 to 6 piles per day is estimated. At a maximum, the total number of blows per day will be approximately 6,000 requiring a total of up to 160 minutes of impact driving, spread out over each day. At a maximum installation rate of 6 piles per day, it is anticipated that 13 working days would be required to install 76 piles below the OHWM of the Columbia River. If pile installation is slower, fewer strikes per day can be struck, and additional days of pile driving may be required. A worst-case estimate is that installing all of the in-water piles to tip elevation could require up to 25 to 30 days of in-water work during the in-water work window.

NMFS has established 206 dB_{PEAK} as an underwater noise injury threshold for fish of all sizes. The noise attenuation analysis indicates that peak underwater noise levels could exceed this injury threshold within approximately 30 feet of each pile being driven. Any fish present within approximately 30 feet of the pile being driven could be injured; therefore, the suitability of fish habitat within the immediate vicinity of the pile driving activities will be significantly degraded while pile driving is being conducted. Fish in the vicinity will be expected to avoid the area temporarily during pile driving activity.

Additionally, the noise attenuation analysis indicates that the worst-case estimate of up to 6,000 strikes per day that may be necessary to drive piles to final elevation will result in exceedances of the cumulative underwater noise injury thresholds for fish greater than 2 grams (187 dB_{RMS}) and for fish less than 2 grams (183 dB_{RMS}) within approximately 1,119 feet of pile driving activity, respectively. Given the nature and quality of the habitat, however, most fish are expected to be moving through the action area; their exposure to the sound from all 6,000 strikes per day is not expected.

During the in-water work period, it is possible that native fish, including adults and/or juveniles of several ESU/DPS of salmon, steelhead, bull trout, and Pacific eulachon, could be present within the portion of the project site and vicinity where underwater noise could be temporarily elevated. Although run timing within the river is different for each ESU/DPS, it is possible that

[13] RMS=root mean square

some individuals could be present in the vicinity, and could be exposed to temporarily elevated underwater noise levels resulting from pile installation.

Special status fish present within the portion of the project site where injury thresholds could be exceeded could be adversely affected, but this is unlikely. Special status fish species that could be present during the in-water work period will be expected to avoid the area within approximately 30 feet of the pile, and therefore will not be exposed to levels of peak underwater noise that would result in injury. Similarly, special status fish species are expected to be moving through the project site and vicinity, and therefore will not be exposed to the maximum 6,000 strikes per day. For this reason, special status fish species will not be exposed to cumulative underwater noise levels that could result in adverse effects.

While the underwater noise is temporarily elevated, fish may avoid the area temporarily, but this is unlikely to affect feeding and/or migratory activities significantly. Any elevated underwater noise levels associated with the proposed project will be temporary and will have no effect on any PCE of designated or proposed critical habitat.

Operation

The operation of the proposed project could permanently and indirectly affect fish habitat and special status fish species through operational water quality impacts, including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and through an increased potential for catastrophic accidents such as a spill to surface water. The operation of the Facility also could result in effects associated with the increase in shipping traffic that will occur in conjunction with the proposed project.

Operational Water Quality Impacts – Operational water quality impacts that could be associated with the proposed project include an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as an inadvertent crude oil release to surface water.

The project has the potential to increase stormwater runoff at the site, which could affect water quality and quantity as described in section 2.11 of this application. The entire Facility is located on 41.5 acres, and the proposed construction will result in approximately 38.2 acres of impervious surface. Treatment for stormwater will include enhanced treatment at Area 300 (Storage) and basic treatment at other areas of the Facility, with discharge to existing stormwater systems at Terminal 4 and Terminal 5. The proposed facilities will provide both water quality and water quantity treatment and will be designed to handle the 6-month, 24-hour event as estimated using Ecology's Western Washington Continuous Simulation Hydrology Model (Ecology's hydrology model).

The operation of the Facility also has the potential to increase the risk of catastrophic accidents, such as an inadvertent release of crude oil to the environment. While the likelihood of such an event is exceedingly low, the possibility must be addressed. According to projected volumes, the proposed project will result in approximately 140 shipping trips annually in 2016 (first full year of operations) up to 365 shipping trips per year at full buildout. Spills could occur at the project site or while docking or filling, or in transit downstream on the Columbia River or in marine waters.

The project site and vicinity provide documented habitat for the adult and juvenile forms of several special status populations of salmon, steelhead, and bull trout as well as for Pacific eulachon, green sturgeon, Pacific and river lamprey, and leopard dace. While run timing differs by species and population, these populations may be present within the project site and/or vicinity at various times during the year. Since operational impacts will not be restricted to an in-water work window, each species and its habitat have the potential to be affected by water quality impacts associated with the operation of the Facility.

Habitat suitability for native fish (including special status species) is limited at the site. The project site and vicinity primarily provide habitat as a migratory corridor. For this reason, fish are expected to move rapidly through the vicinity.

Accidental leaks or spills of fuel or other chemicals into surface- or groundwater at the project site have the potential to reduce fish habitat suitability, which also could affect special status fish species. However, the project has implemented several impact minimization measures and BMPs to reduce the potential for any spills or release of materials to occur, and to minimize the extent of any impacts resulting from any accidental spill or release.

Proposed stormwater treatment for new impervious surface at the site will minimize the potential for any adverse effects associated with stormwater. The proposed stormwater treatment will result in an improved water quality condition within the project site in the long term, and will not result in any adverse effects to fish habitat or to special status fish species.

A release to surface water has the potential to result in significant adverse effects to fish habitat and for special status fish species and their designated or proposed critical habitats. However, the likelihood of a spill is extremely low, and the proposed BMPs and safety and security measures (see sections 2.10, 2.11, 2.19, and Appendix B.2) will manage the risk of impacts to fish species and habitats effectively.

Impacts to fish habitat and to special status fish species and their designated or proposed critical habitats from water quality impacts associated with operation of the Facility are expected to be minor.

Shipping – The operation of the Facility will result in ships transiting the Columbia River within the project site, vicinity, and shipping prism. It is estimated that the proposed Facility will result in approximately 140 ship transits per year in 2016 (first full year of operations) up to 365 ship transits per year at full buildout. Marine traffic on the Columbia River has the potential to result in impacts to biological resources through increases in the potential for fish stranding and shoreline erosion associated with propeller wash, and through the introduction of exotic species.

- *Wake Stranding* – Recent studies conducted on the Lower Columbia River suggest that, under certain conditions, deep-draft vessels can produce wakes that can strand juvenile fish (Pearson et al. 2006, Entrix 2008, FERC 2008). Stranding can occur when a fish becomes caught in a vessel's wake and is deposited on shore by the wave the wake generates. Stranding typically results in mortality unless another wave carries the fish back into the water. The most recent and comprehensive study on wake strandings on the Lower Columbia River (Pearson et al. 2006) suggests that the specific mechanisms of stranding are still not completely understood. Fish stranding is thought to depend on interlinked factors that include river surface elevation, beach slope, wake characteristics, and species-specific biological factors (FERC 2008). Given these factors, it is not possible to predict accurately the extent to

which increased shipping traffic may increase the potential for fish stranding. However, it is safe to assume that the proposed project, over the course of its design life, will likely result in the stranding of some fish, including special status fish species. Juvenile fish, and species that are not strong swimmers, will be most susceptible to increased stranding.

- *Bank Erosion* – Propeller wash from ships in transit, as well as wakes breaking on shore, could cause increased erosion along unarmored sections of the shoreline. Erosion can re-suspend eroded material within the water column, increasing turbidity, which can affect habitat suitability for fish and other aquatic organisms. This could result in degradation of habitat suitability for fish habitat and special status fish species.
- *Exotic Species* – Ships in transit could import exotic and/or invasive species on their hulls and exterior equipment and/or in ballast water. Introduced species can often out-compete native species, and have the potential to alter natural habitats significantly. Once an aggressive exotic species is introduced, it may be nearly impossible to eradicate it. However, the BMPs that will be in place for the proposed operation of the terminal including hull maintenance and ballast water practices (section 3.4.4.3) will greatly minimize the potential for any transport of these species. For these reasons, the proposed project is unlikely to result in a significant risk of the increased transport of exotic and/or invasive species.

3.4.3.3 Mitigation Measures

The project will implement several impact minimization measures and BMPs to minimize the potential for impacts to fish and fish habitat. These are described below. Additional measures are also listed in Appendix H.1.

