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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. Three series of field explorations of subsurface materials and conditions were conducted. A geotechnical investigation of Facility upland areas was conducted in the summer of 2013. The report of these investigations is provided as Appendix L.1 to this ASC. The investigation addressed the entire Facility site with the exception of a portion of Area 300. A geotechnical investigation of project areas around the proposed berth modifications was completed in the summer of 2014. The report of these investigations is provided as Appendix L.2 to this ASC. Finally, additional geotechnical investigations were completed in areas 300 (including the locations that were not tested in 2013) and 400 in late 2014. The report of these investigations is provided as Appendix L.3 to this ASC.

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, compaction and subsurface soil improvements 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 as addressed in Appendices L.1 through L.3.

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).

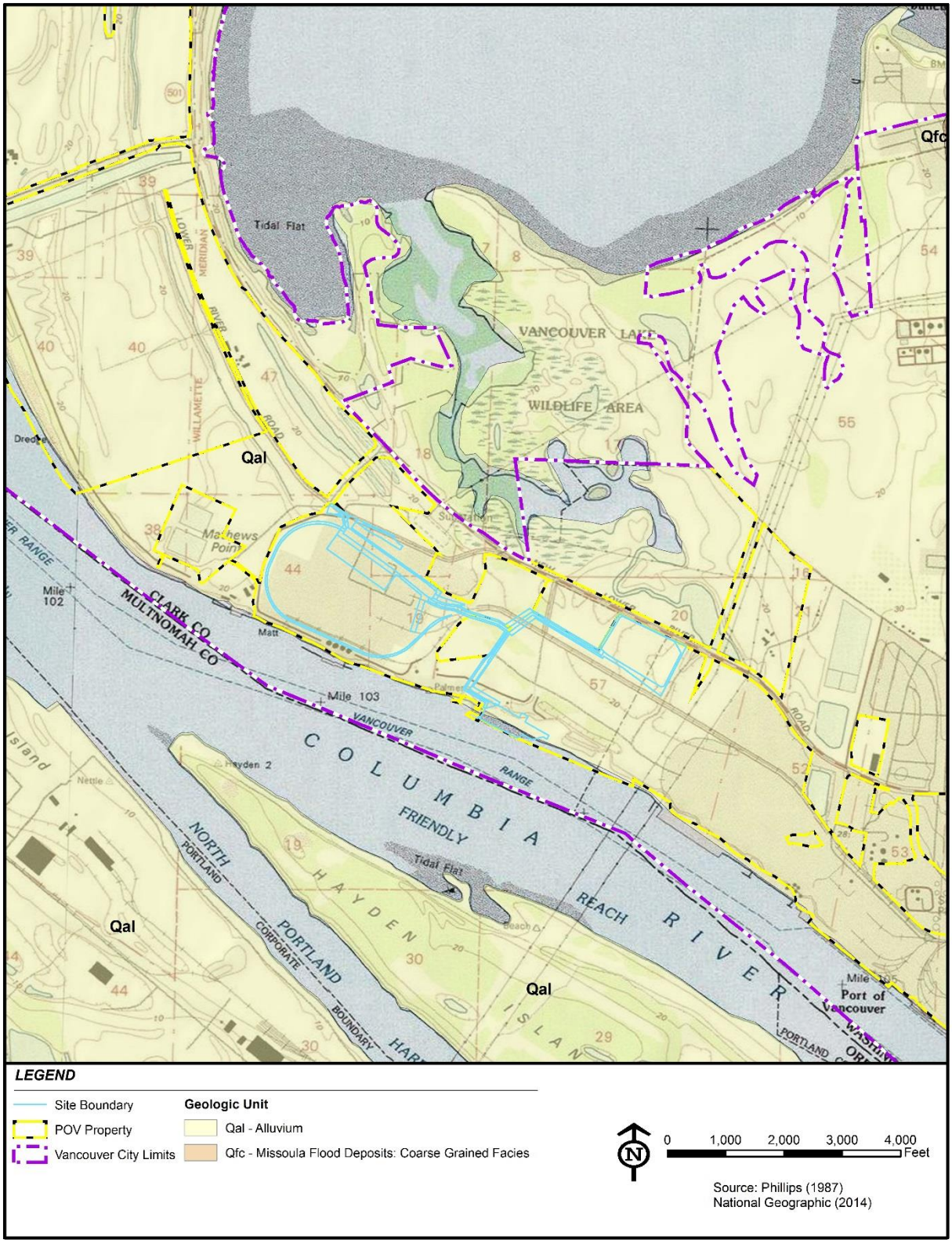

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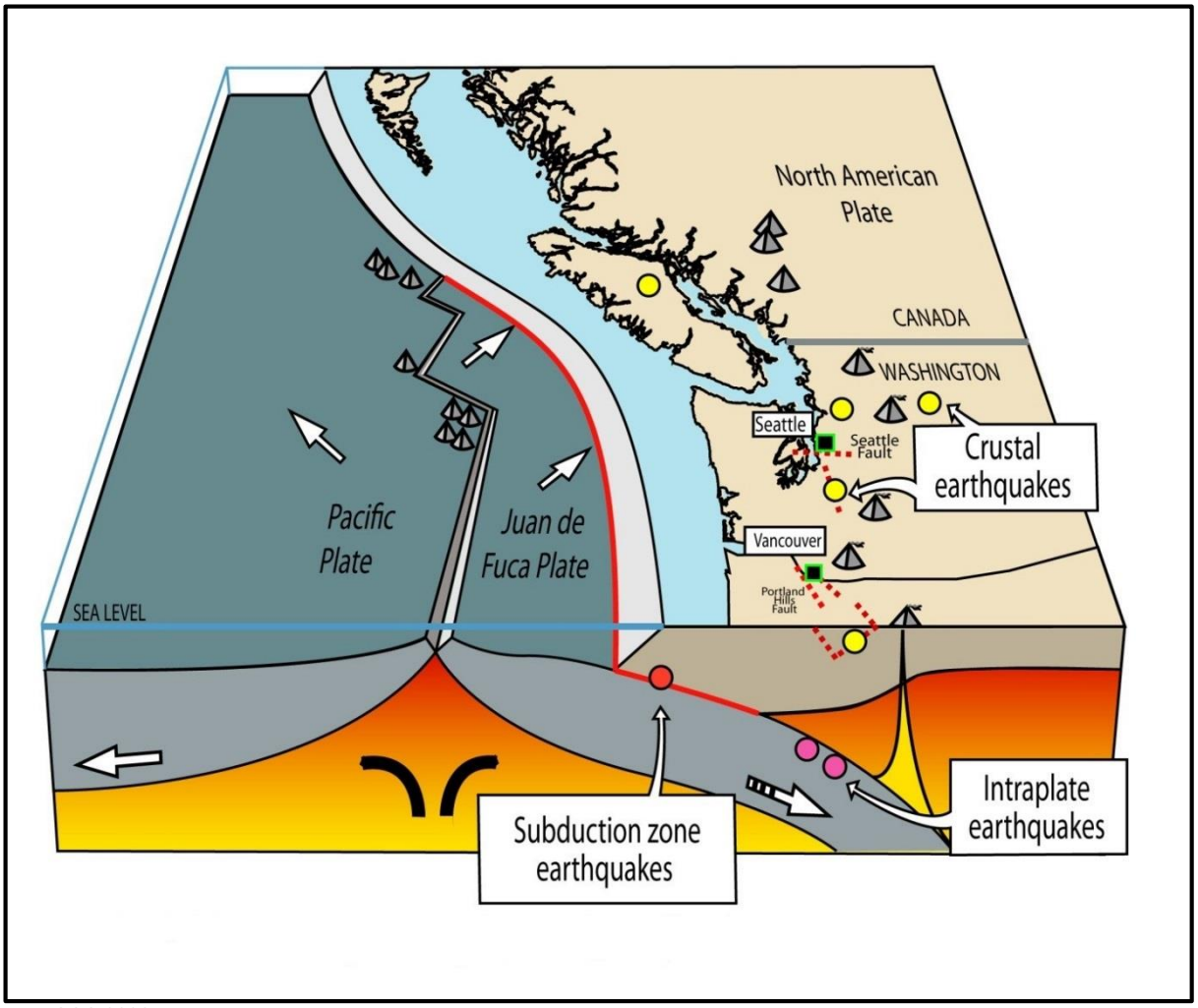
Figure 3.1-1. Site Geology (Revised)



Source: USGS 2000

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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) (see Table 3.1-1). 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 2.18.2, 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).

The Applicant's geotechnical investigations concluded that portions of the site could potentially liquefy during the design level earthquake resulting in settlement, a reduction of soil strength, and significant lateral spreading deformations near the riverbank. The geotechnical report

findings state ground improvements and deep structural foundations will be required to mitigate static and seismic settlement, liquefaction movement, and lateral deformations under the tanks, transfer pipeline, and near the dock abutment (Hayward Baker 2015, see Appendix L.3).

As illustrated in Figure 3.1-6, the USGS estimates that there is between a 0.01 and 0.02 percent annual probability that 4 inches or more of ash would be deposited at the site from eruptions throughout the Cascade Range, with the highest probability resulting 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.

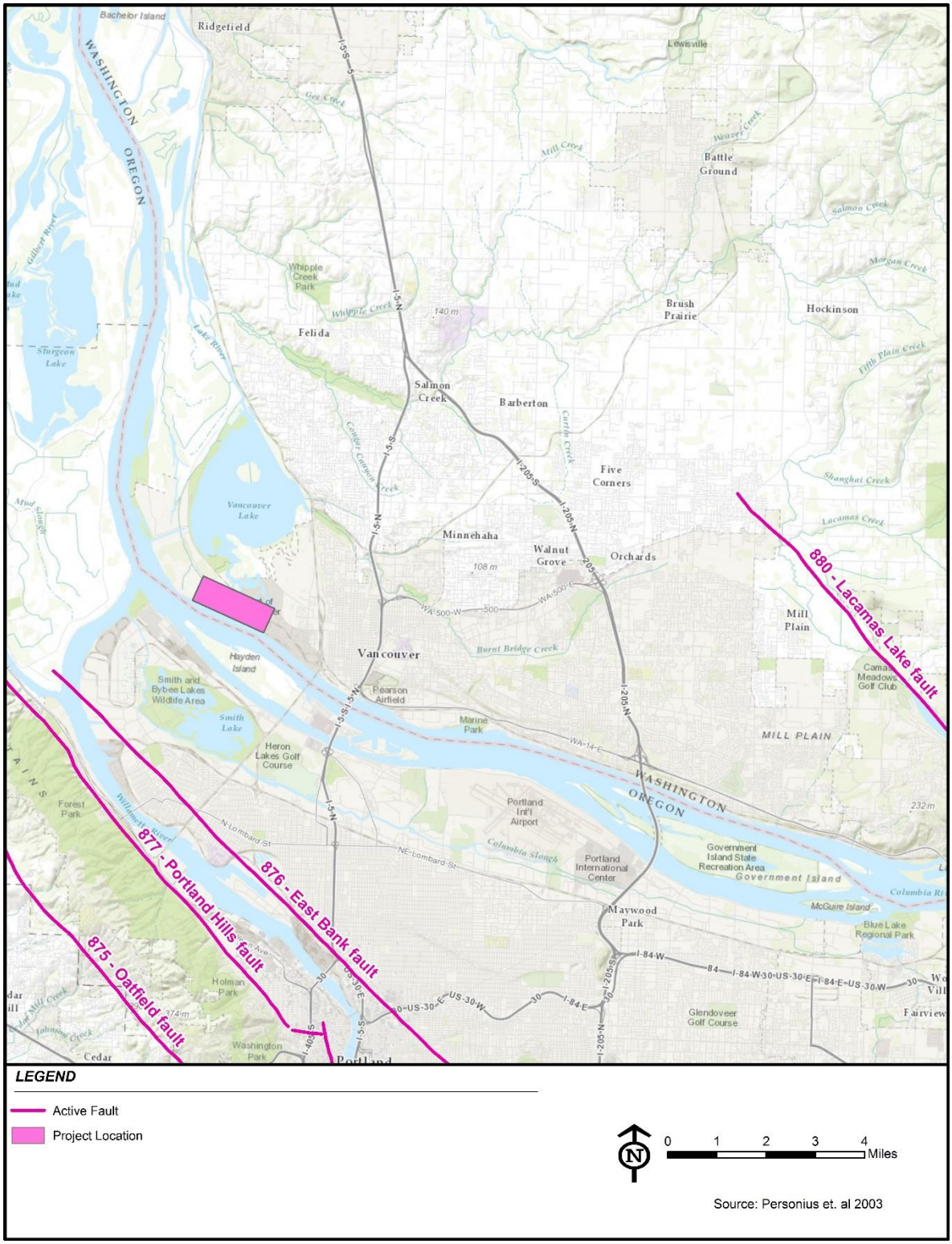

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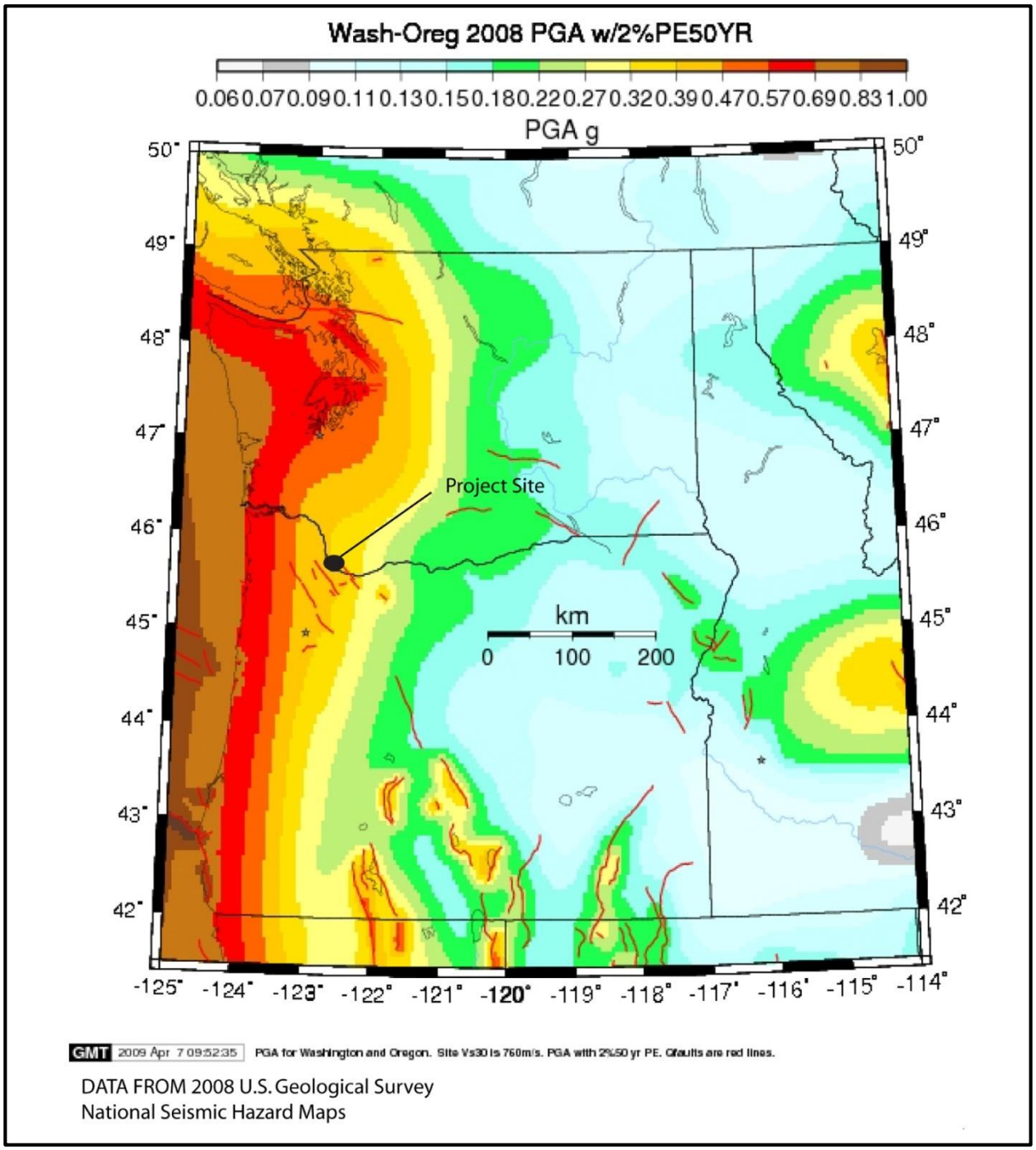
Figure 3.1-3. Local Fault Map (Revised)