Direct Habitat Modification

The project will result in no net new direct, permanent impacts to fish habitat. The dock configuration has been designed to require the minimum amount of new piling and overwater structure necessary, and has reduced the quantity of direct permanent habitat impacts to the amount practicable. The proposed removal of piles and existing overwater coverage has further minimized the extent of impacts. The no net increase in direct, permanent impacts to fish habitat at the project site is expected to result in no significant effects on the quality or function of fish habitat within the project site, project vicinity, or project shipping prism.

The impact minimization measures and BMPs fully mitigate for the direct habitat modification impacts associated with the project.

Temporary Water Quality Impacts

The project has the potential to result in temporary water quality impacts during construction including increased potential for spills, and a potential for temporarily elevated levels of turbidity during construction. Construction at the site will be governed by an SPCC plan (Appendix B.2), which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Natural currents and flow patterns in the Lower Columbia River routinely disturb sediments. Flow volumes and currents are affected by precipitation as well as upstream water management at dams. High volume flow events can result in hydraulic forces that re-suspend benthic

sediments, temporarily elevating turbidity locally. Any temporary increase in turbidity as a result of the proposed project is not anticipated to measurably exceed levels caused by these normal periodic increases. Additionally, the volume of flow will help minimize the intensity and duration of any temporary episodic increases in sediment suspension or turbidity.

In addition, all pile installation will be conducted within the approved in-water work period for the project (anticipated to be October 1 to February 28). This work window has been established to minimize potential impacts to native fish species, particularly to ESA-listed salmonids and Pacific eulachon. While there is no time when ESA-listed fish are absent from the project vicinity, the window between October 1 and February 28 avoids the peak migratory periods for adult fish and out-migrating juveniles of most populations.

These impact minimization measures and BMPs fully mitigate for the temporary water quality impacts associated with the project.

Temporary Construction Noise

The proposed project has the potential to result in elevated underwater noise during construction which can temporarily affect fish and fish habitat quality. The project has been designed to minimize the likelihood of any impacts resulting from underwater noise during pile installation activities. The project will implement a bubble curtain or similarly effective noise attenuation device during all impact pile installation. These devices, when installed and operated properly, typically provide at least 5 dB of noise attenuation (Caltrans 2009). This will reduce the intensity of underwater noise, and will limit the potential for adverse effects to fish.

In addition, all pile installation will be conducted within the approved in-water work period for the project (anticipated to be October 1 to February 28). This work window has been established to minimize potential impacts to native fish species, particularly to ESA-listed salmonids and Pacific eulachon. While there is no time when ESA-listed fish are absent from the project vicinity, the window between October 1 and February 28 avoids the peak migratory periods for adult fish and out-migrating juveniles of most populations.

These impact minimization measures and BMPs fully mitigate for the temporary construction noise impacts associated with the project.

Operational Water Quality Impacts

The proposed project has the potential to result in indirect effects to fish and fish habitat through operational water quality impacts including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as spills to surface waters. The Facility will discharge to existing Columbia River outfalls through existing manmade conveyance pipelines, and is categorically exempt from the flow control provisions of the Ecology stormwater manual. According to Appendix I-E of the manual, the Columbia River is listed as a flow control-exempt water body.

As described in section 2.11 of this application, operational stormwater will be collected, treated, and conveyed in permanent constructed conveyances from source to discharge. Stormwater from the storage area will be treated to enhanced water quality standards and discharged to the existing Terminal 4 stormwater system. Stormwater from areas 200, 500, and 600 and the rail improvements will be treated to basic levels and discharged to the existing Terminal 5

stormwater system. Stormwater from Area 400 will be treated to an enhanced treatment level and conveyed to existing infiltration swales located immediately north of the site. Stormwater treatment facilities will be sized to accommodate the 6-month, 24-hour event as estimated using Ecology's hydrology model. The proposed stormwater treatment will provide treatment to a level that is consistent with the discharge permits applicable to the Facility and will ensure that fish and fish habitat are not adversely affected by operational stormwater.

Operations at the site will be governed by an SPCC plan (Appendix B.2), which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs and safety and security measures will minimize the risk of impacts to biological resources.

These impact minimization measures and BMPs fully mitigate for the operational water quality impacts associated with the project.

Shipping

The proposed project will result in approximately 140 ship transits per year in 2016 (first full year of operations) up to 365 ship transits per year at full buildout. Oceangoing vessel traffic on the Columbia River has the potential to result in impacts to fish and fish habitat through increases in the potential for fish stranding, increased potential for shoreline erosion associated with propeller wash, and through the introduction of exotic species.

The risk of adverse effects to fish and fish habitat from increased bank erosion is low. Streambanks at the site are well armored, and not particularly sensitive to erosion, so these habitats likely will not be affected. Elsewhere in the project vicinity and shipping prism, there are unarmored banks, which could potentially be susceptible to increased erosion from prop wash. Effects associated with bank erosion would be temporary and localized, and would result in only minor negative impacts to fish and fish habitat.

Operators of commercial vessels have a significant economic interest in maintaining underwater body hull platings in a clean condition. Fouled bottom platings result in increased fuel costs and can reduce the vessel's maximum transit speed. To prevent fouling and higher costs, operators preserve and maintain the hulls of their ships aggressively (FERC 2008), greatly reducing the risk of the transport of exotic species. Additionally, the USCG has developed mandatory practices for all vessels with ballast tanks in all waters of the United States. Washington has developed similar guidelines. These practices include requirements for ballast water exchange, to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin, to regularly remove fouling organisms from the hull, piping, and tanks, and to dispose of any removed substances in accordance with local, state, and federal regulations.

These impact minimization measures and BMPs mitigate for the increased shipping-related impacts associated with the project.

3.4.4 Wildlife

3.4.4.1 Existing Conditions

The general suitability of wildlife habitat within the project site and vicinity was examined based on the vegetation and habitat assessment described in section 3.4.2 because habitat suitability for wildlife species typically is closely associated with vegetation and species composition. This information is presented in section 3.4.2, as well as in the biological resources report prepared for this project (Appendix H.1).

Special Status Wildlife Species

This section evaluates the potential for special status wildlife species to occur within the project study area. Information regarding the potential presence of special status wildlife species was obtained from the USFWS web site (USFWS 2013) and the NMFS web site (NMFS 2013) on June 27, 2013. Additional information came from data from WDFW's two on-line databases, Priority Habitat and Species (PHS) on the Web (WDFW 2013a) and Salmonscape (WDFW 2013b), as well as from the 2008 PHS list (WDFW 2008).

The biological resources report prepared for this project (Appendix H.1) lists the special status wildlife species known to, or with the potential to, occur at the project site or within the vicinity. The report also discusses each species' life history, listing status, and potential to occur within the project site or vicinity based on an evaluation of the presence or absence of appropriate habitat for each species at the project site and vicinity scales. This information is summarized in Table 3.4-3.

No special status wildlife species have been documented at the project site and it provides only low to moderate habitat suitability for special status wildlife species. Based on the presence of potentially suitable habitat, several special status wildlife species have been documented or have the potential to occur in the project vicinity. As described in section 3.4.2, the project vicinity provides several relatively high quality wetland, riparian, and aquatic habitats, several of which are documented as habitat for one or more species of special status wildlife species.

Table 3.4-3. Special Status Wildlife Species and Their Potential to Occur within the Project Site or Vicinity

Species	ESU/ DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Birds									
Bald Eagle (*Haliaeetus leucocephalus*)	N/A	None	N/A	SS	1	Y	Moderate – low quality foraging habitat in riparian zone.	High – Documented nesting occurrences in Columbia River riparian forested habitats.	High – Foraging habitat throughout Lower Columbia River.
Aleutian Canada Goose (*Branta canadensis leucopareia*)	N/A	FSC	N/A	None	None	N	Low – No suitable habitat on-site.	Moderate – Potentially suitable migratory habitat in wetlands adjacent to Vancouver Lake and agricultural lands on Parcel 3.	Moderate – potentially suitable habitat throughout Lower Columbia River
Cavity Nesting Ducks (several species)	N/A	None	N/A	None	3	N	Low – No suitable habitat on-site.	High – Documented breeding areas and suitable habitat for breeding for several species in vicinity of Buckmire Slough.	Moderate – potentially suitable habitat throughout Lower Columbia River
Common Loon (*Gavia immer*)	N/A	None	N/A	SS	1, 2	Y	Low – No suitable habitat on-site.	Moderate – One or more documented occurrences and potentially suitable habitat at Vancouver Lake.	Low – Not in Columbia River mainstem or marine waters.
Great Blue Heron (*Ardea herodias*)	N/A	None	N/A	None	2	Y	Low – No suitable habitat on-site.	High – Documented breeding occurrences and rookeries near Vancouver Lake and Buckmire Slough.	Moderate – potentially suitable habitat throughout Lower Columbia River
Lewis' Woodpecker *(Melanerpes lewis)*	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	Low – Potentially suitable habitat throughout lowlands, but not documented extensively in Clark County.	Low – Not in Columbia River mainstem or marine waters.