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

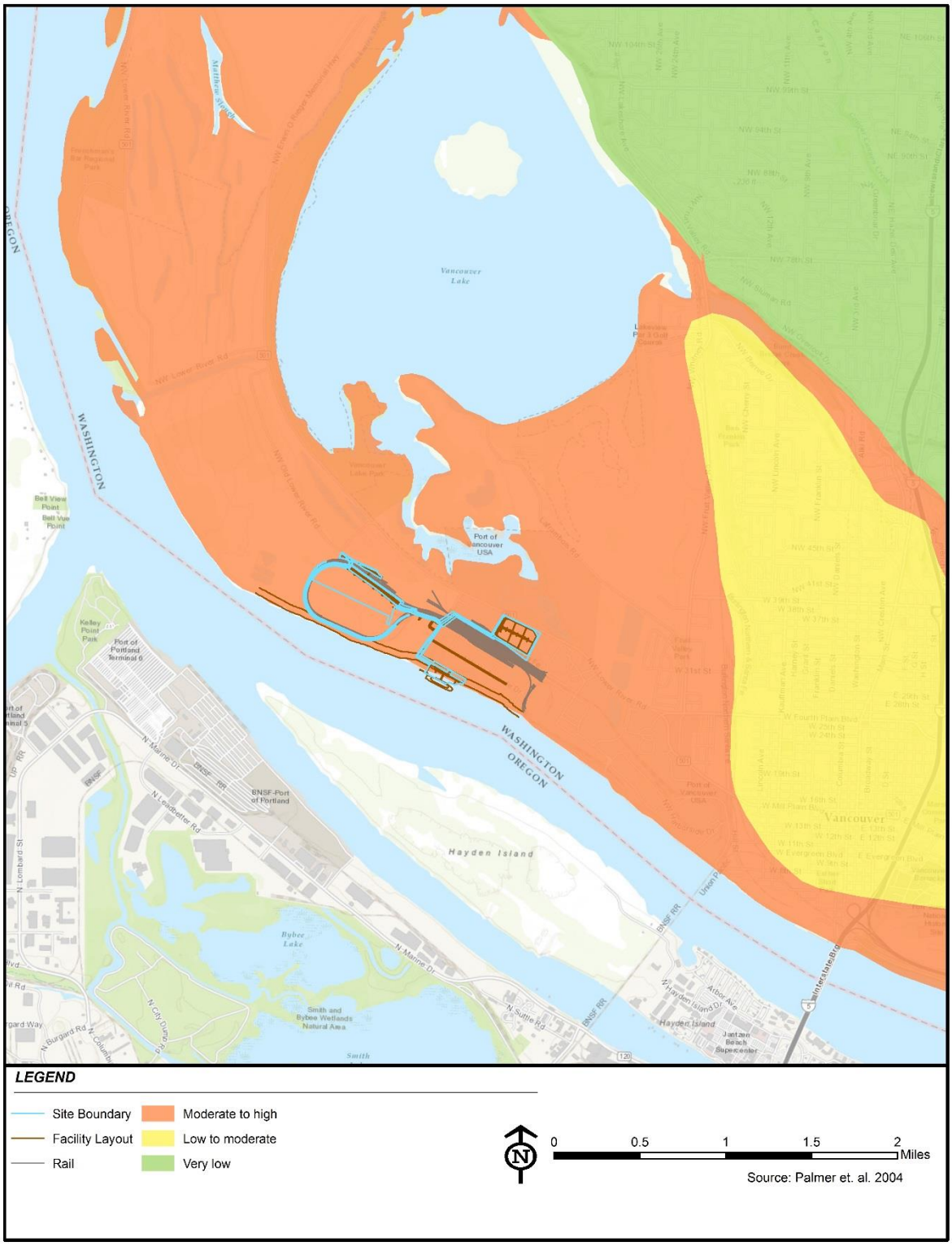


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Figure 3.1-5. Site Liquefaction Susceptibility

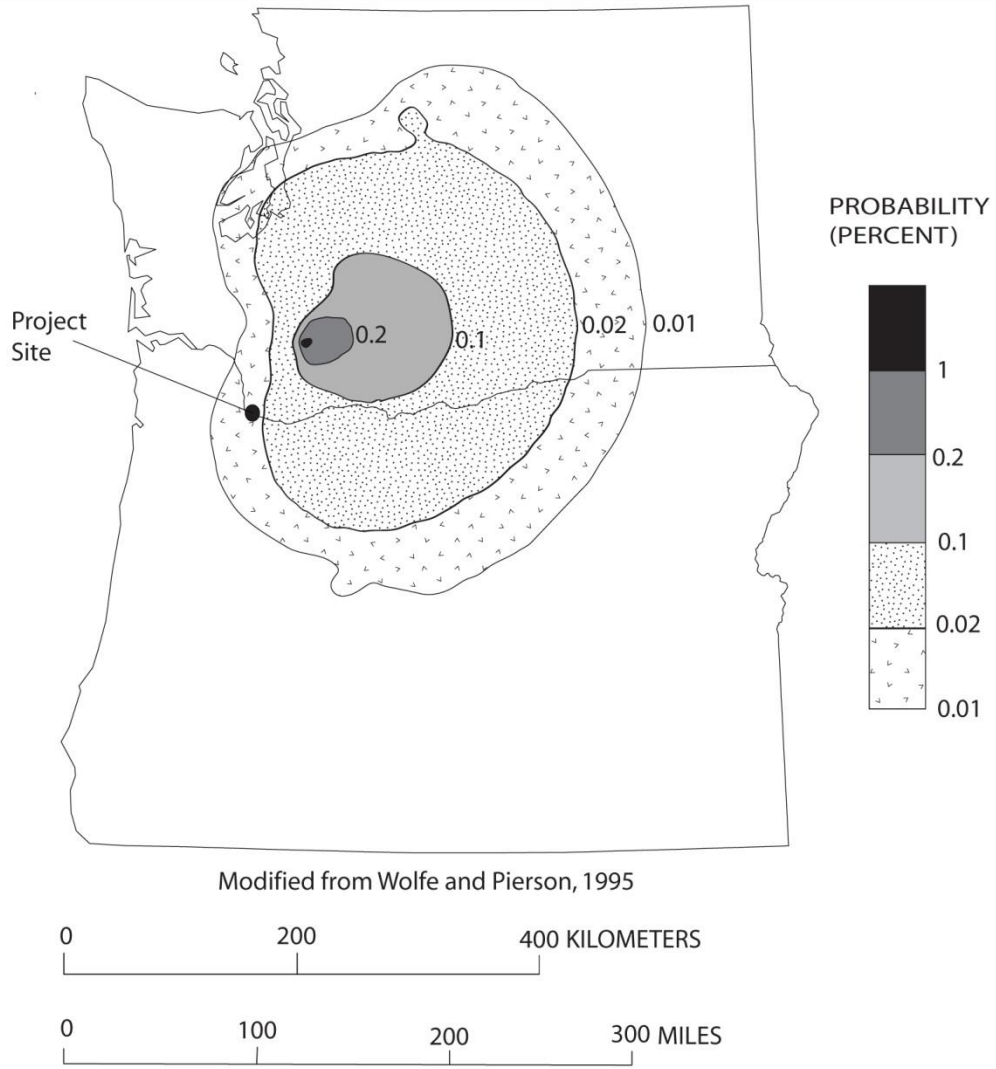

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Figure 3.1-6. Ash Accumulation

3.1.3.6 Mitigation

Based on the data derived from the geotechnical investigations described in section 3.1.1, the Applicant's geotechnical consultant established the seismic threshold, identified potential site risks, and conducted specific ground motion analyses for the upland portions of the site and for the site locations in vicinity of the dock structure (see Appendices L.1 and L.2). These data sets were used to establish design criteria for ground improvements, as well as aboveground structures, transfer pipelines, and storage tanks (see section 2.18.1.4 and Appendix L.3). The geotechnical investigations concluded that portions of the site could potentially liquefy during the design level earthquake resulting in settlement, a reduction of soil strength, and significant lateral spreading deformations near the riverbank. Several types of ground improvement methods and deep structural foundations could be implemented to mitigate liquefaction-induced settlement and lateral spreading deformations of the nature possible at the Facility location, as follows (Hayward Baker 2014, Hayward Baker 2015, see Appendix L.3).

- **Vibro-Stone Columns (Stone Columns** is a ground-improvement technique that constructs dense aggregate columns (stone columns) by means of a crane-suspended downhole vibrator, to reinforce all soils and densify granular soils. Vibro replacement stone columns are constructed with either the wet top feed process or the dry bottom feed process.

  In the wet top feed process, the vibrator penetrates to the design depth by means of the vibrator's weight and vibrations, as well as water jets located in the vibrator's tip. The stone (crushed stone or recycled concrete) is then introduced at the ground surface to the annular space around the vibrator created by the jetting water. The stone falls through the annular space to the vibrator tip, and fills the void created as the vibrator is lifted several feet. The vibrator is lowered, densifying and displacing the underlying stone. The vibro replacement process is repeated until a dense stone column is constructed to the ground surface.

  The dry bottom feed process is similar, except that no water jets are used and the stone is fed to the vibrator tip through a feed pipe attached to the vibrator. Predrilling of dense strata at the column location may be required for the vibrator to penetrate to the design depth. Both methods of construction create a high modulus stone column that reinforces the treatment zone and densifies surrounding granular soils.

- **Jet Grout** creates soilcrete (grouted soil) using a grouting monitor attached to the end of a drill stem. The jet grout monitor is advanced to the maximum treatment depth, and then high-velocity grout jets (and sometimes water and air) are initiated from ports in the side of the monitor. The jets erode and mix the in situ soil as the drill stem and jet grout monitor are rotated and raised.

  Depending on the application and soils to be treated, one of three variations is used: the single fluid system (slurry grout jet), the double fluid system (slurry grout jet surrounded by an air jet), or the triple fluid system (water jet surrounded by an air jet, with a lower grout jet). The jet grouting process constructs soilcrete panels, full columns, or anything in between (partial columns) with designed strength and permeability.

Jet grouting is effective across the widest range of soil types of any grouting system, including silts and most clays. Because it is an erosion-based system, soil erodibility plays a major role in predicting geometry, quality, and production. Cohesionless soils are typically more erodible by jet grouting than cohesive soils. Because the geometry and physical properties of the soilcrete are engineered, the properties of the soilcrete are readily and accurately predictable.

- **Deep Soil Mixing (DSM)** improves the characteristics of weak soils by mechanically mixing them with cementitious binder slurry. To construct columns, a powerful drill advances drill steel with radial mixing paddles located near the bottom of the drill string. The binder slurry is pumped through the drill steel to the tool as it advances, and additional soil mixing is achieved as the tool is withdrawn. To perform mass wet soil mixing, or mass stabilization, a horizontal axis rotary mixing tool is located at the end of a track hoe arm.

  The binder slurry is injected through a feed pipe attached to the arm. The process constructs individual soilcrete columns, rows of overlapping columns, or 100 percent mass stabilization, all with a designed strength and stiffness. The technique has been used to increase bearing capacity; decrease settlement; increase global stability; and mitigate liquefaction potential for planned structures, tanks, embankments, and levees.

- **Dry Soil Mixing** improves the characteristics of soft, high moisture content clays, peats, and other weak soils, by mechanically mixing them with a dry cementitious binder to create soilcrete. To construct columns, a high-speed drill advances drill steel with radial mixing paddles located near the bottom of the drill string. During penetration, the tool shears the soils preparing them for mixing. After the tool reaches the design depth, the binder is pumped pneumatically through the drill steel to the tool where it is mixed with the soil as the tool is withdrawn. To perform mass soil mixing, or mass stabilization, a horizontal axis rotary mixing tool is located at the end of a track hoe arm. The binder is pneumatically injected to the soil mixing tool through a feed pipe attached to the track hoe arm.

  The dry soil mixing process constructs individual soilcrete columns, rows of overlapping columns, or 100 percent mass stabilization, all with a designed strength and stiffness. The technique has been used to increase bearing capacity; mitigate liquefaction; fixate contaminants in situ; decrease settlement; and increase global stability for planned structures, embankments, and levees. Dry soil mixing is low vibration and quiet, and uses readily available materials. The process is often used in high groundwater conditions and has the advantage of producing practically no spoil for disposal.

- **Wick drains** provide drainage paths for pore water in soft compressible soil, using prefabricated geotextile filter-wrapped plastic strips with molded channels. These drains assist in draining and capturing excess pore water pressures that can develop during the stone column installation or during an earthquake.

  A hollow mandrel is mounted on an excavator or crane mast. The wick drain material, contained on a spool, is fed down through the mandrel and connected to an expendable anchor plate at the bottom of the mandrel. A vibratory hammer or static method is used to

insert the mandrel to design depth. The mandrel is then extracted, leaving the wick drain in place. The wick drain is cut at the ground surface, a new anchor plate is connected to it, and the mandrel is moved to the next location. A pattern of installed vertical wick drains provides short drainage paths for pore water; thereby accelerating the consolidation process and allowing for a faster construction schedule.

Structural foundations that will be used include the following:

- **Driven piles** are deep foundation elements driven to a design depth or resistance. If penetration of dense soil is required, predrilling may be required for the pile to penetrate to the design depth. Steel piles are anticipated to be used. The finished foundation element resists compressive, uplift, and lateral loads.

- **Spread footings** are shallow foundation elements that are constructed by excavating the footing footprint, layering base materials, concrete forming and pouring, and backfilling.

A preliminary ground improvement design was submitted to EFSEC for review (Appendix L.3), and is described in section 2.18.1.2.

It is anticipated that EFSEC will contract with the City for the review of final project design for compliance with the required code provisions as well as for providing the required inspections and issuance of occupancy permits. The Applicant will submit the required plans, which will be designed in compliance with the codes and requirements referred to above.

The Applicant will also implement the following plans.

- Construction Emergency Plan to address actions and responses related to seismic activities
- Operations Emergency Plan to address actions and responses to site emergencies, including those related to seismic events

3.1.4 Soils

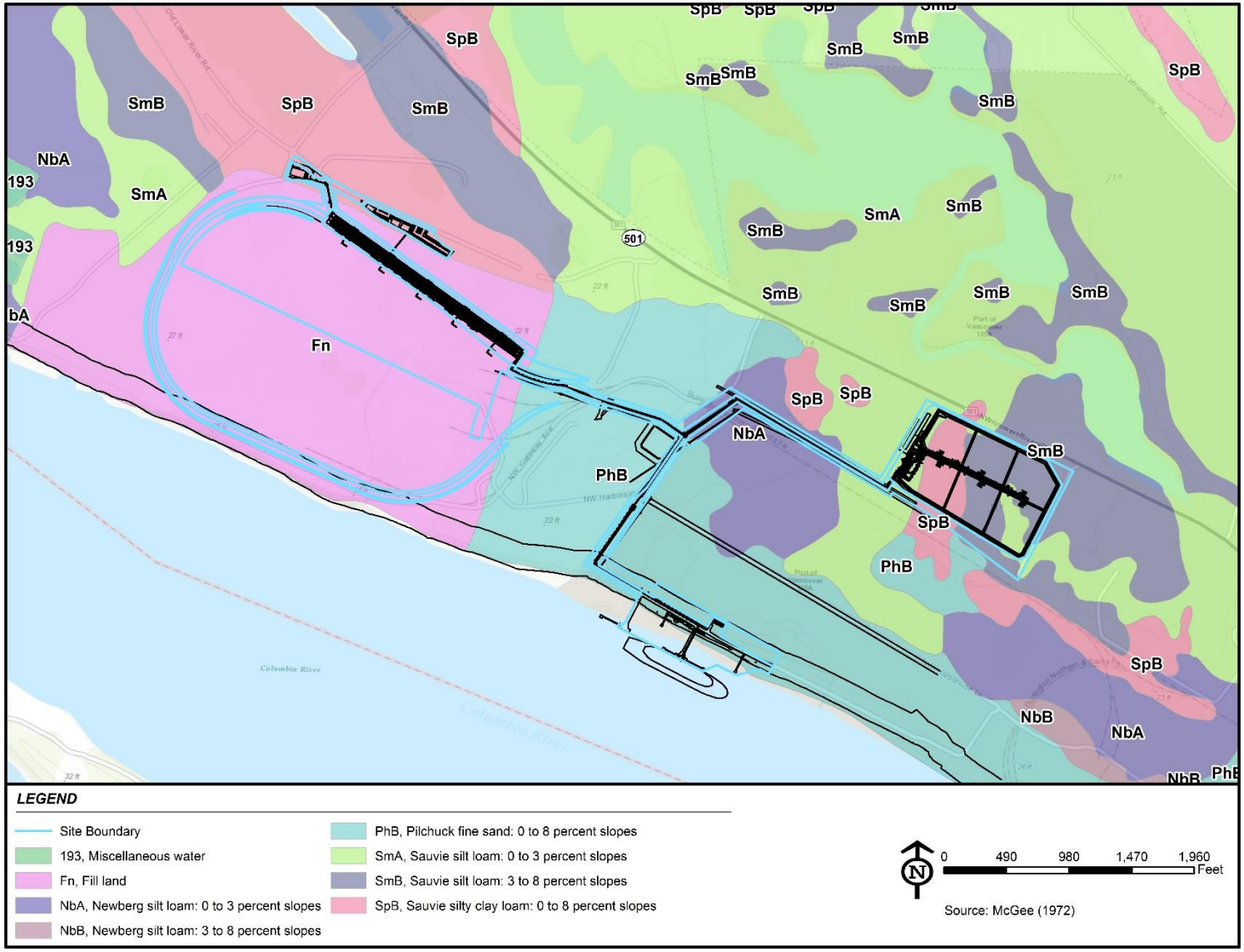
Soil types in the vicinity of the site have been identified by the Natural Resource and Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) (McGee, 1972). The following soil types are found within the vicinity of the project site (Figure 3.1-7).

- **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.



BergerABAM

Figure 3.1-7. Soil Map (Revised)

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 deep soil mixing and/or jet grouting may be necessary for soils that are susceptible to settlement or liquefaction, as described above. 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. As described in section 3.1.3.6, appropriate types of ground improvements will be selected during final design based on the specified performance criteria for the elements of the Facility. Final ground improvement methods will be determined during design refinements and documented in construction plans submitted to EFSEC for review.

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. At the Marine Terminal (Area 400), there will be a temporary topographical modification to the shoreline that will include temporary benching of the shoreline at the location of ground improvement installation to accommodate safe construction equipment staging during installation of ground improvements. The shoreline will be returned to its existing configuration when construction is complete. 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. Temporary benching used along the shoreline during construction will be removed when construction activities are complete and the shoreline will be restored to its previous condition. Therefore, no mitigation measures will be required for topography impacts.

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. 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 ordinary high water mark (OHWM) and include the construction of the MVCU, control room, maintenance parking area, and transfer pipeline, as well as the temporary benching during ground improvements installation. Construction in these areas may disturb soils and could lead to potential soil erosion if proper

mitigation practices are not in place. The project will not significantly impact the potential for erosion along the riverbank.

3.1.7.2 Mitigation

The potential erosion impacts (temporary erosion, long-term erosion, and sedimentation) will be minimized through the use of mitigation measures described below. Erosion impacts associated with construction and operation will be mitigated by erosion and sedimentation control measures outlined in the construction and operation stormwater polution prevention plans (SWPPPs) (Appendices C.1 and C.2), and through implementation of city, county, and state best management practices (BMPs) and as described in section 2.11 of this application.

Construction

The Applicant submitted a preliminary construction SWPPP (cSWPPP) to EFSEC for review (Appendix C.1). The cSWPPP identifies the stormwater pollution prevention measures to minimize potential impacts of erosion and sediment transport at the construction site and is described in section 2.11. The Applicant will also implement city, county, and state BMPs.