Species	ESU/ DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Olive-Sided Flycatcher (*Contopus cooperi)*	N/A	FSC	N/A	None	N/A	N	Low – No suitable habitat on-site.	Low – There is no mature coniferous forest habitat present within the project vicinity	Low – Not in Columbia River mainstem or marine waters.
Pileated Woodpecker (*Dryocopus pileatus*)	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	Moderate – Riparian cottonwood forests provide potentially suitable foraging habitat.	Low – Not in Columbia River mainstem or marine waters.
Peregrine Falcon (*Falco peregrinus*)	N/A	FSC	N/A	SS	1	Y	Moderate – low quality foraging habitat present.	Moderate – One or more historic documented nesting occurrences in vicinity.	Low – Not in Columbia River mainstem or marine waters.
Purple Martin (*Progne subis*)	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	High – Documented nesting habitat and regular concentrations near Vancouver Lake.	Low – Not in Columbia River mainstem or marine waters.
Sandhill Crane (*Grus canadensis*)	N/A	None	N/A	SE	1	Y	Low – No suitable habitat on-site.	High – Documented regular concentrations throughout Vancouver Lake Lowlands, particularly on agricultural lands at Parcel 3.	Low – Not in Columbia River mainstem or marine waters.
Shorebird Concentrations (Several species)	N/A	None	N/A	None	2	N	Moderate – riparian and aquatic zone provides opportunities for foraging.	High – Regular concentrations of shorebirds documented on Vancouver Lake	High – potentially suitable habitat throughout Lower Columbia River and marine waters
Slender-Billed White-Breasted Nuthatch (*Sitta carolinensis aculeata*)	N/A	FSC	N/A	SC	1	Y	Low – No suitable habitat on-site.	Moderate – One or more documented occurrences near Vancouver Lake.	Low – Not in Columbia River mainstem or marine waters.

Species	ESU/ DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Streaked Horned Lark (*Eremophila alpestris strigata*)	N/A	FP	Not designated	SE	1	Y	Low – No suitable habitat on-site.	Moderate – Documented presence on dredge material placement sites and barren lands throughout Lower Columbia River.	Documented presence on dredge material placement sites and barren lands throughout Lower Columbia River.
Marbled Murrelet (*Brachyramphus marmoratus*)	N/A	FT	Designated	ST	1, 2	Y	Low – No suitable habitat.	Low – No suitable habitat.	High – Marine habitats represent foraging habitat
Short-Tailed Albatross (*Phoebastria albatrus*)	N/A	FE	Not Designated	SC	1	Y	Low – No suitable habitat.	Low – No suitable habitat.	Moderate – Marine waters represent foraging habitat, but species is rare
Western Snowy Plover (*Charadrius nivosus nivosus)*	N/A	FT	Designated	SE	1	Y	Low – No suitable habitat.	Low – No suitable habitat.	Moderate – Marine waters and intertidal and estuarine areas are documented habitat
Vaux's Swift (*Chaetura vauxi*)	N/A	None	N/A	SC	1	Y	Low – No suitable habitat on-site.	Low – Limited presence of large snags for nesting in vicinity	Low – Not in Columbia River mainstem or marine waters.
Waterfowl Concentrations (several species)	N/A	None	N/A	None	3	N	Moderate – riparian and aquatic zone provides opportunities for foraging.	High – Documented concentrations throughout Vancouver Lake Lowlands .	High – potentially suitable habitat throughout Lower Columbia River and marine waters
Mammals									
Steller Sea Lion (*Eumatopius jubatus*)	Eastern DPS	FT	Designated	ST	1, 2	Y	Moderate – Aquatic portion of site is within migratory/foraging corridor	High – Columbia River is a documented migratory/foraging corridor.	High – Columbia River and adjacent marine habitats are documented habitat.

Species	ESU/ DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Whales (Several species)	Varies	Varies	Varies	Varies	Varies	Varies	Low – No habitat	Low – No habitat	High – Marine waters off coast provide documented habitat
Non-ESA-Listed Marine Mammals	N/A	None	N/A	Varies	Varies	Varies	Moderate – Aquatic portion of site is within migratory/foraging corridor	High – Columbia River is a documented migratory/foraging corridor.	High – Columbia River and adjacent marine habitats are documented habitat.
Columbian White-Tailed Deer (*Odocoileus virginianus leucurus*)	N/A	FE	Not Designated	SE	1	Y	Low – No habitat	Low – No habitat	Moderate – Islands in the Lower Columbia River represent suitable habitat.
Gray-Tailed Vole (*Microtus canicaudus*)	N/A	None	N/A	SC	1, 2	Y	Moderate – Ruderal grass/forb habitat may provide limited habitat.	Moderate – Agricultural lands, pastures, and fields provide suitable habitat.	Low – Not in Columbia River mainstem or marine waters.
Pacific Townsend's Big-Eared Bat (*Corynorhinus townsendii townsendii*)	N/A	FSC	N/A	SC	1, 2	Y	Low – No suitable habitat on-site.	Moderate – potentially suitable foraging habitat throughout Vancouver lowlands, but limiting roosting habitat.	Low – Not in Columbia River mainstem or marine waters.
Myotis Bats (*Myotis evotis* and *Myotis volans*)	N/A	FSC	N/A	None	N/A	N	Low – No suitable habitat on-site	Moderate – potentially suitable foraging habitat throughout Vancouver lowlands, but limiting roosting habitat.	Low – Not in Columbia River mainstem or marine waters.
Invertebrates									
California Floater (*Anodonta californiensis*)	N/A	FSC	N/A	SC	1, 2	Y	Low – No suitable habitat on-site.	Moderate – One or more documented occurrences and potentially suitable habitat in Vancouver Lake.	

Species	ESU/ DPS[1]	Federal		State			Potential for Occurrence		
		ESA Listing Status	Critical Habitat	State Listing Status[3]	PHS Listing Criterion[4]	SGCN (Y/N)[5]	Project Site	Project Vicinity	Shipping Prism
Amphibians									
Oregon Spotted Frog (*Rana pretiosa*)	N/A	FC	N/A	SE	1	Y	Low – No suitable habitat on-site.	Moderate – Suitable aquatic habitat in vicinity of Vancouver Lake and adjacent wetlands, but no documented occurrences.	Low – Not in Columbia River mainstem or marine waters.
Western Toad (*Bufo boreas*)	N/A	FSC	N/A	SC	1	Y	Low – No suitable habitat on-site.	Moderate – Potentially suitable habitat throughout Vancouver lowlands, but no recently documented occurrences.	Low – Not in Columbia River mainstem or marine waters.
Reptiles									
Pacific Pond Turtle (*Actinemys marmorata*)	N/A	FSC	N/A	SE	1	Y	Low – No suitable habitat on-site.	Moderate – Suitable habitat throughout Vancouver Lake Lowlands, but no documented occurrences.	Low – Not in Columbia River mainstem or marine waters.
Sea Turtles (Various species)	Varies	Varies	Varies	Varies	Varies	Varies	Low – No suitable habitat on-site.	Low – No suitable habitat on-site.	High – Marine waters represent documented habitat.

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

2 ESA Classifications: FE = federal endangered; FT = federal threatened; FSC = species of concern; FP = federal proposed; FC = federal candidate.

3 Washington State Species of Concern Classifications: SE = state endangered; ST = state threatened; SS = state sensitive; SC = state candidate.

4 WDFW PHS Listing Criteria: Criterion 1 = state-listed and candidate species; Criterion 2 = vulnerable aggregations; Criterion 3 = species of recreational, commercial, or tribal importance.