Construction staging and laydown activities will only occur in areas that have been previously disturbed and developed. Construction activities will be sequenced and controlled to limit erosion. In some locations, light surface leveling might be required to provide safe access to the site by construction employees and equipment. Surface disturbance in these areas is not anticipated. Clearing, excavation, and grading will be limited to the areas necessary to construct the Facility. Individual excavations will be used for equipment foundations. Following completion of foundations, the site will be filled and compacted to the final grade.

Disturbed areas will be surrounded with silt fencing, wattles to prevent migration of eroded materials to other areas. Interim surface protection measures, including temporary ditches, sediment fences, silt traps, dust control, straw matting, and erosion control blankets, will be required to prevent erosion. Earth movement and other construction activities associated with installation of the benches and ground improvement installation activities will be subject to the cSWPPP and associated BMPs.

Final surface restoration will be completed within 14 days of an area's final disturbance. All construction practices will emphasize erosion control to eliminate the sources of stormwater contamination. 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.

Fill, grade, and excavation areas will be completed per final construction plans submitted to EFSEC. Permanent erosion control will be installed within 14 days upon completion of construction activities, including on-site stormwater collection systems.

Operation

Permanent erosion control will be installed as necessary upon completion of construction activities, including on-site stormwater collection systems.

The Applicant will use the following erosion control measures during operation of the Facility:

- Design site surfacing to capture stormwater directly from hardscape to limit erosion

- Design industrial yards and landscape areas to either infiltrate or use flow dispersion to avoid concentration of runoff that contributes to erosion
- Incorporate BMPs from the 2012 Stormwater Management Manual for Western Washington for erosion and sediment control during operations
- Stabilize surfaces that may become exposed during operation in accordance with Facility National Pollutant Discharge Elimination System (NPDES) construction stormwater permit and final construction plan requirements
- Collect and convey stormwater from new impervious surfaces using systems that avoid contact of stormwater with bare soil
- Incorporate BMPs from the stormwater manual addressing soil erosion and sediment control for industrial yard areas

In addition. Applicant has submitted a preliminary operation SWPPP (oSWPPP) to EFSEC for review (Appendix C.2). The oSWPPP identifies the stormwater pollution prevention measures to minimize potential erosion impacts (long-term) at the Facility and is described in section 2.11.

The Applicant will be responsible to ensure Facility stormwater components operate in compliance with the stormwater permits issued by EFSEC relative to the Facility. The Port will continue to be in charge of compliance with permit requirements applicable to Port systems.

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. 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 will issue the preconstruction permits that allow construction of the Facility to begin.

The review of air quality impacts of a source requires an understanding of the difference between air emissions and air contaminant concentrations. Emission regulations limit the amount of a particular air pollutant that can be emitted (e.g., 10 pounds per hour [lbs/hr] of particulate matter) from a stack or other emission unit. Outdoor ambient air quality standards limit concentrations of certain air pollutants (in parts per million [ppm] or micrograms per cubic meter of air [$\mu g/m^3$]) in the outdoor 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 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 Best Available Control Technology (BACT) has been employed for all pollutants not previously emitted, evaluates ambient concentrations resulting from these emissions to ensure compliance with ambient air quality standards, and issues an Order of Approval.

3.2.1.2 Prevention of Significant Deterioration (PSD)

The PSD regulations were established by EPA 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. The Facility will not be subject to PSD regulations because it will not have the potential to emit any regulated pollutant at an annual rate that exceeds the PSD threshold (see Table 2.12-1).

3.2.1.3 Emission Standards

EPA 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 Small Industrial-Commercial-Institutional Steam Generating Units;

- Subpart Kb, Standards of Performance for Volatile Organic Liquid Storage Vessels; (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984
- 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.

Under the provisions of Section 112 of the 1990 Clean Air Act Amendments, EPA regulates emissions of 187 HAPs from stationary sources. EPA has identified specific industry categories and tailors controls to the major sources of emissions and the HAPs of concern from those particular industry categories. The emission control requirements for a particular category are determined to by the maximum achieveable control technology (MACT) standards being achieved by the best-performing similar sources in that category. As discussed in greater detail in section 5.1.3.1.2, the following MACT standards apply to the Facility:

- Part 61, Subpart A – General Provisions;
- 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
- Part 63, Subpart A, General Provisions.

As discussed in section 5.1, Attachment 1, BACT is the best control technology technology determined by the permitting authority on a case-by-case basis that is feasible for a specific application, considering the economic, energy and environmental and other costs of each technology 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 pollutants 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.

3.2.1.4 Ambient Air Quality Standards

Ambient air quality standards have been established by EPA 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 provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Table 3.2-1. Ambient Air Quality Standards

Pollutant	National Ambient Air Quality Standards		Washington
	National Primary	National Secondary	
Inhalable Particulate (PM_{10})			
24-hour Average ($\mu g/m^3$)[b]	150	150	150
Fine Particulate ($PM_{2.5}$)			
Annual Arith. Mean ($\mu g/m^3$)[c]	12	15	12
24-hour Average ($\mu g/m^3$)[d]	35	35	35
Sulfur Dioxide (SO_2)			
Annual Arith Mean ($\mu g/m^3$)			52
24-hour Average ($\mu g/m^3$)			365
3-hour Average ($\mu g/m^3$)		1,300	1,300
1-hour Average ($\mu g/m^3$)[e]	196		196
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)			
Annual Arithmetic Average ($\mu g/m^3$)	100	100	100
1-hour Average ($\mu g/m^3$)[h]	188		188
Lead (Pb)			
Quarterly Average ($\mu g/m^3$)	0.15	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 PM_{10} concentrations at each monitor.

[c] Based on the 3-year average of annual arithmetic mean $PM_{2.5}$ concentrations.

[d] Based on the 3-year average of the 98th percentile of 24-hour $PM_{2.5}$ 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 $\mu g/m^3$, 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)

3.2.1.5 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 by Ecology to protect human health. The regulations also identify Small Quantity Emission Rates (SQERs). If the total emissions of a given TAP 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 TAP emissions from the source are sufficiently low to protect human health. The Facility TAP emissions are below either the SQERs or ASILs established by Ecology.

3.2.1.6 Existing Air Quality

Ecology and EPA designate regions as being "attainment" or "nonattainment" areas for particular air pollutants based on ambient 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.[1] 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:

- CO: SE Lafayette, Portland, Oregon, EPA AQS Site No. 41-051-0080 (about 10 miles southeast 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 (Oregon DEQ 2012).
- 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

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

State.[2] Design values were collected in July 2013 using the tool for project site coordinates (46.643 Lat., -122.705 Long.).

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
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 five-year dataset was produced using the AERMOD meteorological preprocessor AERMET using meteorological data from the Vancouver Airport/Pearson Airfield (KVUO), located about 4 miles east of the project site on the north bank of the Columbia River. Pearson Airfield was judged to be the best available source of meteorological data for air quality dispersion modeling of the proposed Facility. The meteorological station at Pearson Airfield is the station closest to the proposed project site that is part of the National Weather Service (NWS) Automatic Surface Observing System (ASOS), and provides 1-minute wind speed and wind direction data that are used to resolve calm and variable wind conditions, as recommended by the EPA.

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

A "wind-rose" plot of the 2008-2012 wind speed and direction measured with a cup-anemometer at 10-meter elevation at KVUO is illustrated in Figure 3.2-1. The majority of surface winds are from the northwest and the east-southeast, indicating strong influence from the surrounding terrain and 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 wind speed was 21.5 knots from the west-southwest occurring March 15, 2009.

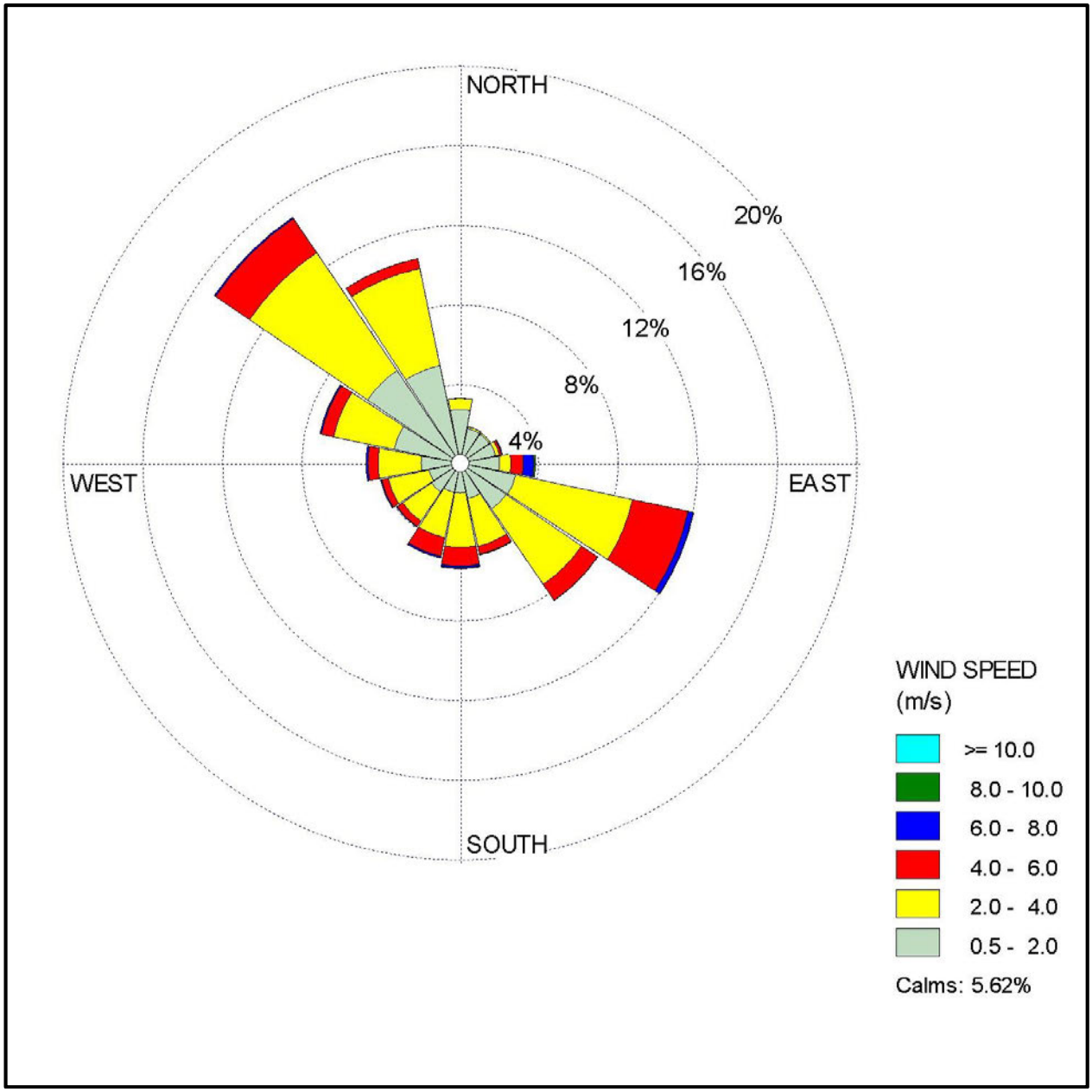
Atmospheric stability has traditionally been classified using the Pasquill-Gifford (P-G) system ranging from Class "A" (very unstable) to Class "F" (very stable). The categories indicate the level of thermal stratification within the atmospheric boundary layer, which determines the vertical advection 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 five-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

1) Analysis 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 158 years of data, is included in Table 3.2-4 (Western Regional Climate Center 2013). 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.



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

A 17-year dataset of relative humidity and dewpoint temperature collected at the Portland International 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°F generally occur in summer during periods of warm advection from the south and dewpoints near 70°F 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.

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 EPA regulatory guidelines (40 CFR Part 51, Appendix W).

Compliance with ambient air quality standards was assessed using total concentrations, which were calculated by combining model-predicted design concentrations with background concentrations based on air quality monitoring data discussed in section 3.2.1.6 and summarized in Table 3.2-2. Background concentrations represent the influence of other sources of emissions in the area.

Total predicted concentrations are compared to the WAAQS and NAAQS in Table 3.2-5. The analysis indicates that when predicted design concentrations are added to the monitored design concentrations, the resulting 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	Modeled Design Concentration[1]	Background Concentration	Total Concentration[2]	NAAQS/ WAAQS
		(µg/m³)			
CO	1-hour	87.5	2,364	2,452	40,000
	8-hour	69.4	1,461	1,530	10,000
NO2	1-hour	19.6	70	89.6	188
	Annual	0.588	13	13.6	100
PM10	24-hour	10.1	31	41.1	150
PM2.5	24-hour	6.59	20	26.6	35
	Annual	0.295	6	6.30	12
SO2	1-hour	16.9	25	41.9	196
	3-hour	17.1	19	36.1	1,300
	24-hour	10.4	9	19.4	365
	Annual	0.207	8	8.21	52

Notes:

[1] The forms of the design concentrations are as follows:

CO, 1- & 8-hour average & SO_2, 3- & 24-hour average – highest 2nd high concentration over the five modeled years of meteorological data

NO_2, 1-hour average – 98th percentile of the annual distribution of daily maximum 1-hour average concentrations averaged at each receptor over the five modeled years of meteorological data

NO_2 & SO_2, annual average – maximum annual average concentration

PM_{10}, 24-hour average – highest 6th high concentration over the five modeled years of meteorological data

$PM_{2.5}$, 24-hour average – 98th percentile of the annual distribution of 24-hour average concentrations averaged at each receptor over the five modeled years of meteorological data

$PM_{2.5}$, annual average – maximum annual average concentration averaged over the five modeled years of meteorological data

SO_2, 1-hour average – 99th percentile of the annual distribution of daily maximum 1-hour average concentrations averaged at each receptor over the five modeled years of meteorological data

[2] Total Concentration = Modeled Design Concentration + Background Concentration

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 5.1-12. 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	Averaging Period	Maximum Predicted Concentration (µg/m³)	ASIL (µg/m³)
10102-44-0	Nitrogen dioxide	1-hour	22.6	470
7446-09-5	Sulfur dioxide	1-hour	18.6	660
7783-06-4	Hydrogen Sulfide	24-Hour	1.55E-01	2.00E+00
57-97-6	7,12-Dimethylbenz(a)anthracene	Annual	8.41E-07	1.41E-05
7440-38-2	Arsenic	Annual	1.05E-05	3.03E-04
71-43-2	Benzene	Annual	2.29E-02	3.45E-02
7440-43-9	Cadmium	Annual	5.78E-05	2.38E-04
18540-29-9	Chromium, (hexavalent)	Annual	2.94E-06	6.67E-06
N/A	Diesel Engine Particulate	Annual	1.45E-03	3.33E-03
50-00-0	Formaldehyde	Annual	3.94E-03	1.67E-01

3.2.1.9 Title V (Air Operating) Permit

EFSEC implements a Title V (Air Operating) Permit Program through its adoption by reference of Ecology's WAC 173-401-100 through -300, and -500 through -820 (see WAC 463-78-005(2). The Facility will not emit any criteria pollutant in an amount greater than 100 tons per year, is not a major source, and is, therefore, not required to obtain a Title V permit.

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 will 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 during operation. Some of the site will 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. The following design measures will address odor control:

Area 200 – Unloading, and Area 500 – Transfer Pipelines: Throughout the unloading process, crude oil is contained within rail cars and piping prevent the exposure of the oil to the ambient atmosphere. Pumping of the crude oil from the unloading area to containment tanks and from the containment tanks to the Marine Terminal is also conducted in closed piping, and pumping systems, which prevents exposure of the crude oil to the ambient atmosphere.

Area 300 – Storage: Within the storage tanks, crude oil exposure to the atmosphere is minimized through the use of an internal floating roof which minimizes the formation of hydrocarbon vapors.

Area 400 – Marine Terminal: As for areas 200 and 500, transfer of the crude oil to marine vessels is conducted in closed piping and pumping systems that prevent exposure of the crude oil to the atmosphere. A submerged loading configuration will be used to fill all marine vessel cargo compartments in accordance with U.S. Coast Guard (USCG) regulations. A potential source of odors is the vapors that are displaced from the vessel holds during transfer operations. These sulfurous gases (such as H_2S) and petroleum hydrocarbon vapors are routed through the vapor containment system to an H_2S treatment system and then to the MVCU. The MVCU will reduce sulfurous compounds to SO_2 gas and convert most hydrocarbons to odorless carbon dioxide. The odor detection threshold of SO_2 is less than the SO_2 NAAQS; the local ambient air quality modeling analysis summarized in section 5 demonstrates that the SO2 NAAQs threshold will not be exceeded at any time, and therefore will not result in perceptible odors.

Area 600 – Unloading Boilers: Emissions from the boiler units are not expected to cause any significant offensive odors at the Facility or adjacent properties. Although the natural gas supplied to the boilers is odorized by the supplier for safety purposes, odor impacts will not be observed because combustion of the natural gas is odorless and the methyl mercaptan used to odorize the gas is destroyed during combustion.

Slight minor odor impacts due to road and rail diesel traffic may occur but will 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 and MVCU, no visible plumes are expected from the Facility emissions units. Consequently, no off-site fogging, misting, visibility impairment, or icing is expected.

3.2.4 Climate Change

Although most scientists concur that anthropogenic global emissions of greenhouse gases (GHGs) are affecting climate, there are no analytical tools or established procedures for evaluating climate impacts from individual projects. Ecology estimates 2010 statewide GHG emissions were 96.1 million metric tons (CO_2e) (Ecology 2013). The Facility is estimated to have the potential to emit approximately 86,200 metric tons of GHGs (CO_2e) annually. (See Table 2.13-1.) The Facility stationary source GHG emissions are approximately 0.09 percent of the state GHG emissions. Consequently, the incremental effect of project emissions on global climate change is insignificant.