5 SGCN – As defined in WDFW's Comprehensive Wildlife Conservation Strategy (CWCS) (WDFW 2005).

3.4.4.2 Impacts

Construction

As discussed in sections 3.4.2.2 and 3.4.3.2, construction of the proposed project will have only minor effects to terrestrial habitat and vegetation at the project site. The only construction-related impacts will be any direct impacts to habitat and vegetation associated with the terrestrial components of the project. Vegetation and habitat within these portions of the project site will be permanently removed.

Direct Habitat Modification – Impacts associated with direct habitat modification are described in sections 3.4.2.2 and 3.4.3.2.

The project site provides potentially suitable, relatively low quality, foraging habitat for raptors such as bald eagles and peregrine falcons. Bald eagles have been documented extensively in the project vicinity, and it is likely that they use riparian habitats throughout the project vicinity as foraging habitats. Peregrine falcons have not been documented foraging at the project site, but they may occur in the vicinity. If present, peregrine falcons could forage in upland and riparian habitats at the site. The ruderal grass/forb habitats at the site provide potentially suitable, relatively low quality habitat for gray-tailed vole. The limited quality and quantity of available terrestrial habitat for these species, and the highly industrial nature of the surroundings, likely greatly limit the extent of habitat function. As described in section 3.4.2.2 above, direct impacts consisting of removal of approximately 46,250 square feet of ruderal grass-forb and approximately 6,300 square feet of upland cottonwood stands are expected to result in only minor potential impacts to bald eagle, peregrine falcon, and gray-tailed vole.

The aquatic portion of the site represents suitable foraging and resting habitat for shorebirds and wintering waterfowl, which are WDFW priority species. As stated in section 3.4.3.2, the project will not result in any net increase in permanent impacts to the aquatic portion of the project, and is therefore not expected to result in any measurable or significant impact to shorebird or waterfowl habitat suitability.

The aquatic portion of the project site also represents potentially suitable habitat for Steller sea lion. If present, they are expected to be passing through in deep water habitats outside the immediate project site. They are not known or expected to use habitats near the existing dock, and are therefore unlikely to be affected by the relatively small amount of direct habitat impacts associated with new pile footprints or new overwater coverage.

Temporary Water Quality Impacts – As with any construction project, there is a potential for leaks and/or spills from construction equipment. The proposed overwater work creates the potential for construction debris to enter the waterway. Equipment and storage containers associated with the proposed project also create the potential for leaks and spills of fuel, hydraulic fluids, lubricants, and other chemicals.

The proposed project also has the potential to disturb sediments and increase turbidity temporarily at the project site during pile installation and removal activities. These impacts would not affect terrestrial wildlife species or habitats at the site, but could affect wildlife species that use aquatic habitats. Increased levels of turbidity could have temporary negative impacts on aquatic habitats and, if any wildlife species are present in the project vicinity during construction, could affect them directly.

The aquatic portion of the project site represents suitable foraging and nesting habitat for shorebirds and wintering waterfowl. The aquatic portion of the project site also represents potentially suitable foraging habitat for Steller sea lion.

The accidental release of construction debris or leaks or spills of fuel or other chemicals into the waters of the project site has the potential to reduce habitat suitability for shorebirds and waterfowl as well as for Steller sea lion.

Similarly, temporarily elevated levels of turbidity that could result during pile-driving and removal activities also have the potential to reduce habitat suitability for these species by reducing visibility and habitat suitability for prey species. However, any temporary elevation of turbidity is expected be short term, and to not exceed the turbidity levels generated by natural events such as high volume flow events.

Impacts to special status wildlife species from temporary water quality impacts are expected to be minor.

Temporary Construction Noise – The proposed project has the potential to result in temporarily elevated terrestrial and underwater noise levels during pile driving activities.

Terrestrial construction noise and noise from other human activity can result in a variety of effects to wildlife species, including displacement from occupied habitats, interference with hearing ability in songbirds and mating and alarm calls in amphibians and ground squirrels, and disruption of raptor foraging activities (Madsen 1985; Van der Zande et al. 1980; Fyfe and Olendorff 1976).

Terrestrial noise levels will be elevated within the vicinity of the project site during impact pile driving, but these sound levels will be expected to decrease to ambient conditions within a relatively short distance from the immediate project site.

Peak terrestrial noise generated during impact pile installation has been estimated at a maximum of approximately 110 A-weighted decibels (dBA), measured at 50 feet (FTA 2006). Baseline and construction-related noise levels were inferred using an industry-standard technique recommended by WSDOT (WSDOT 2013). This guidance includes information regarding noise levels associated with typical construction procedures from the City of Boston's noise assessment methodology (Thalheimer 2000) and noise attenuation data from the Federal Transit Administration's construction noise methodology (FTA 2006).

Peak terrestrial noise generated during impact pile installation has been estimated to be approximately 110 decibels (dBA), measured at 50 feet (FTA 2006). As stated above, the baseline noise levels associated with the action area are relatively high, and this terrestrial noise attenuation analysis assumes baseline noise levels similar to those associated with a high density urban area (78 dBA measured at 50 feet). Hard site conditions were assumed for noise attenuation purposes because the surrounding landscape is largely unvegetated, so the linear attenuation rate was estimated to be approximately -6 dBA per doubling of distance. At this rate, terrestrial noise from impact pile driving is expected to attenuate to ambient conditions between approximately 1,600 and 3,200 feet from the location of project activities.

Most of the terrestrial habitat within approximately 3,200 feet of the dock is not suitable for wildlife species, and terrestrial wildlife habitats at the immediate project site are of limited quality and quantity. Species that utilize these industrialized habitats are generally well adjusted to nearly continuous human presence and activity. Terrestrial habitats at the project site represent

low-quality foraging habitat for bald eagle, peregrine falcon, and other raptor species. These species may avoid habitats near the pile driving activity temporarily, but the foraging habitat in the vicinity is sufficient so that a significant adverse effect to any species is not anticipated.

Temporarily elevated terrestrial noise levels could extend beyond the project site onto portions of the CRWMB and associated wetlands and forested habitats on the Shillapoo NWR south of Vancouver Lake. In addition to being used extensively by a variety of waterfowl, raptors, migratory birds, small mammals, amphibians, and reptiles, these habitats provide potentially suitable habitat for a number of special status wildlife species. There is potential for these species to be present in these habitats during construction and they could be exposed to elevated terrestrial noise levels. Terrestrial noise from pile driving will have attenuated significantly by the time it reaches these habitats. The noise levels may potentially be of sufficient intensity to generate a behavioral response, but will not be expected to elicit avoidance or other behaviors that could result in adverse effects to any wildlife species such as missed feeding opportunities, nest abandonment, or increased susceptibility to predation that could result in adverse effects to any special status wildlife species.

In addition, the aquatic portion of the action area is suitable foraging and resting habitat for several species of shorebirds and waterfowl and foraging habitat for Steller sea lion. Shorebirds and waterfowl will avoid the area in the immediate vicinity of pile driving activity temporarily, but the foraging and resting habitat in the vicinity is sufficient, and this is not expected to represent a significant adverse effect.

Elevated underwater noise can also affect aquatic wildlife species, particularly marine mammals. The range of effects can range from mild disturbance to severe auditory damage. Direct mortality in marine mammals has not been observed as a result of elevated underwater noise levels. The project's marine mammal monitoring plan will reduce the potential for significant impacts to marine mammals, which in any event are not expected to occur within the action area during the in-water work period.

Operation

The operation of the proposed project could affect wildlife habitat and special status wildlife species through operational water quality impacts, including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery and a potential for catastrophic accidents such as a spill to surface water. Lighting associated with the project could lead to direct and/or indirect impacts to wildlife species because it may affect the nocturnal behavior of animals within the project vicinity, including bird and bat species. Increased shipping traffic also could result in effects associated with the operation of the Facility.

Operational Water Quality Impacts – Operational water quality impacts that could be associated with the proposed project include an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery and a potential for spills to surface waters during transportation of product by vessel.

As discussed in section 2.11, the project has the potential to increase stormwater runoff at the site, which could affect water quality and quantity. The project will provide both water quality and water quantity treatment.

Terrestrial habitats could be affected by an increased potential for spills or leaks. Accidental leaks or spills of fuel or other chemicals into surface- or groundwater at the project site have the potential to reduce habitat suitability for shorebirds and waterfowl as well as marine mammals.

Spills occurring at time of vessel loading will have the potential to affect wildlife species adversely as well as shorebirds, waterfowl, and marine mammals, as these species occupy aquatic habitats at the project site and within the vicinity. A spill while in transit in the project's shipping prism also has the potential to affect a number of special status species, depending on the location of the spill.

Impacts to special status wildlife species from water quality impacts related to normal operation of the Facility are expected to be minor.

Shipping – The operation of the Facility will result in ships transiting the Columbia River within the project site, vicinity, and shipping prism. It is estimated that the proposed Facility will result in approximately 140 ship transits per year in 2016 (first full year of operations) up to 365 ship transits per year at full buildout. Marine traffic on the Columbia River has the potential to result in impacts to wildlife through increases in the potential for shoreline erosion associated with propeller wash, through the introduction of exotic species, and (for certain species) through increased potential for direct mortality through ship strikes.

- *Bank Erosion* – Propeller wash from ships in transit, as well as wakes breaking on shore, could cause increased erosion along unarmored sections of shoreline. Erosion can re-suspend eroded material within the water column, increasing turbidity, which can affect habitat suitability for fish and other aquatic organisms. While most of the streambanks in the project vicinity are armored, and thus less susceptible to erosion, unarmored beaches could be susceptible to erosion from prop wash.
  Wildlife habitat and special status wildlife species within the project site, vicinity, and shipping prism may be affected by an increased potential for bank erosion that will result from increased ship traffic. Streambanks at the project site are well armored and not particularly sensitive to erosion, so these habitats will not likely be affected. Elsewhere in the project vicinity and shipping prism there are unarmored banks that could potentially be susceptible to increased erosion from prop wash. This could result in temporary degradation of wildlife habitat suitability and could affect special status wildlife species.
- *Exotic Species* – Ships in transit could potentially import exotic and/or invasive species on their hulls and exterior equipment and/or in ballast water. Introduced species often can out-compete native species and have the potential to alter natural habitats by competing with native species.
- *Ship Strikes* – The 140 vessel transits per year in 2016 up to 365 ship transits per year at full buildout on the Lower Columbia River, as well as in marine waters during transit, has the potential to result in collisions of ships with species that include sea turtles, marine mammals, and cetaceans. Although sea turtles and cetaceans will not occur in the immediate vicinity of the project site or its vicinity, they could be affected in marine waters by vessels transiting to/from the Columbia River.

3.4.4.3 Mitigation Measures

The project will implement an array of impact minimization measures and BMPs to minimize the potential for construction and operational impacts to wildlife species.

Direct Habitat Modification

The upland facilities associated with the project have been located on developed portions of an existing industrial site, which in its current state provides very little habitat function and very little native vegetation. By siting the project in a developed location, impacts to native terrestrial habitats and native species of vegetation, including special status species, have been avoided. Ground disturbance and vegetation removal will be limited to the minimum amount necessary to construct the project, and construction fencing will be used to protect existing vegetation to be retained.

These impact minimization measures and BMPs fully mitigate for the direct habitat modification impacts associated with the project.

Temporary Water Quality Impacts

The project has the potential to result in temporary water quality impacts during construction including increased potential for spills, and a potential for temporarily elevated levels of turbidity during construction. Construction at the site will be governed by an SPCC plan (Appendix B.2), which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Natural currents and flow patterns in the Lower Columbia River routinely disturb sediments. Flow volumes and currents are affected by precipitation as well as upstream water management at dams. High volume flow events can result in hydraulic forces that re-suspend benthic sediments, temporarily elevating turbidity locally. Any temporary increase in turbidity as a result of the proposed project is not anticipated to measurably exceed levels caused by these normal periodic increases. Additionally, the volume of flow will help minimize the intensity and duration of any temporary episodic increases in sediment suspension or turbidity.

In addition, all pile installation will be conducted within the approved in-water work period for the project (anticipated to be October 1 to February 28). This work window has been established to minimize potential impacts to native fish species, but also avoids the peak migration timing for marine mammals in the Lower Columbia River.

These impact minimization measures and BMPs fully mitigate for the temporary water quality impacts associated with the project.

Temporary Construction Noise

Terrestrial noise levels will be elevated within the vicinity of the project site during impact pile driving, but these sound levels will be expected to decrease to ambient conditions within a relatively short distance from the immediate project site. Most of the terrestrial habitat within approximately 3,200 feet of the dock is not suitable for wildlife species, and terrestrial wildlife habitats at the immediate project site are of limited quality and quantity. Species that utilize these industrialized habitats are generally well adjusted to nearly continuous human presence and activity.

The proposed project has the potential to result in elevated underwater noise during construction which can temporarily affect marine mammals and the quality of their habitat. The project has

been designed to minimize the likelihood of any impacts resulting from underwater noise during pile installation activities. The project will implement a bubble curtain or similarly effective noise attenuation device during all impact pile installation. These devices, when installed and operated properly, typically provide at least 5 dB of noise attenuation (Caltrans 2009). This will result the intensity of underwater noise, and will limit the potential for adverse effects to marine mammals.

In addition, all pile installation will be conducted within the approved in-water work period for the project (anticipated to be October 1 to February 28). This work window has been established to minimize potential impacts to native fish species, but also avoids the peak migration timing for marine mammals in the Lower Columbia River. Marine mammals are not expected to occur within the action area during the in-water work period.

These impact minimization measures and BMPs fully mitigate for the temporary construction noise impacts associated with the project.

Operational Water Quality Impacts

The proposed project has the potential to result in indirect effects to wildlife through operational water quality impacts including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as spills to surface waters. However, the terrestrial habitats at the site provide very little functional habitat, and the impact minimization measures and BMPs that will be implemented will effectively reduce the potential for any adverse effects to the quantity or quality of terrestrial habitats as a result of operation.

As described in section 2.11, operational stormwater will be collected, treated, and conveyed in permanent constructed conveyances from source to discharge. The proposed stormwater treatment will provide treatment to a level that is consistent with existing treatment at the site, which will ensure that aquatic wildlife are not adversely affected by operational stormwater.

Operations at the site will be governed by an SPCC plan (Appendix B.2), which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of crude oil should an accident occur. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans. The likelihood of a catastrophic release of crude oil is very low, and the proposed BMPs and safety and security measures will manage the risk of impacts to biological resources effectively.

These impact minimization measures and BMPs fully mitigate for the operational water quality impacts associated with the project.

3.4.5 Federal Approvals

Federal approvals anticipated for the project are identified in section 2.23. As noted a permit under Section 10 of the Rivers and Harbors Act will be required for proposed work below the

OHWM of the Columbia River. Issuance of Section 10 permit will require compliance with the ESA, NEPA and NHPA. A permit or review under the MMPA may also be required. Submittal of the required application materials to the USACE had not occurred at the time of submittal of the Application for Site Certification but is anticipated to occur shortly thereafter. Contacts with federal agencies are identified in section 1.6.

Section 3.5 – Wetlands

WAC 463-60-333
Natural environment - Wetlands.

The application shall include a report for wetlands prepared by a qualified professional wetland scientist. For purposes of this section, the term "project site" refers to the site for which site certification is being requested, and the location of any associated facilities or their right of way corridors if applicable. The report shall include, but not be limited to, the following information:

(1) Assessment of existing wetlands present and their quality. The assessment of the presence and quality of existing wetlands shall include:

(a) A wetland delineation performed by a qualified professional according to the Washington State Wetlands Delineation and Identification Manual, 1997, and associated data sheets, site maps with data plots and delineated wetlands areas, photographs, and topographic and aerial site maps.

(b) A description of wetland categories found on the site according to the Washington state wetland rating system found in Western Washington, Ecology Publication # 93-74 and Eastern Washington, Ecology Publication 391-58, or as revised by the department of ecology.

(c) A discussion of water sources supplying wetlands and documentation of hydrologic regime encountered.

(d) A function assessment report prepared according to the Washington State Wetland Function Assessment Method to assess wetlands functions for those wetland types covered by the method, and including a description of type and degree of wetland functions that are provided.

(2) Identification of energy facility impacts. The application shall include a detailed discussion of temporary, permanent, direct and indirect impacts on wetlands, their functions and values, and associated water quality and hydrologic regime during construction, operation and decommissioning of the energy facility. The discussion of impacts shall also include impacts to wetlands due to proposed mitigation measures.