3.2.5 Dust

Because the site is flat, there will be very little grading of the site prior to construction. Therefore, dust generated by excavation and grading will be controlled and short term. Dust from access roads will 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

Construction

- To control dust during construction, water will be applied as necessary. Site access and travel roads would be graveled or paved.
- During construction activities, dust and diesel emission control measures will be implemented consistent with Washington Associated Gneral Contractors Brochure, "*Guide to Handling Dust from Construction Projects,"* including the following*:*
  - Proper maintenance of off-road mobile equipment
  - Use off-road mobile equipment that meets applicable emission standards
  - Encourage carpool and trip reduction strategies for construction workers
  - Minimize construction truck and other vehicle idling time
  - Spray exposed soil with water or other suppressant to reduce windblown emissions
  - Pave or gravel staging areas
  - Use appropriate methods to control dust from trucks transporting materials
  - Rock exits or provide wheel washers to reduce particulate matter carried off site by vehicles
  - Cover dirt/gravel/debris piles to reduce dust and wind-blown debris

Operation

- BACT will be incorporated into the Facility design and implemented to minimize air pollution emissions.
- During operational activities, dust and diesel emission control measures will be implemented as needed consistent with Washington Associated Gneral Contractors Brochure, "*Guide to Handling Dust from Construction Projects"* stated above.

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, 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, containment tank, 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 47.4-acre site, the volume of precipitation will total approximately 156.4 acre-feet per year.

3.3.1.1 Impacts to Surface Water

Potential impacts to surface water include sediment discharge and other pollutants associated with ground improvement construction activity, and with stockpiling/storage of raw materials used for grout batching. A typical result of jet grouting ground improvement installation is that some amount of soil/grout mixture spoils are brought to the surface. At Area 400, jet grouting occurs in proximity to the Columbia River adjacent to the OHWM and could potentially result in the introduction of high pH materials in the river.

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.

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 and minimal 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, containment 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.

Stormwater, during construction and operation, 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. A complete description of the existing stormwater systems in place is discussed in section 2.11 and in the Engineering Report in section 5.3. Stormwater from the Facility site is currently collected, treated, and released to the Columbia River through existing outfalls permitted under existing NPDES permits.

The Port manages three stormwater treatment systems within a half-mile of the site: the Terminal 5 water quality lagoons, Terminal 4 water quality ponds, and Parcel 8 water quality pond.. Discharges from the site will be treated on site and monitored for water quality compliance prior to discharge to the existing stormwater treatment systems and outfalls as described in sections 2.9 and 2.11 of this Application.

This project will reduce the amount of existing impervious surface coverage at the Facility site and will convert a portion of the existing pollution-generating impervious area to non-pollution-generating roof areas.

3.3.1.2 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 sections 2.11.2 and the Engineering Report at section 5.3. It 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.

Construction

Construction Stormwater Capture and Treatment

The Applicant will use management techniques to reduce the discharge of contaminated stormwater runoff. These techniques will be implemented on site prior to beginning construction activities and will include establishment of stormwater monitoring and maintenance programs to ensure compliance of erosion control practices.

The Applicant will also implement site-specific BMPs selected from the Stormwater Management Manual for Western Washington and meet the following water quality criteria:

- Chapter 173-200 WAC
- Chapter 173-201A WAC
- Chapter 173-204 WAC

During construction, the contractor will be directed to implement an environmental protection program for construction-related activities that complies with specific site conditions. Impacts to surface water will be mitigated through the use of on-site stormwater management. BMPs that reduce erosion will be emphasized to reduce the sources of stormwater contamination. Ground disturbing activities will be limited to necessary construction areas. Construction methods will be modified as needed to protect surface water quality, and sequenced and controlled to limit potential erosion and sediment transport, including monitoring the installation and removal of temporary piles. Sediment control measures will be designed based on 10-year design storm. Water quality measures (other than sediment control) will be designed on a six-month, 24-hour design storm.

The Applicant will conduct construction activities in accordance with the provisions of the NPDES Individual Construction Stormwater Permit issued for the Facility. Under the provisions of this permit, the Applicant's responsibilities will include, but are not be limited to:

- Prepare and implement a cSWPPP.
- Install and maintain stormwater BMPs as specified in the cSWPPP to prevent and mitigate any construction-related impacts to surface water.
- Provide training to construction employees regarding provisions of the cSWPPP.
- Conduct site inspections at least once a week and within 24 hours following any discharge from the site and as required by the Permit.
- Implement the construction water quality protection and monitoring plan (WQPMP) (Appendix F.2)
- Monitor and sample construction storm water discharges in compliance with permit provisions, and report such results as required.

Additional Measures for Jet Grouting Activities

The potential stormwater and non-stormwater runoff from jet grout-related spoils will be mitigated to reduce the likelihood of contaminants released into the Columbia River.

The Applicant will conduct additional monitoring of surface water quality within the Columbia River upstream and downstream of the ground improvement installation to monitor for changes in pH and sulfate levels.

The mitigation measures listed below as part of the cSWPPP were specified in the Applicant's Project Refinement Report (May 2015). These mitigation measures were listed specifically for the containment and handling of jet grout-related spoils. The BMPs are in addition to those already included in the cSWPPP.

Construction Stormwater Pollution Prevention Plan

The preliminary cSWPPP (February 27, 2015) has been submitted to EFSEC for review. The cSWPPP, identifies specific construction stormwater BMPs to address stormwater within the ground improvement construction areas, techniques to reduce the discharge of contaminated stormwater runoff, establishment of stormwater monitoring and maintenance programs to ensure compliance of erosion control practices, and specific applications for installation of BMPs to prevent and mitigate any construction-related impacts to surface water. The final cSWPPP will be submitted to EFSEC for review and approval before any Facility-related ground disturbance begins.

The cSWPPP places specific emphasis on protecting surface water quality of nearby wetlands and the Columbia River. Downslope and perimeter protection was identified for all construction areas and where ground improvements are necessary. Specific BMPs identified in the cSWPPP are summarized in Table 2.11-1 in section 2.11.1. The following BMPs are identified specifically for use during ground improvement activities:

- Wheel washes will be provided at applicable construction entrances during all ground improvement activities.
- Groundwater or jet water used and brought to the surface during ground improvements at the Marine Terminal will be collected and pumped into weir tanks for turbidity control.
- Silt fencing will be installed along the top of bank where the transfer pipelines and ground improvements are constructed along the river. Compost socks would be installed along river embankment above the OHWM or waterline whichever is higher.
- All groundwater or jet grout slurry resulting from ground improvements will be processed through chemical treatment BMPs, such as pH reducers and/or polymer assisted stormwater filtration and will be used between areas of ground improvement (stone columns, soil mixing, jet grouting, etc.) and surface waters and wetlands.
- Wick drains will be used between areas of ground improvement (stone columns, soil mixing, jet grouting, etc.) and surface waters and wetlands.
- At Area 300, wick drains will be installed at a minimum of 16 feet on center where ground improvements are within 150 feet of the adjacent wetlands to the north and east. At areas 400 and 500, wick drains will be installed along the top of bank at 8 feet on center for the entire bank area receiving ground improvement. Visual monitoring of turbidity within the wetlands or Columbia River will occur daily during ground improvement. If any turbidity is observed as a result of ground improvement, ground improvement activities will be stopped and additional mitigation measures will be installed, including additional wick drains, turbidity curtains, or change in ground improvement methods will be considered.
- Cutoff channels would be installed in Area 300 – Storage tanks along the downslope construction area to capture construction stormwater where existing site grading is insufficient to direct stormwater into conveyances for the construction stormwater. These channels would also be used to contain ground improvement runoff where necessary.
- Channel lining and check dams would be used to protect channel from erosion, and check dams to assist in flow control.
- Install and maintain an erosion/sediment control barrier along the top of the Columbia River embankment for the areas adjacent to stone column installations consisting of silt fencing, filtration fabric, and straw wattles or similar measures approved by EFSEC. Monitor the

water on the river side of the sediment control barrier to ensure the expected level of water quality is maintained. If the water quality on the river side of the barrier is unacceptable, implement additional sediment control measures until the desired level is achieved. These measures would reduce impacts to minor levels.

Where ground improvement may extend below top of the river embankment, the following additional stormwater BMPs were also identified to protect downslope water quality:

- Install sheet pile wall landward of the OHWM to act as a barrier to grout migration waterward of the OHWM. The sheet pile is most likely installed using a vibratory hammer.
- Sequence installation of the first row of jet grout columns landward of the temporary sheet pile wall to act as a barrier to potential grout migration during the installation of subsequesnt jet grout columns landward of OHWM. This will reduce the potential for later grout installations to migrate through seams in the wall, or under the wall, toward the Columbia River.
- Earthen berms, sheeting, straw wattles, or shallow trenches, will be used to isolate the work area and contain spoils exiting the grouting hole to prevent their entry into surface water. In addition, in-ground containment will be achieved by the installation of a temporary sheet pile wall between the river and the ground improvement treatment area. The sheet pile wall will be installed with vibratory methods landward of the OHWM.
- Spoils will be extracted from the containment area by vacuum pumps. Spoils may be loaded to trucks to be removed from the site, or may be handled on site to separate solids from liquids for additional treatment and disposal. If handled on site, soils will be removed and placed in a temporary holding area, such as lined ponds or tanks; these will temporarily hold spoils until they can be treated as necessary and disposed of holding ponds would be constructed in previously disturbed locations and would be located away from sensitive resources. Holding areas would be lined to prevent the migration of high pH water into the ground.
- High pH water will be pumped from these holding areas or tanks into portable water quality treatment systems and neutralized. Following neutralization, the water will be discharged similar to other construction site groundwater that has been treated to the appropriate water quality standards.
- Remaining solid materials in holding areas or tanks will be tested as necessary and disposed of in accordance with applicable regulations if they classify as hazardous waste. If the solids do not classify as hazardous waste they will be used on site (for construction of the Area 300 containment berm for example, or will be disposed off site at an appropriate location.
- A WQPMP has been prepared and submitted to EFSEC; the monitoring provisions of this plan will continue to address how activities are monitored to identify potential surface water exceedances. The plan will be revised to address protection measures specific to ground improvement construction activities, which are described above.
- Conduct site inspections at least once a week and within 24 hours following any discharge from the site and as required by the NPDES Individual Construction Stormwater Permit to be issued by EFSEC. The WQPMP (Appendix F.2) also identifies additional in-stream monitoring within the Columbia River to monitor construction activities.

The NPDES Individual Construction Stormwater Permit is anticipated to include reporting and correction requirements that are substantially similar to those of the Construction Stormwater

General Permit (Ecology 2015). These reporting notifications and noncompliance standards within the General Permit Section S5.F require the steps below. Note that for EFSEC issued permits, "Ecology" would be replaced by "EFSEC."

- Ecology will be immediately notified of the failure to comply.
- Immediate action will be taken to control the noncompliance issue and to correct the problem. If applicable sampling and analysis of any noncompliance will be repeated immediately and results submitted to Ecology within five days of becoming aware of the violation.
- A detailed written report describing the noncompliance will be submitted to Ecology within five days, unless requested earlier by Ecology.

Construction Spill Prevention Control and Countermeasures

The construction spill prevention control and countermeasure plan (cSPCCP) (Appendix B.2) will also be implemented and includes a listing of responsible personnel, spill reporting procedures, project and site information, pre-existing contamination at the Facility site, potential spill sources, spill prevention and response training, spill report form(s), plan approval, and cSPCCP acknowledgement forms (to be signed by all project personnel). The cSPCCP will meet NPDES permit requirements.

Any required surface restoration will the completed within 14 days after an area's final construction-related disturbance.

With the above-stated cSWPPP, cSPCCP, and additional mitigation measures and BMPs in place, the resulting impacts to surface water from construction stormwater activities should be reduced from moderate to negligible.

Operation

Surface water quality will be protected during operations through the use of the BMPs designed in accordance with Ecology's stormwater manual. 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 installation of the permanent stormwater management system.

Once all permanent stormwater BMPs are in place, operations-related impacts to surface water will be minimized through the use of operational and structural source control BMPs and operational procedures. The Applicant will implement secondary structural containment measures to supplement the structural source control BMPs. BMPs are from Volume IV of the Stormwater Management Manual for Western Washington and will meet the following water quality criteria:

- Chapter 173-200 WAC
- Chapter 173-201A WAC
- Chapter 173-204 WAC

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 or spill 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 pans, pumps, and containment 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. Equipment and parts wash (including facility washdown, railcar exterior cleaning) will be conducted in a covered portion of the rain unloading building. Wastewater will be pumped to secondary containment tanks.

Area 300 secondary containment area will be surrounded by a containment berm approximately 6 feet high with a full impervious liner that will have a capacity at least equal to 110 percent of the API 650 maximum capacity of the largest tank, plus precipitation from a 24-hour, 100-year storm 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. For example, API 653 requires tanks to be inspected every 10 years to assess the tanks' physical condition and determine suitability for continued use.

The transfer pipelines (Area 500) will be constructed of welded steel pipe, designed specifically for crude 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 secondary containment with leak detection will be provided for pipe installed underground. The above-grade portion of the pipeline will be subject to visual inspection for leaks and secondary containment with leak detection provided for pipe installed underground.

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.

Parking and access areas will be designed with a combination of catch basin spill traps and water quality filter vaults to treat stormwater runoff.

See sections 2.10 and 2.11.2 and Appendices B.2 and C.1 for additional Facility design features and spill control and prevention measures.

The Applicant will implement planning and preparedness actions required by state and federal regulations to prevent, contain, and respond to inadvertent releases that could impact surface water, including, but not limited to:

- A comprehensive site-specific operations SPCCP (oSPCCP) developed in accordance with 40 CFR 112 and WAC 173-180, Part F
- A safe and effective threshold determination report, prepared under WAC 173-180-224
- A pre-loading transfer plan according to WAC 173-180-230
- A Facility operations manual in compliance with WAC 173-180 400 to -435
- An oil transfer training program in compliance with WAC 173-180, Part E
- A certification program in compliance with WAC 173-180, Part E
- A spill contingency plan in compliance with WAC 173-182, 40 CFR 112, Subpart D and 33 CFR 154, Subpart F
- Prepare coordinated plans to meet all applicable local, state, and federal requirements

The Applicant submitted to EFSEC for review a preliminary oSWPPP (Appendix C.2) based on the preliminary design in place when this Application was submitted. BMPs are described in the preliminary oSWPPP. A final oSWPPP will be submitted for review prior to the beginning of Facility operations.

In accordance with the permitted levels of the downstream system, discharge stormwater meeting established water quality benchmarks will be consistent with the Industrial Stormwater General Permit. To the maximum extent possible, stormwater will be protected and segregated from contact with industrial activity and crude oil. With the oSWPPP, mitigation measures and BMPs in place, stormwater discharges from the Facility will meet state and local water quality standards. A Tier II anti-degradation analysis is being completed in accordance with WAC 173-201A-320 to demonstrate water quality compliance. The final report will be submitted to EFSEC.

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 Individual NPDES Construction Stormwater Permit issued to the Facility by EFSEC. Construction stormwater BMPs will be used to control erosion and sediments on the site. Additional detail on construction BMPs are included in the preliminary cSWPPP located in Appendix C.1. 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 Map (FIRM) Panels #53011C0363D and 364D include the project area (Figure 3.3-1). FEMA FIRM data 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, and in a portion of Area 500. 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.

The project is located within the inundation area of the 500-year flood event. The entire upland portion of the site is located above the 100-year floodplain and therefore also out of the 5- and 50-year floodplain.

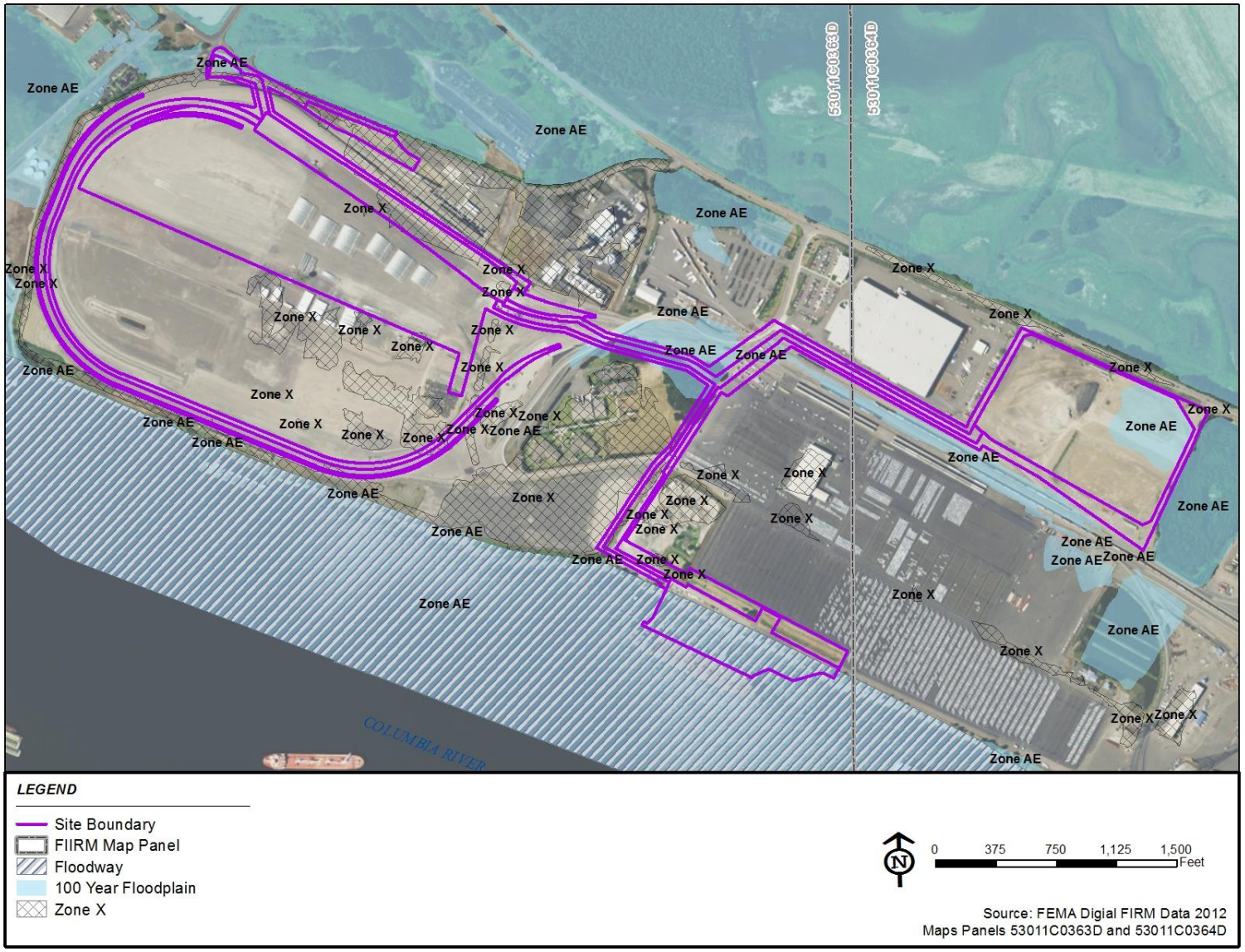


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Figure 3.3-1. Mapped Floodplains (Revised)

3.3.3.2 Potential for Flooding and Mitigation Measures

There are no impacts to the site for the 5- and 50-year flood events.

Construction/100-500-Year Flood

Construction activities will cease if a flood event is predicted and move, to the extent possible, hazardous materials and equipment from the site to above the 500-year floodplain.

Operation/100-5-Year Flood

Within Area 200, the below-grade trenches will be watertight eliminating inundation concerns during the 100-year flood, or from seasonal shallow groundwater.

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 is located in the floodplain, the pipeline will be elevated above the 100-year flood elevation. 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 structures or portions of structures located in Area 400 will be located outside the 100-year floodplain. These include a dock transformer pad, combined control room/E-house, 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.

Floodwaters are anticipated to inundate the facilities with approximately 1-foot of water during the 500-year event and a maximum of 3 feet in the lowest areas. The Facility will be designed to maintain integrity in these worst-case flood conditions. The containment berm around the product storage tanks (Area 300) provides protection against inundation. The unloading facility is located within the inundation area of the 500-year flood plain. Flood waters inundating the unloading area would fill the below-grade trenches and containment pans. In order to prevent the contamination of flood water, operating procedures will require that any crude oil spill, including minor leaks and drips be contained and affected surfaces cleaned promptly limiting the amount of any residue that could comingle with flood waters inundating the containment pans, containment piping, and below-grade trenches.

In the event of flood events exceeding the 100-year or 500-year flood stages, the Applicant will monitor the rate of flood water rise and suspend threatened Facility operations prior to the flooding occurring.

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

The impacts to groundwater from operations and maintenance activities are expected to be minor. 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.

Clark County GIS (Clark Count 2013a) indicates that the project site is not located within a public wellhead protection zone. The nearest public well is for the Port of Vancouver's domestic supply and is located approximately 7,700 feet southeast of Area 300. Based upon the 10-year wellhead protection zone, the well is too far removed from the project site to be affected. The Facility is also located outside of the nearest private wellhead zone, which is located approximately 1,200 feet from Area 600. This well is for the West Vancouver Materials Recover Center. During the final phase of the site cleanup and demolition activities, two supply wells were discovered and decommissioned (Anchor QEA, LLC 2009). Clark County GIS database does indicate that there is a wellhead zone for the Alcoa (Vanalco Inc.) wells (Well 700061). The associated high production wells from the Alcoa are believed to have been decommissioned during the site remediation and at a minimum are no longer active. Therefore, these high-production wells cannot contribute to migration of contaminants.

Ground improvements, such as piles, jet grout columns, wick drains, and/or stone columns, are not located within contaminated areas identified in the contaminated media locations

(Appendix F.1). The project is limiting disturbance within the contaminated media locations to shallow excavations and work within these areas will comply with a contaminated media management plan (Appendix F.1).

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.

Construction

Construction of foundations and utility and pipeline excavations for the project may require dewatering of the excavations. 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. 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.

During construction, the Applicant will conduct on-site investigations where production wells were known to be located. If a borehole is located, confirmation will be made that the borehole has been properly sealed to a depth at least 10 feet below the finished ground surface with a cementitious grout. Abandoned production wells on the site could potentially be impacted and will be monitored during construction.

As part of the Contaminated Materials Management, construction activities will be identified that could potentially impede monitoring and access of groundwater through existing water supply wells if access is necessary for ongoing remediation activities.

The Applicant has submitted a preliminary cSWPPP to EFSEC for review (Appendix C.1). The cSWPPP identifies the stormwater pollution prevention measures to be implemented at the construction site and as described in section 2.11 of this Application.

Operation

Secondary containment systems will be provided under storage tanks and in buried transfer piping to capture leaks, preventing discharges directly into the soil, which could impact groundwater.

The potential for the discharge of contaminants to the groundwater due to surface water infiltration will be limited through development of surface water control infrastructure and the implementation of water quality control protocol.

Site design monitoring and control systems will be incorporated to allow early detection of a release when containment and remediation can be most effective.

During final design, potential contaminants in the soil will be identified and addressed in the plans and specifications to establish procedures to minimize the potential for groundwater impacts, including the following:

- Restrictions on work in portions of the site,
- Minimize/controlling grading to prevent ponding water that would promote leaching, and
- Use of temporary covers over disturbed areas, and controlling tracking of contaminants from one portion of the Site to another.

An oSPCCP (Appendix B.3) and oSWPPP (Appendix C.2) will be implemented to establish procedures to prevent and control the impact of spills on the natural environment. The oSPCCP (Appendix B.3), 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 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. The oSPCCC will be used for appropriate response and cleanup procedures, including the handling of vegetation that would be affected by spills. Applicable spill response equipment and material designated in the oSPCCP will be maintained at the job site. In the event of an inadvertent release, containment and begin cleanup efforts will begin immediately and be completed in an expeditious manner, in accordance with all local, state, and federal regulations, and taking precedence over normal work. Cleanup will include proper disposal of any inadvertently released material and used cleanup material. The cause of the inadvertent release will be assessed and appropriate action will be taken to prevent further incidents or environmental damage. Inadvertent releases will be reported to Ecology's Southwest Regional Spill Response Office.

There are no anticipated adverse impacts to existing groundwater sources resulting from the use of City-supplied potable, process, and emergency fire suppression water.

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 73,984 gpd of process water, and 6,370 gpd of domestic potable water, and 4,771 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 (see Engineering Report in section 5.3 of this ASC) 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 capacity and operational capacity.

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 public wellhead protection map is shown on Figure 3.3-2. 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 during construction and operation 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 as shown on Figure 3.3-3. 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.

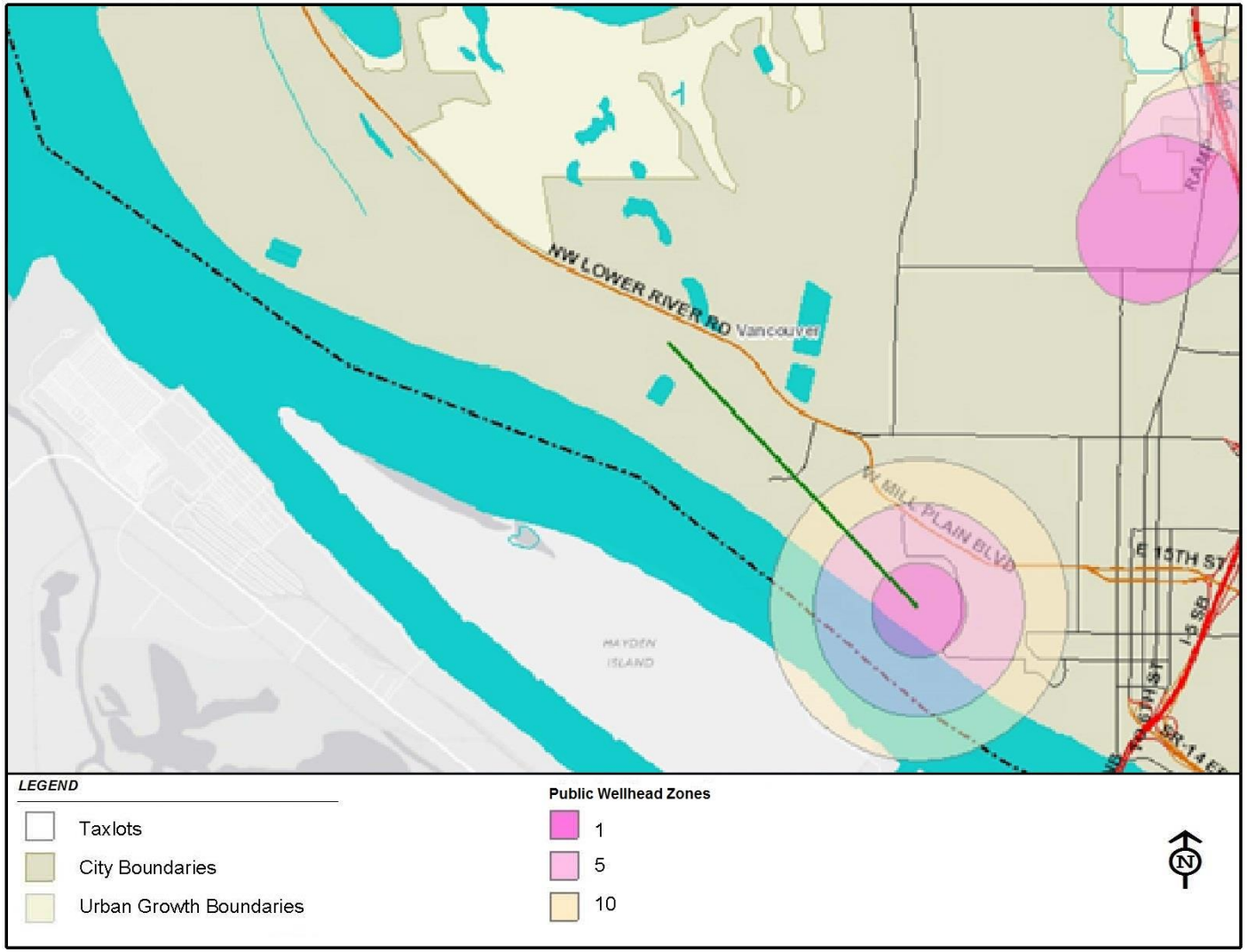

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Figure 3.3-2. Public Wellhead Zones (New)

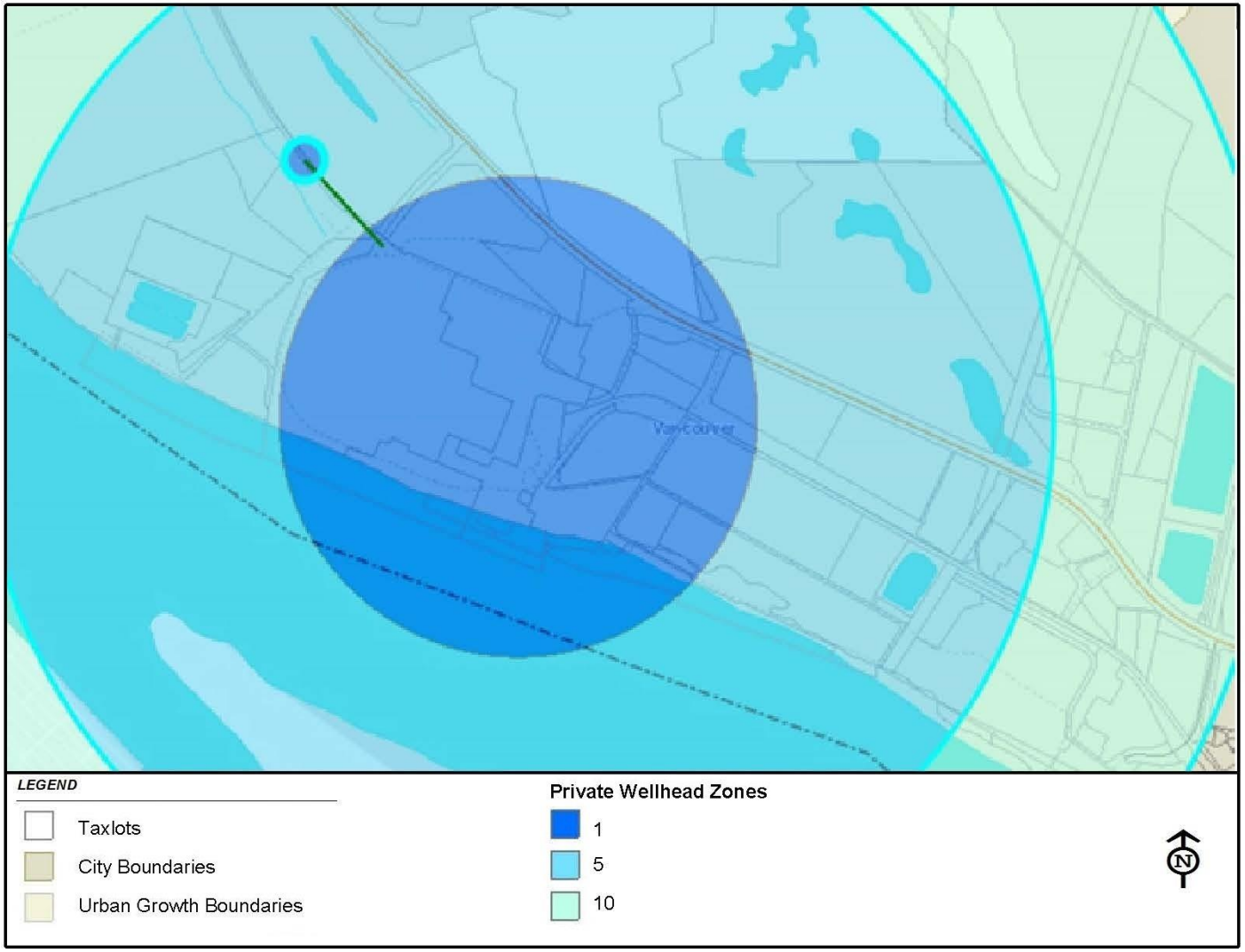

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Figure 3.3-3. Private Wellhead Zones (New)

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 map-able 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

The analysis includes 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 coast of Washington, out to the extent of the Washington Coastal Zone, a distance of 3 nautical 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.

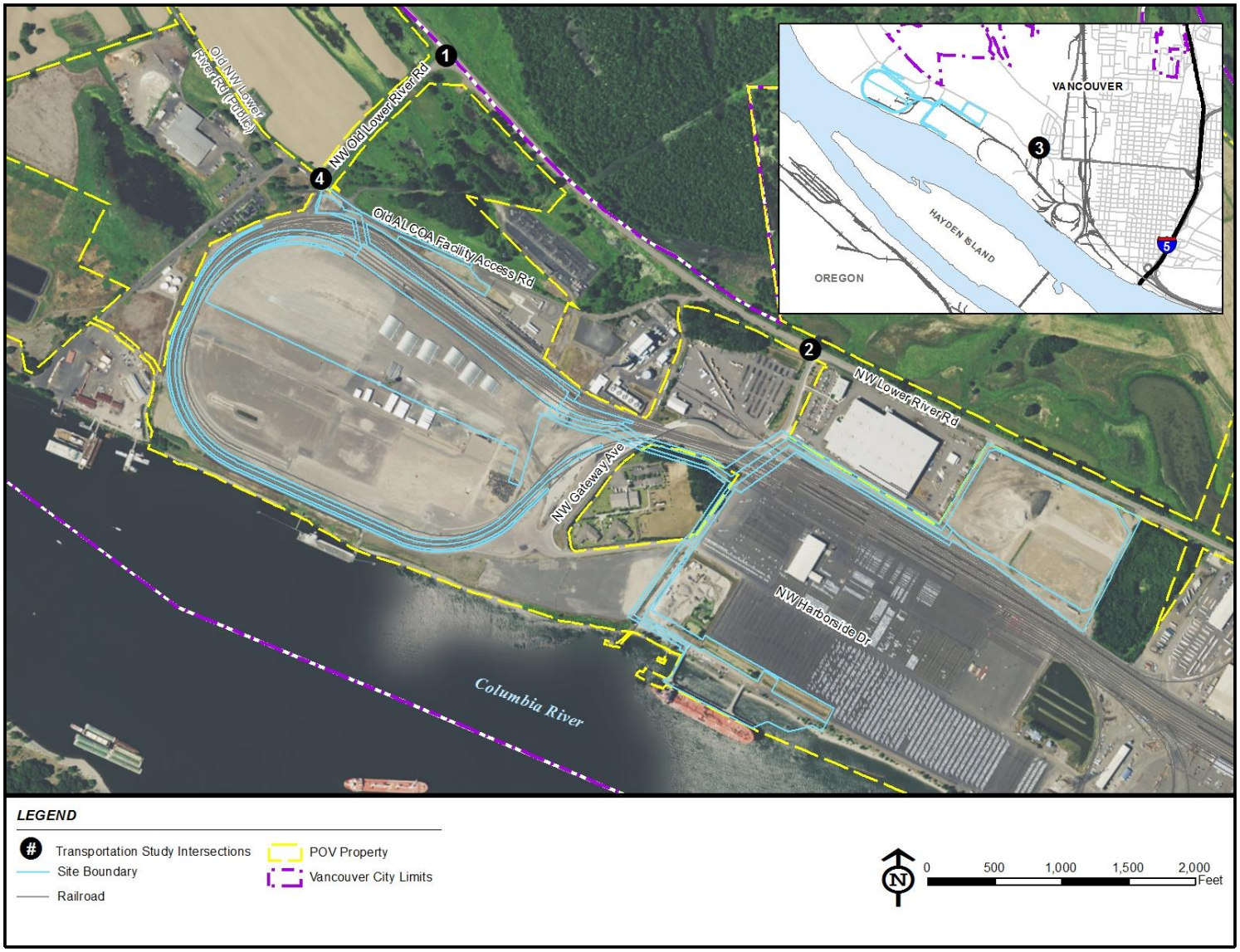

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Figure 3.4-1. Biological Resource Overview (Revised)

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 the Washington Department of Fish and Wildlife's (WDFW) 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. The Applicant has not conducted site-specific wildlife or vegetation species surveys to determine use of the Facility site or the project vicinity, because there is ample documentation which demonstrates that there is negligible habitat present to support wildlife species. The Applicant's consultant for biological resource issues, BergerABAM, has extensive knowledge of the Facility site and vicinity based on previous work conducted for the Port and Port tenants. The presence (or lack thereof) of terrestrial wildlife is indicative of the highly disturbed nature of the site (i.e., an active industrial area), and the small amount of habitat present to support wildlife species.