(3) Wetlands mitigation plan. The application shall include a detailed discussion of mitigation measures, including avoidance, minimization of impacts, and mitigation

through compensation or preservation and restoration of existing wetlands, proposed to compensate for the direct and indirect impacts that have been identified. The mitigation plan shall be prepared consistent with the Department of Ecology Guidelines for Developing Freshwater Wetlands Mitigation Plans and Proposals, 1994, as revised. The application shall also include, but not be limited to:

(a) A discussion of how standard buffer widths have been incorporated into the mitigation proposal. Variances from standard buffer widths must be supported with professional analyses demonstrating that smaller or averaged buffer widths protect the wetland functions and values based on site-specific characteristics;

(b) A demonstration of how enhancement, restoration or compensatory mitigation actions will achieve equivalent or greater hydrologic and biological functions at the impact site, and whether any existing wetland functions would be reduced by the mitigation measures; (c) A discussion of how standard mitigation ratios have been incorporated into the mitigation proposal. Variances from standard mitigation ratios must be supported with professional analyses demonstrating that equivalent or greater hydrologic and biological functions will be achieved; (d) A demonstration that the mitigation actions are being conducted in an appropriate location, and that consideration was given in order of preference to: On-site opportunities; opportunities within the same subbasin or watershed assessment unit; opportunities within the same Water Resources Inventory Area (WRIA); opportunities in another WRIA; (e) A discussion of the timing and schedule for implementation of the mitigation plan; (f) A discussion of ongoing management practices that will protect wetlands, including proposed monitoring and maintenance programs; (g) Mitigation plans should give priority to proven mitigation methods. Experimental mitigation techniques and mitigation banking may be considered by the council on a case-by-case basis. Proposals for experimental mitigation techniques and mitigation banking must be supported with analyses demonstrating that compensation will meet or exceed requirements giving consideration to the uncertainty of experimental techniques, and that banking credits meet all applicable state requirements.

(4) Federal approvals. The application shall list any federal approvals required for wetlands impacts and mitigation, status of such approvals, and federal agency contacts responsible for review.

(04-23-003, recodified as § 463-60-333, filed 11/4/04, effective 11/11/04. Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, § 463-42-333, filed 10/11/04, effective 11/11/04.)

Section 3.5 Wetlands

The purpose of this section is to document the wetland resources that could be affected by the construction, operation, decommissioning, or abandonment of the proposed project. A biological resources report, which provides additional detail about wetlands in the vicinity of the proposed project site, is included as an appendix to this application (Appendix H.1).

Figure 3.4-1 is an overview of the biological resources in the study area and of the important habitat areas and features that are referred to in this section. Since there are no wetlands present at the project site, this analysis did not include detailed wetland mapping.

3.5.1 Study Area

The wetlands assessment examined the project study area, defined as all of the areas that could be affected directly or indirectly by the proposed project, and was conducted at three scales. Most of the analysis is focused at the project site scale, as this is the scale at which wetland impacts would be most likely to occur, if wetlands were present on the site. The project site is limited to the areas within the proposed physical footprint of the project.

The project vicinity includes parcels immediately adjacent to the proposed project site as well as biologically important features within approximately 1 mile of it. Examples of features included within the project vicinity BAPE include the wetland complexes associated with Vancouver Lake and the Shillapoo NWR, the CRWMB, the Port's Parcel 1A and Parcel 2 wetland mitigation sites, and wetland habitats on Port Parcel 3. Wetlands present within the project vicinity would not be directly impacted by the proposed project, but could be indirectly affected by potential impacts related to water quality.

The analysis included a third scale – the project's shipping prism, defined as the area in which effects associated with increased shipping could occur. This BAPE includes the entirety of the Lower Columbia River downstream of the site, as well as marine habitat off the coasts of Washington, Oregon, and California, out to the extent of the Exclusive Economic Zone (EEZ), a distance of 200 miles offshore. The shipping prism includes only the Lower Columbia River and adjacent marine waters. There are numerous backwater and side channel wetland habitats present on the Lower Columbia River.

3.5.2 Methodology

Project scientists coordinated with regulatory agency biologists, conducted a review of existing literature and reference material, and carried out field investigations at the project site.

Information regarding the potential presence of wetlands at the project site included reviews of NWI data (USFWS 1989), soils data (NRCS 2013), and recent and historic permitting documentation.

Biologists from BergerABAM conducted site visits on May 28 and June 27, 2013 to delineate the OHWM of the Columbia River at the project site, conduct a riparian habitat assessment and tree inventory, and assess the wetland and terrestrial site conditions present throughout the project site.

3.5.3 Existing Conditions

Project Site

The NWI map for Vancouver, Washington USGS Quadrangle (USFWS 1989) indicates the presence of numerous wetlands within the project vicinity, including five wetland polygons on the portion of the project site that encompasses Parcel 1A (Figure 3.4-1).

Wetland types mapped on Parcel 1A include:

- PEMA – Palustrine Emergent Temporarily Flooded
- PEMC – Palustrine Emergent Seasonally Flooded
- PFOA – Palustrine Forested Temporarily Flooded
- PFOC – Palustrine Forested Seasonally Flooded

It is important to note that NWI mapping is a coarse-scale mapping tool, and does not always reflect the presence or absence of wetland features at a given site. The NWI identifies much of Port Parcel 1A as having wetland characteristics, but wetland delineations conducted on the parcel prior to its initial development in 1996 documented significantly less wetland than identified by the NWI (The JD White Company 1993).

Nine wetlands, totaling approximately 16 acres in size, were present on Parcel 1A prior to development of that parcel (The JD White Company 1993), but these wetlands were all filled through permitted actions. Development on Parcel 1A was initiated in 1996. USACE permit number 96-1850 authorized impacts to 9.92 acres of emergent wetlands on the parcel. Wetland impacts associated with this development activity were mitigated through the establishment of the Port's Parcel 2 wetland mitigation site. A small forested wetland at the extreme eastern property boundary of Parcel 1A was enlarged and enhanced into the existing Parcel 1A wetland mitigation site.

In 2012, the Port applied for and received permission to fill a 1.76-acre isolated emergent wetland in the northeast corner of Parcel 1A, which was hydrologically and functionally isolated and provided little function and was filled in 2012.

The NWI also identified two isolated wetlands located north of the Jail Work Center. The boundaries of these wetlands were delineated in 2006 and 2007 in association with the Port's WVFA project (The JD White Company 2007). These wetlands were filled as part of that project in 2007. Impacts were permitted under a USACE nationwide permit (NWP-2007-721) and an Ecology administrative order (AO # 6902), and mitigation was accomplished through the purchase of credits in the CRWMB.

No other wetlands are present within the project site. Field investigations conducted on May 28 and June 26, 2013 included a visual reconnaissance to document the presence of any potential wetlands. The OHWM of the Columbia River within the vicinity of the dock was also delineated during the May 28, 2013 site visit. All portions of the project site above the OHWM are either impervious, paved, or gravel-covered surfaces, or are upland ruderal grass/forb habitats that are clearly dominated by upland vegetation and have neither the potential to accumulate or detain surface water or precipitation nor any visible hydrologic features that indicate the potential presence of wetlands. It has been determined, therefore, that there are no wetlands present on the project site.

Project Vicinity – Within the greater project vicinity, there are numerous wetlands, including several relatively high-quality wetland complexes. The NWI map (USFWS 1989) identifies a large complex of emergent, scrub-shrub, and forested wetlands north of the project site associated with the south end of Vancouver Lake; emergent and forested wetlands on Port Parcel 2; emergent wetlands to the east and south of Parcel 1A; and emergent wetlands to the west of Port Parcel 5, extending onto Parcel 3 (Figure 3.4-1).

Mapped wetland types include the following:

- PEMA – Palustrine Emergent Temporarily Flooded
- PEMC – Palustrine Emergent Seasonally Flooded
- PEMF – Palustrine Emergent Semi-permanently Flooded
- PEMR – Palustrine Emergent Seasonal – Tidal
- PEMT – Palustrine Emergent Semi-permanent – Tidal
- PFOA – Palustrine Forested Temporarily Flooded
- PSSA – Palustrine Scrub-shrub Temporarily Flooded
- PSSC – Palustrine Scrub-shrub Seasonally Flooded
- PSSR – Palustrine Scrub-shrub Seasonal – Tidal
- PSS/EMC – Palustrine Scrub-shrub/Emergent Seasonally Flooded
- PUBH – Palustrine Unconsolidated Bottom Permanently Flooded

As with the project site mapping, the NWI mapping within the project vicinity is accurate only at a coarse scale. Extensive wetland delineations associated with various project proposals and wetland mitigation activities have been conducted throughout the project vicinity, and these defined the actual boundaries of many of the wetlands within the project vicinity more accurately.