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 vegetation and 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. For the purposes of this analysis, vegetation communities are defined by the observed vegetation present. Terrestrial habitats are characterized by the wildlife-habitat associations described by Johnson and O'Neill (2001). 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 vegetation communities at the project site can be described according to the following subcategories (Figure 3.4-2).

- *Unvegetated Industrial* – The unvegetated industrial habitat type comprises most of the project site (over 95 percent of the relative cover at the 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*). [3] This vegetation type represents approximately 2 percent of the relative cover at the project site. 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 and quality 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. Riparian habitat represents less than 1 percent of the relative cover at the project site. 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.

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[3] 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

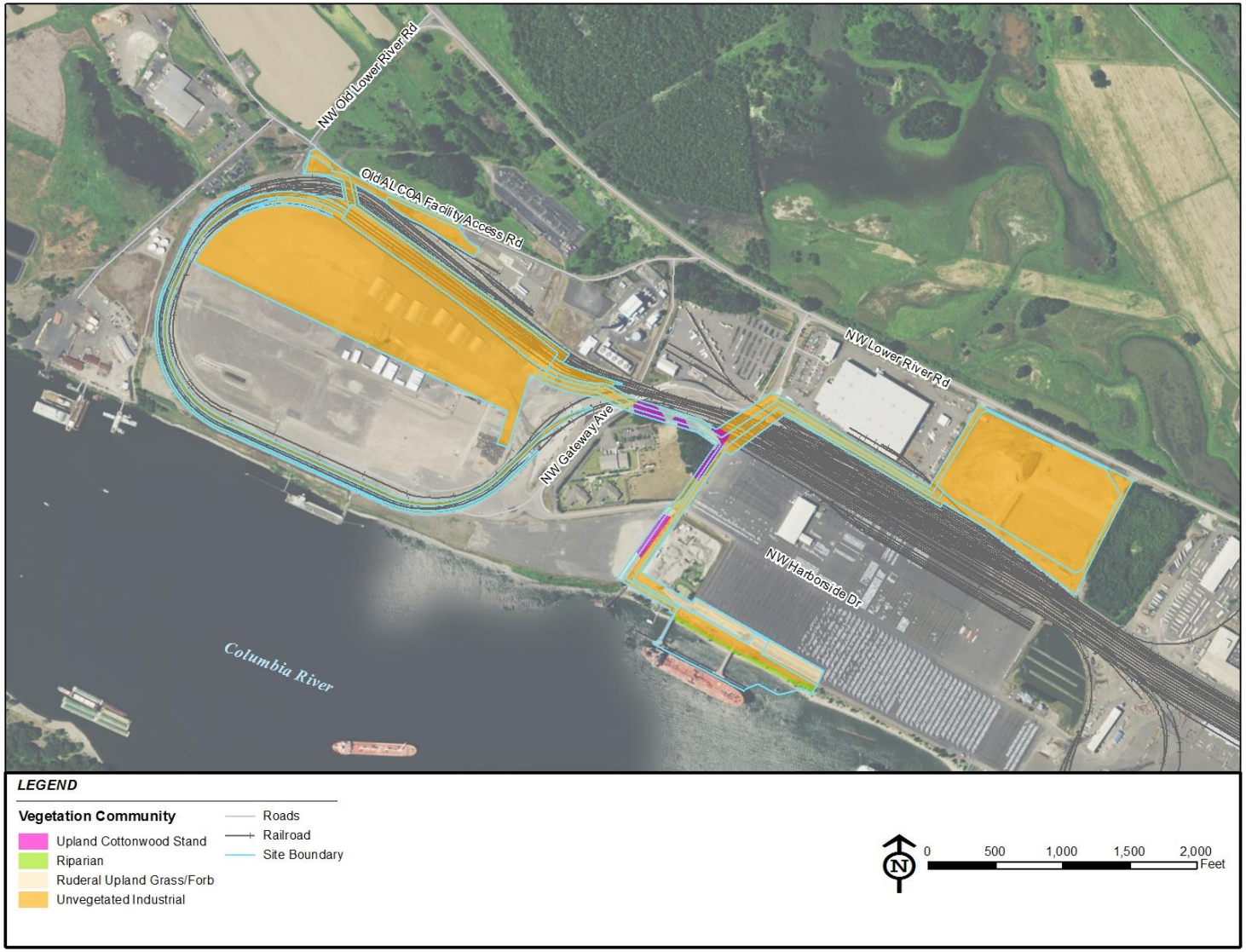

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Figure 3.4-2. Terrestrial Vegetation Communities (New)

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. This habitat type represents approximately 2 percent of the relative cover at 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.

A previously permitted project for the Clark Public Utilities substation is removing 246 trees greater than 6 inches in diameter, over approximately 1.1 acres. This project has yet to be constructed, but when complete would alter the quality of the existing forested habitat.

Terrestrial habitat of the project site is characterized by several habitat types described by Johnson and O'Neill (2001): Urban/Mixed Environs, Westside Riparian-Wetlands, Westside Lowland Conifer-Hardwood Forest. Available habitat mapping (using data compiled by Johnson and O'Neill [2001]) is shown below in Figure 3.4-3. Within the immediate project footprint, habitats have been modified from the original habitat mapping based on site-specific reviews of available data.[4]

- *Urban/Mixed Environs* – The Urban/Mixed Environs wildlife habitat covers the majority of the project site. Vegetation communities present in this habitat classification include the Unvegetated Industrial and Ruderal Upland Grass/Forb communities, which provide very little wildlife habitat function. The Urban/Mixed Environs habitat type is the most drastically altered from native conditions. The high-density distinction describes the least amount of total tree canopy cover, the lowest tree density, the highest percentage of exotics, the poorest understory and subcanopy, and the poorest vegetative structure (Johnson and O'Neill 2001). They are small, isolated patches of vegetation with little potential or opportunity to provide significant function. While this habitat is generally poor, the area may provide some opportunities for songbirds to forage and rest.
- *Westside Riparian-Wetlands* – WDFW defines riparian habitats as a Priority Habitat for the important hydrologic, water quality, and habitat functions they provide (WDFW 2008). Because riparian habitat at the project site is highly altered (i.e., riprap armored bank, minimal riparian vegetation, lack of structural complexity), it does not provide any

[4] Outside of the project footprint existing habitats are displayed from the source data, available at: http://www.nwhi.org/index/gisdata#Columbia%20River%20Basin%20GIS%20Data. Mapped habitats were interpolated from aerial imagery and may not match existing land use.

significant hydrologic, water quality, or habitat functions. Existing riparian vegetation communities in the immediate project site comprise this habitat type.

- *Westside Lowland Conifer-Hardwood Forest* – Westside Lowland Conifer-Hardwood Forest habitat is scattered throughout the study area, but it is highly fragmented. These habitat types include the Upland Cottonwood Stands. Several isolated cottonwood stands are present within the immediate area near the JWC and Parcel 3; however, the nature of these stands limits their habitat function and values for wildlife. They likely provide refuge and foraging habitat for songbirds and small mammals, as well as perching and nesting habitat for raptors. Within the study area, the species composition of this habitat is dominated almost exclusively by black cottonwood and Oregon ash, similar to the forested communities identified within the Westside Riparian-Wetlands habitat. The difference in the habitat type is related to the presence of aquatic habitat. Westside Lowland Conifer-Hardwood Forest is primarily upland and therefore not associated with aquatic areas. This habitat provides refuge and foraging habitat for migratory songbirds and small mammals, perching and nesting habitat for raptors, and cover and foraging habitat for upland mammals.

Aquatic habitat is characterized as the Open Water—Lakes, Rivers, Streams type and is limited to a stretch of the Columbia River at project site (see Figure 3.4-3).

- *Open Water—Lakes, Rivers, Streams* - At the project site, aquatic habitat is the Columbia River and conditions are typical of an industrial waterway and port operations. In general, this reach of the Columbia River provides suitable habitat for the entire Columbia River bank, which has been armored with riprap, and the entire portion of the location that is above OHWM, which has been isolated from the historical floodplain. At this location, the river is approximately 2,800 feet wide with a maintained channel width of 600 to 800 feet, and a depth from -43 CRD. Water quality conditions at the project site are generally appropriate for aquatic life, although the reach of the Lower Columbia River has several areas listed on the 2008 Ecology 303(d) list for chemical- and nutrient-related contamination (Ecology 2012).

  An important component of aquatic habitat is the shallow water habitat (SWH) zone, which is also referred to in the literature as the nearshore, in the Columbia River. The SWH zone is considered to be the nearshore migratory corridor for salmonids and other fish species. Typically, the literature uses a water depth of 20 feet to describe the SWH zone. Recent literature suggests that shallow water habitat varies with river and tide stage in the Lower Columbia and is defined as the area with water depth from 0.1 to 2.0 meters for any given river stage (Bottom et al. 2005; Kukulka and Jay 2003). At the project site, ordinary high water has been defined as 15.2 feet and 1.7 feet for mean lower low water in the CRD. Using this definition, the SWH zone at the project site would range from 15.2 feet to -4.3 feet CRD. Within this zone, existing conditions include the riprap shoreline with no riparian vegetation, an existing pile-supported trestle for access to Terminals 13 and 14, and a sandy/silty benthic substrate with no aquatic vegetation. The existing marine terminal is situated at an elevation of -20 feet CRD, and do not fall within the defined SWH zone.

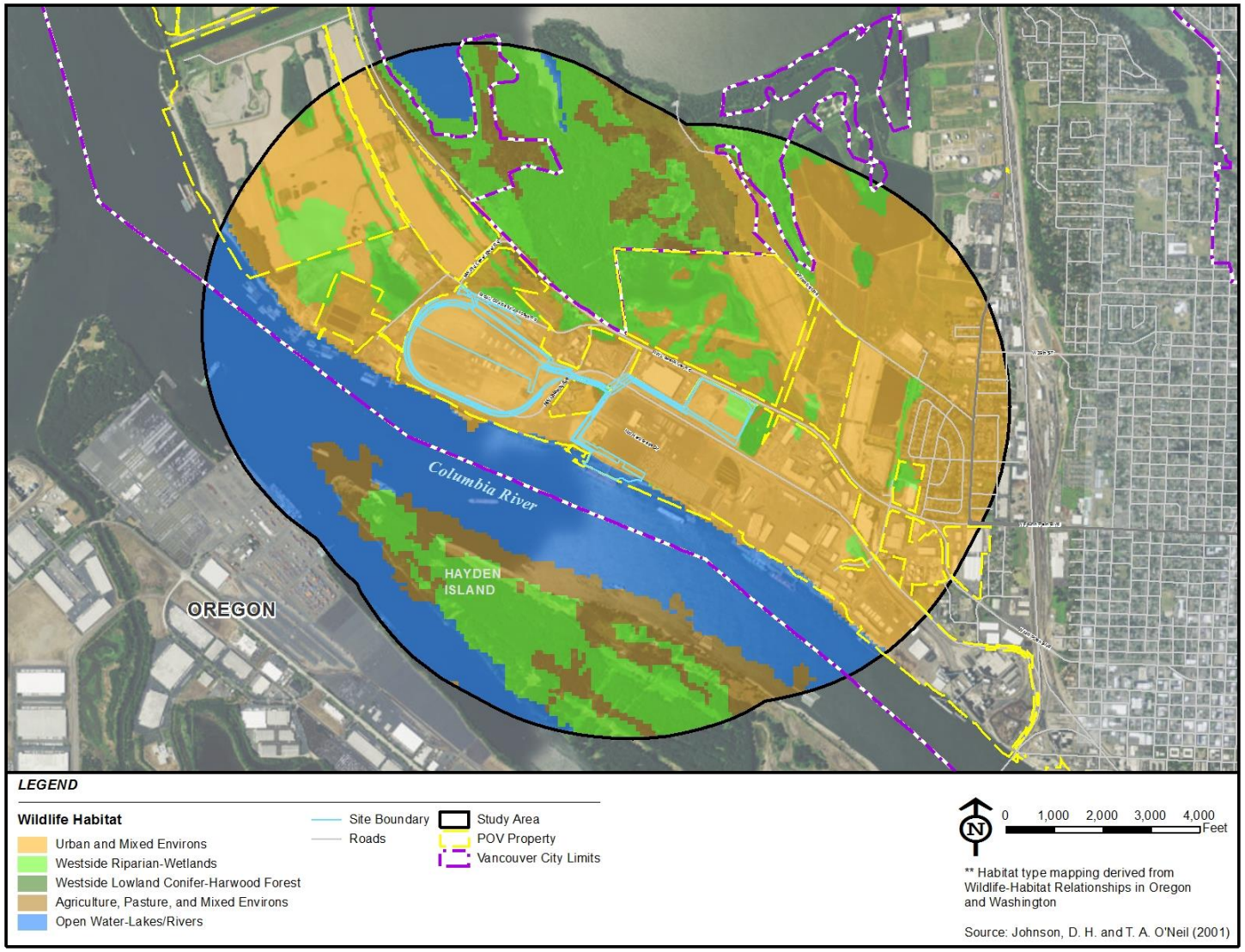

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Figure 3.4-3. Wildlife Habitats (New)

Project Vicinity – Vegetation communities are not assessed outside the project site, but generally consist of the same communities as described for the project site. While there is little habitat present at the project site, there are several areas of relatively higher quality terrestrial habitat adjacent to the project site, and within the immediate vicinity. These include Westside Riparian-Wetlands, Westside Lowland Conifer-Hardwood Forest and Agricultural, Pasture, and Mixed Environs. Aquatic habitat within the project vicinity includes the Columbia River and Vancouver Lake.

- *Westside Riparian-Wetlands* – Within the project vicinity, Westside Riparian-Wetland habitats are present on Hayden Island to the south and Vancouver Lake to the north, and include wetland, shrub and forested communities[5]. Forested communities are dominated by black cottonwood and Oregon ash, while various willow species comprise the shrub communities. Cottonwood-dominated riparian forests border the river west of the proposed Facility and south on Hayden Island. Riparian areas most likely provide 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.

  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.

[5] As described in Section 3.5.3 below, the imagery used in Figure 3.4-3 predates the permitted filling of Parcel 1A where Area 300 is located. There are no existing wetlands within the Facility footprint, and no wetland fill is proposed.

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 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 to improve aquatic habitat functions.

- *Westside Lowland Conifer-Hardwood Forest* – 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, Pasture, and Mixed Environs Lands* – Agricultural habitats are present within the project vicinity, notably to the northeast and west of the proposed Facility. Existing habitat mapping (Figure 3.4-3) shows these areas as Urban and Mixed Environs, which can include surrounding agricultural lands (Johnson and O'Neil 2001). 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 (e.g., sparrows and other songbirds) and for a variety of small mammal species (e.g., mice, voles, and squirrels).

Aquatic habitats in the project vicinity are associated with the Columbia River and Vancouver Lake, and equate to the Open Water – Lakes, Rivers, Streams type described by Johnson and O'Neill (see Figure 3.4-3).

- *Open Water—Lakes, Rivers, Streams* - The Columbia River is an important waterway for commercial vessel traffic. Water depth is artificially maintained in the Columbia River Navigation Channel, approximately 600 feet wide and 43 feet deep, which extends from the mouth to River Mile 106.5. The Columbia River Navigation Channel has been historically dredged by USACE to allow commercial vessel traffic to the Ports of Portland and Vancouver. Routine vessel traffic is normal in the vicinity of the proposed Facility and generates underwater noise. Existing vessel traffic in the Columbia River consists of a variety of vessel types and sizes, all of which generate different sound levels. Recent studies of background noise levels in the Columbia River indicate average sound levels between 110 and 120 decibel (dB), though passing vessels increased ambient sound to between 145 and 157 dB (CRC 2011).

  Aquatic habitats are used by a variety of species, including mammals, birds, amphibians, and invertebrates (fish are discussed separately in section 3.4.3). Habitat at the immediate proposed Facility location is generally lacking in quality. Prior investigations of aquatic conditions at the marine terminal location indicate a general lack of habitat due to the steep shoreline and absence of overbank and riparian vegetation (Anchor Environmental 2007). Shallow water substrate is generally sands and gravels without the presence of large woody debris or submerged vegetation. The sandy bottom is not likely to support large communities of benthic invertebrates, which makes it less suitable as foraging habitat for fish. The lack of submerged vegetation also makes it less likely to be used by foraging waterfowl. Between berths 10 and 13, an area of higher quality habitat lies within the Port's shoreline. The channel bathymetry gradually transitions to deep water that provides some shallow water nearshore habitat, which many juvenile species of fish prefer (see section 3.4.3) and potentially provides some foraging habitat for piscivores when fish are present.

  Habitat for marine mammals is primarily limited to moderate-quality foraging habitat that occurs within the Lower Columbia River, namely Steller sea lion (*Eumatopius jubatus*), California sea lion (*Zalophus californianus*), and harbor seal (*Phoca vitulina*). As described previously, existing underwater noise is elevated from commercial vessel traffic and likely exceeds the threshold for behavioral effects throughout the lower reaches. Areas of noise refuge may occur in side channels where landforms and orientation to the navigation channel block sound transmission. No documented marine mammal haulouts are located within the study area; therefore, these species are considered to be transitory and likely only foraging within the vicinity (WDFW 2013). Diving ducks and other waterfowl forage within and adjacent to aquatic habitats at the study area where potential food sources are more likely to be present. Terrestrial wildlife (e.g., otter or muskrat) do not likely use aquatic habitat at the study area extensively due to the low habitat suitability and limited connectivity to other terrestrial habitats.

Aquatic habitat conditions throughout the study area are similar to those present at the proposed Facility location. There are several areas of relatively higher quality habitat within the immediate vicinity, however, which provide relatively higher levels of habitat function for terrestrial wildlife species. Some of these areas also provide relatively higher levels of connectivity to other areas of habitat, allowing terrestrial species better access to freshwater aquatic habitats. Vancouver Lake provides higher-quality habitat for multiple bird species, primarily dabbling ducks, kingfishers, raptors and songbirds, and forage within and adjacent to aquatic habitats throughout the vicinity of the proposed Facility. Terrestrial mammals, reptiles, and amphibians that use habitats within the vicinity also likely forage within accessible nearshore aquatic habitats.

Project Shipping Prism – The rail prism includes portions of nearly every major watershed and habitat type, ranging from forested to grasslands, within the state. The project's rail prism also crosses or parallels numerous freshwater rivers and smaller tributaries to the Columbia River and to Puget Sound. The WDFW priority habitats and species (PHS) list identifies 20 habitat types as having priority status within the state (WDFW 2008), all of which likely occur within the project's rail prism. A detailed discussion of each of these habitats is beyond the scope of this document, as the anticipated potential for and extent of impacts to priority habitats within the shipping prism are expected to be low, and are addressed programmatically within this document.

Aquatic habitat within the project's vessel prism includes the mainstem Columbia River from the project site downstream to the river mouth and includes PHS-listed aquatic habitats (instream, freshwater wetlands – deep water, and coastal nearshore). The Columbia River Navigation Channel begins at the mouth of the Columbia River and is maintained at a depth of approximately 43 feet deep and approximately 600 feet wide at the project site. This reach of the river provides habitat for a variety of freshwater aquatic species, including Pacific salmon and other resident and anadromous fish species, marine mammals (Steller sea lion, California sea lion, and harbor seal), and several species of aquatic reptiles and amphibians.

The shorelines of the Columbia River downstream of the project site are highly variable and provide different habitat types and vegetation communities. Shoreline types within the lower Columbia River are influenced by substrate composition, bank characteristics, currents, and waves among other variables. The Lower Columbia River Geographic Response Plan (GRP) has identified 14 shoreline types, listed below in Table 3.4-1, that occur between the project site and mouth of the Columbia River (Ecology 2003).

Table 3.4-1. Lower Columbia River GRP Shoreline Types

1	Exposed rock shores and vertical, hard man-made structure (e.g., seawalls)
2	Exposed wave-cut platforms
3	Fine to medium grained sand beaches and steep unvegetated river banks
4	Course grained sand beaches
5	Mixed sand and gravel beaches, including artificial fill containing a range of grain size and material
6A	Gravel beaches - pebbles to cobble
6B	Gravel beaches - cobbles to boulders
6C	Exposed riprap

7	Exposed tidal flat
8A	Sheltered vertical rock shores and vertical, hard man-made structures (e.g., seawalls, docks, bulkheads)
8B	Sheltered rubble slope
9A	Sheltered sand and mud flats
9B	Sheltered vegetated low bank
10	Marshes

Note: Shoreline lengths are not quantified in the GRP.

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 3.4-2 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 3.4-2. 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 bradshawii*)	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

Noxious Weeds

Noxious weeds are non-native plants that have been designated as undesirable plants under federal and state law. Weeds displace native species; decrease plant species diversity; degrade habitat for rare species and wildlife; decrease productivity of farms, rangelands, and forests; create unattractive areas dominated by single species; and impair the full use of the landscape by wildlife and humans.

Several noxious weeds are present in the project site, including Canada thistle, Himalayan blackberry, and false indigo bush, and are typically found in developed industrial sites. Additional noxious weed species could be present, but specific inventories have not been completed. Table 3.4-3 lists weed species known to occur in Clark County that may be present at the project site and within project vicinity (Clark County 2013).

Table 3.4-3. Noxious Weeds Known to Occur in Clark County

Class[a]	Common Name	Scientific Name	County Control Priority
A	Buffalobur	*Solanum rostratum*	Yes
A	Garlic mustard	*Alliaria petiolata*	Yes
A	Giant hogweed	*Heracleum mantegazzianum*	Yes
A	Ricefield bulrush	*Schoenoplectus mucronatus*	Yes
A	Shiny geranium	*Geranium lucidum*	Yes
A	Italian thistle	*Carduus pycnocephalus*	Yes
A	Milk thistle	*Silybum marianum*	Yes
A	Slenderflower thistle	*Carduus tenuiflorus*	Yes
B	Butterflybush	*Buddleja davidii*	Yes
B	Common fennel	*Foeniculum vulgare*	Yes
B	Dalmatian toadflax	*Linaria dalmatica*	Yes
B	Eurasian watermilfoil	*Myriophyllum spicatum*	Yes
B	Hairy willow-herb	*Epilobium hirsutum*	Yes
B	Mouseear hawkweed	*Hieracium pilosella*	Yes
B	Orange hawkweed	*Hieracium aurantiacum*	Yes
B	Yellow hawkweed	*Hieracium caespitosum*	Yes
B	Herb-robert	*Geranium robertianum*	No
B	Indigobush	*Amorpha fruticosa*	No
B	Knapweed, diffuse	*Centaurea diffusa*	Yes
B	Knapweed, meadow	*Centaurea jacea x nigra*	Yes
B	Knapweed, spotted	*Centaurea stoebe*	Yes
B	Knotweed, Bohemian	*Polygonum bohemicum*	Yes
B	Knotweed, giant	*Polygonum sachalinense*	Yes
B	Knotweed, Himalayan	*Polygonum polystachyum*	Yes
B	Knotweed, Japanese	*Polygonum cuspidatum*	Yes
B	Loosestrife, purple	*Lythrum salicaria*	Yes
B	Parrotfeather	*Myriophyllum aquaticum*	Yes

Class[a]	Common Name	Scientific Name	County Control Priority
B	Poison hemlock	*Conium maculatum*	Yes
B	Puncturevine	*Tribulus terrestris*	Yes
B	Scotch broom	*Cytisus scoparius*	Yes
B	Spurge, leafy	*Euphorbia esula*	Yes
B	Sulfur cinquefoil	*Potentilla recta*	Yes
B	Tansy ragwort	*Senecio jacobaea*	Yes
B	Thistle, plumeless	*Carduus acanthoides*	Yes
B	Wild chervil	*Anthriscus sylvestris*	No
B	Yellow archangel	*Lamiastrum galeobdolon*	No
B	Yellow nutsedge	*Cyperus esculentus*	Yes
C	Common groundsel	*Senecio vulgaris*	No
C	Common St. Johnswort	*Hypericum perforatum*	No
C	Common tansy	*Tanacetum vulgare*	Yes
C	Curlyleaf pondweed	*Potamogeton crispus*	No
C	English ivy	*Hedera helix*	No
C	Evergreen blackberry	*Rubus laciniatus*	No
C	Field bindweed	*Convolvulus arvensis*	No
C	Hawkweeds	*Hieracium spp.*	No
C	Himalayan blackberry	*Rubus armeniacus*	No
C	Old-man's-beard	*Clematis vitalba*	No
C	Oxeye daisy	*Leucanthemum vulgare*	No
C	Perennial sowthistle	*Sonchus arvensis*	No
C	Reed canarygrass	*Phalaris arundinacea*	No
C	Spiny cocklebur	*Xanthium spinosum*	No
C	Thistle, bull	*Cirsium vulgare*	Yes
C	Canada Thistle	*Cirsium arvense*	Yes
C	Tree-of-heaven	*Ailanthus altissima*	No
C	Wild carrot	*Daucus carota*	No
C	Yellowflag iris	*Iris pseudacorus*	No
C	Yellow toadflax	*Linaria vulgaris*	No

Source: Clark County (2013)

[a] Class A weeds are the highest priority as these species have limited distribution in the state and can readily be controlled. Class B species are currently present in the state and control is decided that the local level. Class C species are widespread within that state, and control may be locally enforced, but not required.

3.4.2.2 Impacts

Construction

Direct Habitat Modification – 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

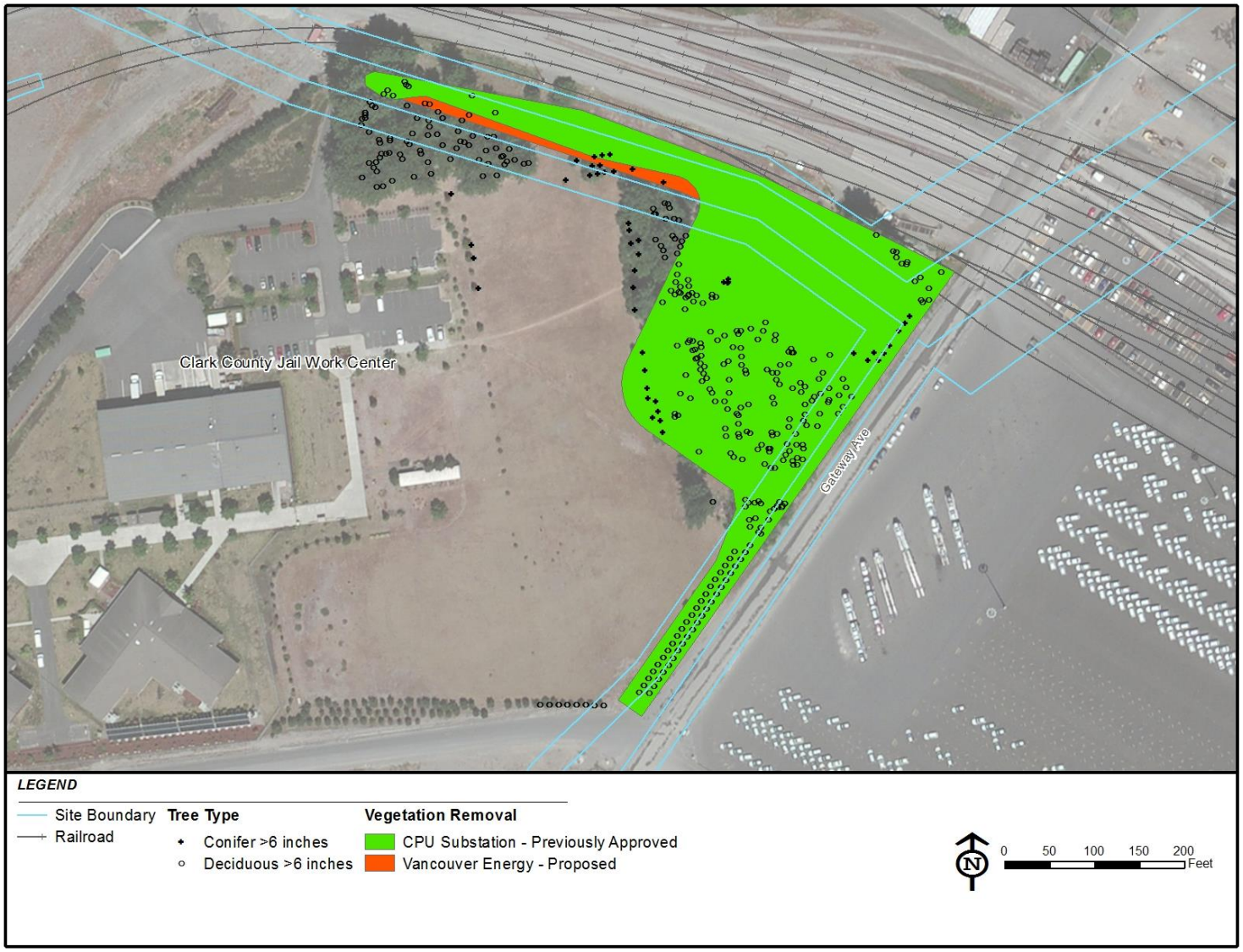
present at the project site. Most of the site has been filled, paved, and/or capped in association with previous development and cleanup activities. What little natural vegetation is present is small and isolated, and/or significantly disturbed from its natural condition. As such, construction of the 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 and ruderal upland grass/forb vegetation communities (Table 3.4-4). These vegetation communities correspond to the Urban/Mixed Environs habitat type (Table 3.4-5) which provides little or no wildlife habitat function. Direct permanent impacts to unvegetated industrial communities total approximately 40.21 acres and will not result in any impacts to vegetation or habitat resources. Temporary impacts, approximately 53.65 acres for staging and construction access, will be restored to previous conditions following construction and are not expected to result in a permanent loss of the vegetation community and the associated habitat function it provides.

Approximately 42,000 square feet (0.96 acre) of ruderal upland grass/forb vegetation will be permanently impacted by construction in Area 200 related to the office building and Area 500 related to portions of the pipeline. Temporary impacts associated with staging and construction access, approximately 3.49 acres, will be restored to existing conditions following construction. These areas provide very little habitat function because of their isolated and disturbed nature. Therefore permanent and temporary 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 3,252 square feet (0.07 acre) of a small, isolated upland cottonwood stand north of the Jail Work Center. This stand contains approximately 273 trees, 246 of which have previously been 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). The current stand provides moderate habitat function, which would be reduced to low quality following construction of the CPU substation because of the limited number and extent of the remaining trees. The proposed pipeline will remove 9 of the remaining 27 trees, which are not already permitted for removal associated with the CPU project (see Figure 3.4-4). The tree removal is not expected to change habitat quality, the trees to be removed are located on the fringes and would not increase fragmentation of the remnant stand.

While the proposed pipeline will pass through the riparian area, this will occur primarily in an unvegetated portion of the riparian area. Construction of the pipeline and other improvements at Area 400 will not impact high quality vegetation and riparian function will not be affected. As stated previously, 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.



BergerABAM

Figure 3.4-4. CPU Tree Plan (Revised)

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. Table 3.4-4 summarizes the impacts to each of the vegetation communities present resulting from construction of the Facility, while Table 3.4-5 summarizes the corresponding impacts to habitats.

Noxious Weeds – Construction of the proposed project could result an increase in the establishment and spread of noxious weeds in the project site. Proposed construction would result in new ground disturbance potentially allowing existing weed populations to spread. Seeds could also be introduced through construction vehicles entering and leaving the proposed Facility location, which could result in the establishment and spread of new species.

Aquatic Exotic and/or Invasive Species – Aquatic exotic and/or invasive species could be introduced during construction through the following activities. Vessels could be used to support in-water construction that could be contaminated with aquatic invasive species if it was previously used in waterbodies outside the Columbia River where such species are present and if the equipment was not properly cleaned prior to arrival at the Facility work location. Certain construction materials (e.g., temporary piles) could also have been previously used at other locations.

Temporary Water Quality Impacts – The project has the potential to result in temporary water quality impacts during pile removal, which could affect aquatic habitat by temporarily disturbing sediments and elevating levels of turbidity during construction. 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 increases in turbidity as a result of the project is not anticipated to measurably exceed levels caused by normal periodic increases of natural turbidity. Additionally, the volume of flow of the Lower Columbia River will help minimize the intensity and duration of any temporary episodic increases in sediment suspension or turbidity.

Temporary Construction Noise – Construction of the Facility has the potential to result in temporarily elevated terrestrial habitat and underwater habitat noise levels at the project site and with the project vicinity during the operation of construction equipment and during in-water pile removal and installation, and upland impact pile driving assocaited with Area 400 improvments (i.e., shore-based mooring points, dolphin access points, and the trestle abutment). These activities have the potential to temporarily affect marine mammals and the quality of their habitat within the project vicinity. During construction aquatic species may tend to avoid the work area or move through the area faster.

Peak terrestrial noise generation would occur from upland impact pile driving impact pile driving in Area 200 and in Area 400 (for area upland of OHWM). Increased sound levels will be temporary and will be expected to decrease to ambient conditions within a maximum distance of

approximately 5,000 feet from the immediate project site. Most of the terrestrial habitat within approximately 5,000 feet of the dock is not suitable for wildlife species, and terrestrial wildlife habitats at the project site are of limited quality and quantity. Wildlife occupying adjacent habitats within 5,000 feet may avoid these habitats or exhibit startle responses to periods of loud noise.

Other sources of temporary construction noise could include general construction activities, however, these activities are not expected to be distinguishable from adjacent industrial activity.

Table 3.4-4. Summary of Vegetation Community Acreage Impacts

Vegetation Community	Existing Community Acreage	Permanent Impacts							Total Permanent Impact	Temporary Construction and Laydown Impacts
		Area 200 – Rail Unloading	Area 200 – Admin	Area 300	Area 400	Area 500	Area 600	Rail Improvements		
Ruderal Upland Grass/Forb	4.45	0.0	0	0.00	0.44	0.52	0.00	0.00	0.96	3.49
Upland Cottonwood Stands	1.68	0.00	0	0.00	0.00	0.07[a]	0.00	0.00	0.07[a]	0
Riparian	0.88	0.00	0	0.00	0.0[b]	0.00	0.00	0.00	0.0	0[b]
Subtotal	*7.01*	*0.0*	0	0.00	*0.44*	*0.59*	*0.00*	*0.00*	*1.03*	*3.49*
Unvegetated Industrial	92.99	6.24	1.60	20.85	1.74	3.55	0.8	5.43	40.21	53.65
Open Water	4.62	0	0	0	4.62[c]	0	0	0	4.62[c]	0
Total Acreage	104.63	6.24	1.60	20.85	7.68	4.89	0.81	5.43	47.47	57.14

[a] Impacts to upland cottonwood stands include prior approvals for the construction of the Clark County PUD substation and total 0.81 acres. Actual impacts associated with the transfer pipeline that occur outside of previous approved tree removal are listed in this table.

[b] Facility elements would be constructed in an area with scarce riparian vegetation at Area 400 covering approximately 0.85 acre. Temporary construction areas would cover approximately 0.03 acre. No high-quality riparian vegetation would be removed and existing riparian habitat function would not be negatively affected.

[c] Construction activities occurring within open water would occur on the existing structure.

Table 3.4-5. Summary of Habitat Acreage Impacts

Habitat Type	Area 200 – Rail Unloading	Area 200 - Admin	Area 300	Area 400	Area 500	Area 600	Rail Improvements	Total Permanent Impact	Temporary Construction and Laydown
Urban/Mixed Environs[a]	6.24	1.60	20.85	2.84	4.89	0.81	5.43	42.66	57.14
Westside Riparian-Wetlands	0.00	0.00	0.00	0.00[b]	0.00	0.00	0.00	0.00	0.00
Westside Lowland Conifer-Hardwood Forest	0.00	0.00	0.00	0.00	0.07[c]	0.00	0.00	0.07	0.00
Open Water – Lakes, Rivers, Streams	0.00	0.00	0.00	4.62	0.00	0.00	0.00	0.00	0.00
Total Acreage	6.24	1.60	20.85	7.68[d]	4.96	0.81	5.43	47.47[d]	57.14

[a] A total of 1.13 acres of vegetation communities within this habitat would be converted and result in a loss of habitat (Table 3.4-4). The remaining area is unvegetated industrial and not considered habitat.