There are two wetland mitigation sites present in the vicinity of the project site. The Parcel 1A wetland mitigation site, located immediately east of Parcel 1A, was established in 1994 under USACE permit number 94-00061. This approximately 7.9-acre wetland is a depressional, palustrine forested wetland (PFO), vegetated with mature black cottonwood trees and a variety of native shrubs and herbaceous species.

The Parcel 2 wetland mitigation site is an approximately 16.4-acre mitigation site, situated on an approximately 31.3-acre parcel north of the existing Terminal 5 site. The mitigation site was established in 2000, under USACE permit number 96-1850, for wetland impacts associated with the initial development of Parcel 1A. The mitigation site received final approval from the USACE in 2007. The site is currently a mosaic of forested, scrub-shrub, and emergent vegetation.

The most significant complex of wetlands in the project vicinity is associated with the southern end of Vancouver Lake. These wetlands are a mosaic of emergent, scrub-shrub, and forested wetlands that are hydrologically connected to Vancouver Lake and, by extension, the Columbia River. These wetlands provide high quality seasonally inundated, tidally influenced, and permanently flooded habitats that most closely resemble the original hydrologic and wetland habitat functions of the Vancouver Lake Lowlands. An approximately 154-acre portion of this wetland complex, located on portions of Port Parcels 6 and 7, has been established as the CRWMB.

There are several emergent wetlands west and northwest of the project site as well. The NWI identifies emergent wetlands on property west of the Terminal 5 property, and on Port parcels 3, 4, and 5. A wetland delineation conducted on parcels 3, 4, and 5 in 2001 identified approximately 148 acres of wetland on these parcels (The JD White Company, Inc. 2001). The delineation concluded that, because of their limited vegetative structural diversity, these wetlands provide primarily water quality functions but also provide some wildlife habitat function.

Project Shipping Prism – The shipping prism includes only the Lower Columbia River and adjacent marine waters. While there are numerous backwater and side channel wetland habitats present on the Lower Columbia River, a detailed analysis of the quantity and/or quality of these wetlands is beyond the scope of this document

3.5.4 Impacts

3.5.4.1 Construction

Impacts associated with the construction of the proposed upland facilities and in-water improvements have the potential to result in effects associated with direct permanent and temporary modification of terrestrial and aquatic habitats as well as through the potential for temporarily reduced water quality conditions during construction, and through the generation of temporarily elevated levels of underwater and terrestrial noise during pile installation.

None of these impacts are expected to result in any measurable or significant temporary or permanent wetland impacts at the project site, project vicinity, or project shipping prism scales. There are no wetlands present on the project site, and the project will not result in any direct permanent or temporary wetland fills. At the scale of the project vicinity, there is a chance that off-site wetlands would be indirectly permanently and/or temporarily affected by construction or operational water quality impacts. Wetlands within the shipping prism would not be affected by construction-related water quality impacts. Wetland function will not be affected by temporarily elevated noise levels during construction.

3.5.4.2 Operation

Impacts to wetlands associated with operation of the proposed Facility would also be minor in extent. Wetlands could be affected by impacts associated with operational water quality, including an increased potential for spills or leaks associated with on-site equipment and machinery, and an increased potential for catastrophic accidents such as a spill to surface waters. However, none of these poses a significant risk to the quantity or quality of wetland habitats.

There are no wetlands on the project site that would be affected by water quality-related impacts associated with operation of the Facility.

At the scale of the project vicinity, wetlands within the project vicinity have the potential to be affected by impacts associated with construction and operational water quality. Accidental leaks or spills of fuel or other chemicals into groundwater at the project site have the potential to reduce habitat function of wetlands in the vicinity. Increased stormwater associated with new impervious surface also has the potential to indirectly affect wetlands within the project vicinity.

Within the shipping prism, wetlands also have the potential to be affected by impacts associated with construction and operational water quality, and could also potentially be affected by the potential for increased shipping traffic. Wetlands within the shipping prism could be indirectly affected through increased potential for accidental leaks or spills, effects associated with

increased stormwater, through the introduction of exotic aquatic plant or animal species, and through the potential for catastrophic events such as a spill to surface waters.

3.5.5 Mitigation Measures

The proposed project has been designed to avoid and/or minimize impacts to wetlands to the greatest extent possible. The project will implement several impact minimization measures and BMPs during construction to further reduce or mitigate the potential for impacts to wetlands.

Direct Habitat Effects

The upland facilities associated with the project have been located on developed portions of an existing industrial site, and no wetlands are present at the site. By siting the project in a developed location, the project has completely avoided the need to directly impact wetlands.

These impact minimization measures and BMPs fully mitigate for the direct habitat modification impacts associated with the project.

Temporary Water Quality Impacts

The project has the potential to result in temporary water quality impacts during construction which could affect off-site wetlands within the project vicinity or shipping prism. Construction at the site will be governed by an SPCC plan (Appendix B.2), which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

These impact minimization measures and BMPs fully mitigate for the temporary water quality impacts associated with the project.

Operational Water Quality Impacts

The proposed project has the potential to result in indirect effects to wetlands through operational water quality impacts including an increased potential for impacts associated with stormwater management at the site and spills or leaks associated with on-site equipment and machinery, and a potential for catastrophic accidents such as spills to surface waters.

As described in section 2.11, the project has the potential to increase stormwater runoff at the site, which could affect water quality and quantity. The proposed stormwater treatment will provide treatment to a level that is consistent with existing treatment at the site, which will ensure that off-site wetlands are not adversely affected by operational stormwater.

Operations at the site will be governed by an SPCC plan (Appendix B.2), which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. These include inspecting construction equipment daily to ensure that there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products, and locating temporary material and equipment staging areas above the OHWM of the waterbody and outside environmentally sensitive areas.

Transport ships are constructed with double hulls to minimize the potential for the release of cargo in the event of a spill. In addition, international convention requires that a SOPEP govern the operation of each ship. All ships also will be required to comply with state spill prevention

and contingency plans. The likelihood of a catastrophic spill is very low, and the proposed BMPs and safety and security measures will manage the risk of impacts to wetlands effectively.

These impact minimization measures and BMPs fully mitigate for the operational water quality impacts associated with the project.

3.5.6 Federal Approvals

Because no wetlands will be impacted by the Facility, no federal approvals will be necessary related to wetlands.

Section 3.6 – Energy and Natural Resources

WAC 463-60-342
Natural environment – Energy and natural resources.

(1) Amount required/rate of use/efficiency. The application shall describe the rate of use and efficiency of consumption of energy and natural resources during both construction and operation of the proposed facility.

(2) Source/availability. The application shall describe the sources of supply, locations of use, types, amounts, and availability of energy or resources to be used or consumed during construction and operation of the facility.

(3) Nonrenewable resources. The application shall describe all nonrenewable resources that will be used, made inaccessible or unusable by construction and operation of the facility.

(4) Conservation and renewable resources. The application shall describe conservation measures and/or renewable resources which will or could be used during construction and operation of the facility.

(5) Scenic resources. The application shall describe any scenic resources which may be affected by the facility or discharges from the facility.

(Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-342, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-342, filed 11/6/92, effective 12/7/92.)

Section 3.6 Energy and Natural Resources

The Facility will consume limited amounts of energy and natural resources during construction. During operation, the Facility will not consume resources directly for the generation of electricity or for the production of a material product, but will consume resources indirectly to support the receipt, conveyance, and storage of crude oil.

3.6.1 Energy and Natural Resources Required

3.6.1.1 Construction

The Facility will be constructed of manufactured materials that require energy to produce. Energy resources also will be consumed transporting these materials to the site. Further, energy sources will be used to operate onsite construction equipment. The Facility's direct energy consumption during construction will be predominantly in the forms of electricity and fuel as follows.

- Electricity: Construction will consume electricity to provide temporary construction site lighting and heat buildings, and to power tools and equipment.
- Fuel: Gasoline and diesel will be used to fuel portable generators, construction vehicles, and other construction equipment while welding gases will be used for the field erection and construction of structures, storage tanks, piping systems, transfer pipelines and rail.

Construction of the Facility will consume materials in the approximate following amounts:

- Steel: Approximately 18,500 tons of steel will be consumed to construct ground improvements (piling), building structures, and siding and roofing, storage tanks, piping, operations access structures (catwalks and gangways), rail loops, and dock improvements.
- Gravel: Approximately 9,800 cubic yards of gravel will be consumed to produce concrete and for ground surface stabilization post-construction.
- Concrete: Approximately 85,000 cubic yards of concrete will be consumed to construct piping trenches, containment basins, building foundations, equipment pads, and storage tank foundations.
- Rail Ballast: Approximately 17,500 cubic yards of rail ballast will be required for the construction of two rail loops.
- Berm construction materials: Approximately 227,000 cubic yards of materials will be needed for berm construction. To the extent possible, the ground materials and soils excavated to construct the trenches in the unloading building and elsewhere at the site are proposed to be used to construct the containment berm that will surround the storage area. As noted in section 4.1.3, not all the materials excavated from the site may be suited for use as part of berm construction.
- Tank area containment liner: Approximately 100,000 square yards of HDPE impervious liner will be placed underneath the tank storage area.
- Asphalt: Approximately 50,000 cubic yards of asphalt will be required to construct new hard surfaces planned throughout the Facility, including hard surfaces between rail tracks in the

unloading building and additional hard surfaces required for parking and ground stabilization in the remainder of the Facility.

- Water: Water use at the site during construction will primarily consist of general water use for construction activities, including dust suppression and the pre-commissioning testing of piping, transfer pipelines, and storage tanks to identify leaks. General construction activities are anticipated to use 20,000 gallons per day. Testing and commissioning of the pipelines, tanks and water lines will require additional water for pipeline flushing and hydrostatic testing. Testing and commissioning the transfer pipelines and storage tanks will be sequenced to reuse as much testing water as possible on site. Assuming no water reuse, testing and commissioning would require a total of 98.4 million gallons of water. With reuse, a total of 20 million gallons of water is expected to be required for testing and commissioning.
- Paints, adhesives, and solvents will be used for protective coatings and finishes. Lubricating oils, greases, and hydraulic fuels will be used in the maintenance of construction equipment.

3.6.1.2 Operation

Once constructed and commissioned, the Facility will use energy for day-to-day operations as follows.

- Natural Gas: Approximately 1,419,286 MMBtu/year or 1,419 million cubic feet per year will be used when the Facility is operating at full capacity. Natural gas will be used to power the boilers that will provide steam to heat crude oil during unloading of rail cars and storage in the storage tanks, as well as in the dock safety skid and MVCU to ensure safe and appropriate operating conditions while marine vessels are being loaded.
- Fuel: Gasoline and diesel will be used to fuel maintenance vehicles and fuel-powered maintenance equipment, low sulfur diesel will be used for emergency firing and testing of fire pumps.
- Electricity: Electricity will be used to heat and light indoor spaces and for outdoor lighting and to power facility equipment and control systems.

The Facility will consume water and incidental operations materials as follows.

- Process water will be consumed at an average of 78,900 gallons per day to operate the boiler plants, for miscellaneous part/equipment wash, and as cooling water for the fire suppression pumps (see section 2.6.4).
- Potable water will be consumed at an average of 8,500 gallons per day (see section 2.6.5).
- Incidental operations materials such as paints, adhesives, and solvents will be used to maintain protective coatings and finishes. Lubricating oils, greases, and hydraulic fuels will be used to maintain equipment.

3.6.2 Sources

3.6.2.1 Sources during Construction

Construction materials will be sourced locally, regionally, and nationally. Procurement will occur prior to construction. Pending the identification of actual suppliers, the Applicant anticipates that:

- Steel will be purchased both within and beyond the Pacific Northwest region;
- Gravel, concrete, rail ballast, berm construction materials, and asphalt will be sourced locally from vendors in the vicinity of the Facility;
- Water will be purchased from the City;
- Gasoline and diesel fuel will be purchased from local and regional distributors;
- Electricity will be provided by and purchased from CPU; and
- Incidental construction materials and lubricating oils, greases, and hydraulic fuels will be sourced locally and/or regionally.

3.6.2.2 Sources during Operation

For the most part, resources and materials used during operation will be sourced locally and regionally; however, certain materials required to maintain specialized equipment may need to be sourced nationally. Procurement will occur prior to and during operations. Pending the identification of actual suppliers, the Applicant anticipates that:

- Process and potable water will be purchased from the City; small amounts of bottled potable water will be purchased locally for use in Area 400.
- Gasoline and diesel fuel will be purchased from local and regional distributors; and Electricity will be provided by and purchased from CPU.

3.6.3 Nonrenewable Resources

A wide variety of natural resources will be used to construct and operate the Facility. While some materials are non-renewable in their original state or at their original source, there are many opportunities for the materials to be re-used or recycled, as follows.

- Although the steel used to construct the Facility may have been originally produced from iron ore, a non-renewable resource, upon decommissioning of the Facility, scrap steel can be sold and recycled.
- Concrete, gravel, berm materials, and rail ballast will come from quarry pits; however, upon decommissioning of the Facility, some of these materials may be re-used at other construction sites.
- Asphalt is produced from non-renewable resources, which can be recycled.
- A certain percentage of the water used to construct and operate the Facility will be lost to evaporation; however, the water discharged to the City WWTP will be treated and ultimately discharged to the Columbia River where it will be re-integrated into natural processes.
- The fuel and natural gas used to construct and operate the Facility will be sourced from non-renewable sources.
- Electricity consumed at the Facility will be sourced from the regional generation mix of renewable and non-renewable resources.
- Incidental construction and operation materials (paints, greases, etc.) are for the most part sourced from non-renewable origins, but many can be recycled after their use.

Within the local and regional economies, the materials needed to construct and operate the Facility are readily available. The amount of electricity consumed during construction and

operations will not affect other users or locally available energy supplies. No natural resources or energy supplies will be made inaccessible or unusable by construction and operation of the Facility.

3.6.4 Conservation Measures and Renewable Resources

During construction, conservation measures will include construction waste recycling when possible and the coordination of carpooling between construction workers to reduce vehicle emissions. The use of water for hydrostatic testing will be minimized to the extent possible.

Operations BMPs will be developed that include conservation measures for nonrenewable resources such as water, fuel, and electricity. These BMPs may include the following conservation measures when cost effective:

- Installation of high efficiency electrical fixtures, appliances, and light bulbs in the support/administrative building;
- Installation of LED light bulbs throughout the Facility;
- Using low-water flush toilets in the support/administrative building;
- Coordinating carpooling among operations workers;
- Recycling waste office paper and aluminum; and
- Sending used oils, lubricants, and greases to facilities where they can be recycled when possible.
- Using vehicles that comply with current fuel consumption and emission standards.

3.6.5 Scenic Resources

A scenic resource can generally be defined as a unique combination of visual elements yielding exceptionally high aesthetic values. However, this project site and its surroundings are typified by industrial facilities such as large industrial buildings, large expanses of impervious surfacing, utility and railroad corridors, fencing, and open storage. The site is generally flat, and is located at the Port on the north bank of the Columbia River, west of downtown Vancouver, and south of NW Lower River Road (SR 501). The adjacent natural areas include deciduous riparian vegetation, open grassland, and natural and modified shoreline conditions.

The site and its surroundings have been highly modified from their original natural state by riverbank stabilization, imported fill, and the development of heavy industrial land uses and transportation corridors. The stormwater and mitigation sites operated by the Port adjacent to the project site offer some vegetation; however, these limited sites are generally disconnected, both visually and physically, from the surrounding landscape. The dominant natural features of the area are the Columbia River, Vancouver Lake, and the Vancouver Lake Lowlands.

The Columbia River is directly south of the site. The Port of Portland owns the western end of Hayden Island on the south shore of the Columbia River across the river from the Port. The views northeast of the site are dominated by low-density residential development located on the bluff east of the site. Within the project limits, past and current industrial activities have modified the character of the landscape greatly. SR 501, industrial uses, and overhead utility lines separate the project area visually and physically from the adjacent natural features.

The visual quality of the project area is consistent with the manmade conditions within the Port.