[b] Facility elements would be constructed in an area with scarce vegetation and no high-quality vegetation would be removed or existing riparian habitat function would be negatively affected.

c Impacts to upland cottonwood stands include prior approvals for the construction of the Clark County PUD substation and total 1.7 acres. Actual impacts associated with the transfer pipeline that occur outside of previous approved tree removal are listed in this table.

d Includes water areas of 4.8 acres within the Marine Terminal.

Operation

The operation of the proposed project could affect vegetation and terrestrial wildlife habitats 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 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 shipping traffic that will occur in conjunction with the proposed project.

Vegetation Maintenance – Improper application of herbicides for control of vegetation for safety reasons (see section 2.10.2) could result in impacts to vegetation outside the Facility boundary.

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, SWH zone shading 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 47.4 acres, and the proposed construction will result in approximately 44.4 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).

Overwater Coverage – During loading operations, potential activities that could affect the SWH zone include the use of two moveable, grated walkways to provide access to the mooring dolphins. These walkways are only intended to cross the SWH zone when vessels are mooring or departing. When not in use, the walkways will be staged onshore. The vessel mooring occurs in deep water, outside the SWH zone, and will not increase temporary shading. Therefore, no additional impacts will occur to the SWH zone as a result of project operations and there will be no further degradation of the nearshore migratory corridor used by salmonids and other fish species.

Operational Water Quality Impacts – The operation of the Facility also has the potential to increase the risk of inadvertent releases of crude oil to the environment. According to projected volumes, the proposed project will result in approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity. Spills could occur at the project site or while docking or loading, or in transit downstream on the Columbia River or in marine waters.

A marine traffic risk assessment completed for the project (see Appendix P.1) assessed the frequency of various types of marine incidents, including: collisions in transit and at the berth, allisions, and groundings. The study assessed the frequency based both on existing vessel traffic on the Columbia River (see Appendix P.2), and very conservatively all other currently proposed maritime cargo projects on the Columbia. The study identified that not all vessel-related incidents result in a release of cargo, and calculated the risk of spill from such incidents based on the size of vessels proposed to call at the Facility. The study also assessed the risk of releases during vessel loading operations. The study reported the following results.

- The model predicts that the Vancouver Energy Terminal vessel traffic will increase the risk of marine incidents for current traffic (with or without consequences of concern) on the Columbia River by approximately 2 percent. The number of incidents predicted by the model for the study area is approximately 40 per year for current marine traffic. The incident return period for an incident of any type (most of which will not result in a spill) is approximately:
  - one every 0.8 year for 47,000 DWT tankers
  - one every 3 years for 105,000 DWT tankers
  - one every 57 years for 165,000 DWT tankers
- When considering all future marine traffic – a combination of current traffic, Sample Vessels, and traffic proposed for future projects – the frequency of an oil spill from a collision was approximately:
  - 1 every 43years1 for 47,000 DWT tankers
  - 1 every 170 years for 105,000 DWT tankers
  - 1 every 3,100 years for 165,000 DWT tankers
- When considering all future marine traffic the frequency of an oil spill from a grounding is:
  - 1 every 40 years for 47,000 DWT tankers
  - 1 every 150 years for 105,000 DWT tankers
  - 1 every 2,800 years for 165,000 DWT tankers

- When considering all future marine traffic, the frequency of an oil spill from a collision at the dock is:
  - 0.00004/year (1 every 25,000 years) for 47,000 DWT tankers
  - 0.00001/year (1 every 100,000 years) for 105,000 DWT tankers
  - 0.0000006/year (1 every 1.6 million years) for 165,000 DWT tankers

When a laden tanker is assisted by a tethered escort tug as opposed to having no tethered escort tug, it was estimated that a laden tanker is 10 times less likely to run aground than it is without a tethered escort tug.

The study concluded that with respect to releases resulting from vessel loading operations small releases (less than 100 bbl) were the most likely, with an estimated frequency of one every seven to nine years. This conclusion was supported by the historical record, which demonstrates that the majority of spills are less than 1 bbl. Loading hoses contribute to the majority of this risk. The replacement of these hoses every five years (as mandated by state and federal regulations) is expected to further reduce the likelihood of these small releases. Spills of tens of thousands of bbl resulting from full bore rupture of the largest transfer pipeline were estimated to be very significantly less frequent, occurring once every 39,000 years or more.

Terrestrial vegetation and wildlife habitats will not be affected significantly by any potential water quality impacts associated with operation of the Facility. Terrestrial habitats that would remain at the project site post-construction could potentially be affected by an increased potential for spills or leaks. 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. A comprehensive strategy for spill prevention and control will be implemented as described in detail in section 2.10 of this Application and in the oSPCCP (Appendix B.3). A spill to surface water would not be likely to affect terrestrial vegetation or terrestrial wildlife habitats.

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 project will result in approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity. Marine traffic on the Columbia River has the potential to result in impacts to vegetation and wildlife habitats through increases in the potential for minor shoreline erosion associated with propeller wash as well as waves, and through the introduction of exotic species. The potential impacts are discussed in further detail below.

Bank Erosion – Propeller wash from ships in transit, as well as vessel wakes breaking on shore, could cause an increase in bank erosion along unarmored sections of the shoreline. This could result in a minor decrease in the quantity and quality of vegetation and terrestrial wildlife habitat along the shoreline. The USACE's Channel Deepening EIS (USACE 1999) reported that the natural shorelines of the lower Columbia River (encompassing the vessel corridor for the project) have remained very stable over the past 100 years, consisting largely of erosion-resistant sand, silt, and clay deposits (USACE 1999). Approximately half of the shoreline between RM 21 and 106 are consists of dredge disposal sites which are not natural shorelines and are highly susceptible to erosion (USACE 1999). The disposal sites are subject to vessel wakes, currents, and continual wind waves which contribute to regular erosion patterns in the river (USACE 1999).

The vessel corridor and habitats along the shoreline are already exposed to vessel wakes from the ships that use the river and a baseline level of propeller scour aleady occurs (see Appendices H.5 and H.6). The vessels that would call at the Facility terminal are within the size range of current vessels and would be piloted at similar speeds and course through the navigation channel. Therefore, the wakes from these vessels would be similar to wakes from vessels currently using the navigation channel. This means the natural shorelines, which have little susceptibility to erosion, would be subject to an incremental increase in vessel wakes that are not currently causing erosion. As a result, any localized minor change would not be expected to result in a long-term change to the habitat because there is a regular state of disturbance. In addition, these habitats are continually disturbed by natural currents and waves.

The shoreline at the Facility site is well armored, and not particularly sensitive to erosion. At the Facility, and other armored shorelines on the river, the impact of vessel traffic on bank erosion should be negligible. Effects associated with bank erosion would be minor, temporary and localized to unarmored banks, and would result in only minor impacts to vegetation and terrestrial wildlife habitat. The risk of adverse effects to shoreline habitat from increased bank erosion caused by vessels calling at the Facility is minimal.

- *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.

  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 requirements. These practices include requirements 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. This also reduces the risk of the transport of exotic species. Vessels calling at the Facility are subject to state and federal requirments regarding ballast water treatment and discharge, as described in section 3.4.3.2 below.

  During operation, with the exception of tanker vessel and ATB calls for loading as discussed below, the following activities involve an in-water component that could also potentially introduce exotic species: the placement and removal of Facility-owned mobile spill booms

during vessel loading operations; participation of Facility[6] and contractor vessels[7] in spill response exercises; and participation of Facility and contractor vessels in spill response activities.

With respect to Facility-owned equipment, the skiff and mobile booms will be primarily used at Vancouver Energy Terminal. The Applicant may enter into mutual aid agreements with other facilities; in the event of drills or incidents at such other facilities the skiff and booms could be dispatched to those locations to participate in response; it is anticipated that mutual aid agreements would primarily be entered into with facilities located along the Columbia River. The skiff and booms would therefore most likely only be exposed to waters within the Columbia River, and there is negligible potential for contamination with invasive species which are not already present in this waterbody. If the equipment was dispatched outside the Columbia River, it would be inspected and cleaned in accordance with the state requirements noted above before being re-introduced to the Columbia River.

With respect to spill response equipment not owned by the Facility but furnished by third party organizations that the Applicant will contract with (including organizations providing mutual aid), based on the current equipment requirements for the Columba River, there are sufficient response resources to meet the current 300,000 bbl response planning standard currently staged on or in proximity to the river[8]. Therefore, this equipment also has minimal potential for introduction of species not already present in the Columbia River. Contractors and mutual aid providers may source equipment from other locations in the event of larger and more complex spill drills or response activities. In such cases, contractors and mutual aid providers are also required to comply with applicable state statutes and rules aimed at preventing the introduction of such species, as identified above.

3.4.2.3 Mitigation Measures

The project will implement several minimization measures and BMPs to minimize the potential for impacts to terrestrial habitats and vegetation. In addition to the following discussion, see sections 3.4.3, Fish, and 3.4.4, Wildlife, and section 1.4.1.11 for additional mitigation measures and BMPs for these habitats.

Construction

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,

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[6] The only vessel anticipated to be directly operated by the Facility will be the skiff associated with the Area 400 Marine Terminal, as described in Section 2.3.7 of the Application for Site Certification No. 2013-01 Supplement, February 2014.

[7] The Applicant has identified mutual aid agreements in their Operations Spill Contingency Plan, July 2015; organizations providing mutual aid may supply vessels during drills and spill response activities.

[8] If an increase of the spill response planning standard were approved in the future, spill response organizations receiving such approval would acquire necessary additional response equipment and stage it appropriately in proximity to the Columbia River on a permanent basis, thereby also minimizing the potential for introduction of aquatic invasive species.

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. Construction fencing will be used to protect existing vegetation to be retained.

Mitigation measures will be implemented for each of the habitats impacted by construction of the Facility as follows:

- Unvegetated Industrial Land: Impacts to unvegetated industrial land do not require mitigation.
- Ruderal Upland Grass/Forb and Upland Cottonwood Stands: As noted above, the 0.96 acre of ruderal upland grass/forb habitat have very limited value; nevertheless, even if no net loss to this impact was required, together with the Upland Cottonwood Stands (0.07 acre) 1.03 acres of compensatory habitat mitigation is warranted for no-net loss. To mitigate for the removal of these habitats, the project will install urban landscaping including trees and shrubs in areas 200 and 300. Native species will be used to the extent practical. Area 200 will include native trees planted in groups within the landscape to provide additional mitigation for loss of trees onsite. These landscaped areas will provide wildlife habitat typical in an urban environment, including perching and foraging opportunities for migratory birds. This action also complies with VMC 20.770 and will plant additional trees to compensate for development that will impact pervious surfaces. Trees will be planted as part of landscaped buffers and parking lot landscaping where currently no trees exist. In total approximately 2.21 acres of planted areas will be completed.

  Locations where ruderal habitat has been impacted by temporary construction laydown will be restored to previous condition so as to result in no net loss to this community.
- Riparian: As noted above, the riprapped bank has very limited riparian vegetation, and the Applicant is not disturbing any existing high quality vegetation or negatively impacting existing habitat function. No mitigation is therefore warranted.

The project will-provide 1.13 acres of compensatory habitat mitigation, including urban landscaping. Approximately 2.21 acres of planted areas, including trees and shrubs in areas 200 and 300 will offset the removal of nine trees associated with construction. Area 200 will include in the landscape plan for the Support Buildings the use of native trees planted in groups within the landscape to provide additional mitigation for the loss of trees onsite. These landscaped areas will provide wildlife habitat typical in an urban environment. In addition, the Applicant will adhere to the requirements of VMC 20.770[9] and plant a minimum of 30 tree units per acre for

[9] VMC 20.770.070(B)(4) allows trees planted in landscaped islands and other areas to meet the tree density requirements. The project includes a Landscaping Plan in Area 200 that calls for the planting of buffer landscape trees and parking lot trees that would exceed the eight tree units required for the project under VMC 20.770. The planted trees would be deciduous and planted at a minimum of 2-inch caliper. These landscaped areas would provide wildlife habitat typical in an urban environment, including perching and foraging opportunities for migratory birds. In total, about 2.21 acres of planted areas would be completed.

undeveloped sites, and, based on a development area of 10,550 square feet, plant a minimum of eight tree units in other areas of the Facility.

No purple martin or nest boxes would be directly affected by the construction of the proposed project. Construction activities do not include removal of any creosote-coated wood piling. All existing piles at the marine terminal are steel and do not contain cavities for nesting wildlife. Purple martin have a low suspected occurrence within the Facility site as noted in the DEIS, Table 3.5-3.

The Applicant has identified the following construction mitigation measures to minimize impacts to avian habitat during construction:

- Perform tree removal outside of the nesting season (February 15 to September 1), to avoid potential impacts to active nests of protected migratory birds. If trees are to be removed during the nesting season, a preconstruction nesting survey will be completed no more than two weeks prior to removal to ensure that no active nests are present. If active nests of protected migratory birds are found, tree removal activities will be suspended until after nests have hatched and young have fledged.
- Monitor the approximate 2.2 acres of landscape plantings (discussed above) for two years after planting and replace all trees that do not become successfully established.

BMPs will be implemented during construction to minimize the spread and establishment of noxious weeds, including the following:

- Complete a weed survey for the proposed Facility site, followed by eradication of any noxious weeds and invasive plants currently established at the site prior to initiation of construction to help prevent the spread of noxious weeds to nearby wetland mitigation and wildlife areas.
- Provide wheel wash equipment at the Area 200 access to limit the dispersion of noxious weed seeds
- Restrict construction activities to the area needed to work effectively to limit the ground disturbance and prevent the spread of noxious weed species.
- Use weed-free straw, hydromulch, or similar ground cover for temporary erosion control during construction.

Aquatic Invasive Species

WDFW hydraulic code rules require that the transportation and introduction of aquatic invasive species be prevented by thoroughly cleaning vessels, equipment, boots, waders, and other gear before removing the gear from a job site [WAC 660-120 (7)(j)]. Contractors would be required to provide documentation that all equipment and materials that will be used in- and over-water have be cleaned to comply with applicable aquatic invasive species statutes and rules, including WAC 660-120 (7)(j). This would include providing documentation that in-water equipment and construction materials have either not been in contact with waters containing state prohibited aquatic invasive species which could be potentially transferred to the Columbia River, or that equipment and materials have been appropriately decontaminated from potentially transferrable aquatic invasive species prior to arrival at the project site.

Temporary Construction Water Quality

A WQPMP (Appendix F.2) has been developed and describes how the project will monitor and control releases of turbidity, suspended sediment, concrete, and other construction-related materials that may be generated during Facility construction activities in, over, and adjacent to the Columbia River and other adjacent water bodies. The plan describes water quality protection measures; monitoring parameters, methods, evaluation criteria; and contingency response and notification procedures in the event a water quality criterion is exceeded during such construction activities.

All in-water temporary pile installation and removal below the OHWM will be conducted within the published in-water work period for the project, which is November 1 to February 28[10]. This work window has been established to minimize potential impacts to aquatic habitat and native fish species and avoids the peak migration timing for marine mammals in the Lower Columbia River.

Construction at the site will be governed by an cSPCCP, which the Applicant has submitted to EFSEC for review (Appendix B.2). The cSPCCP defines specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills and outlines responsive actions in the event of a release, and notification and reporting procedures. 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. The cSPCCP will be used for appropriate response and cleanup procedures, including the handling of vegetation that would be affected by spills. Applicable spill response equipment and material designated in the cSPCCP will be maintained at the job site. In the event of an inadvertent release, containment and begin cleanup efforts will begin immediately and will be completed in an expeditious manner, in accordance with all local, state, and federal regulations, and taking precedence over normal work. Cleanup will include proper disposal of any inadvertently released material and used cleanup material. The cause of the inadvertent release will be assessed and appropriate action will be taken to prevent further incidents or

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[10] In the Applicant-prepared PDEIS for the project, and in the JARPA and Biological Evaluation (BE) for the project, the Applicant has proposed to conduct work below the Ordinary High Water Mark (OHWM) within the US Army Corps of Engineers' (USACE) published in-water work window for the Columbia River mainstem between the mouth of the river to the Snake River confluence (November 1–February 28).[1] This work window has been established by the USACE, in coordination with resource agencies, for the protection of fish life, including ESA-listed species.

In the Advisory HPA, as well as in Sections 3.6.3.1 and 3.6.5 of the DEIS, EFSEC proposes a modified in-water work window of September 1 - January 15 to avoid peak migration and larval stages of salmonid and nonsalmonid species.

The USACE is currently reviewing the JARPA and BE for the project and consulting with National Marine Fisheries Service (NMFS) and US Fish and Wildlife Service (USFWS) as obligated under Section 7 of the Endangered Species Act (ESA). Each of these regulatory agencies may have additional feedback on the preferred window for in-water work.

In the absence of a consensus among the resource agencies regarding a modified work window, EFSEC should defer to the USACE-published in-water work window of November 1 – February 28, as this is the window under consideration with the federal permitting agencies.

If USACE, NMFS, USFWS, and EFSEC can agree upon a modified window in which the project can be accomplished, and which is no shorter in duration than the window proposed in the federal permit application, then the Applicant would support discussions regarding a modified in-water work window.

environmental damage. Inadvertent releases will be reported to Ecology's Southwest Regional Spill Response Office.

Temporary Construction Noise

Aquatic and terrestrial habitat noise associated with construction has been minimized to the extent practicable. The dock modifications have been designed to use vibratory pile removal and installation methods and no in-water (below OHWM) impact pile driving, which will greatly reduce the extent of terrestrial and underwater noise generated during construction. This reduction in the intensity of underwater noise will limit the potential for adverse effects to wildlife, including special status species that may utilize habitats at the project site and within the project vicinity.

All in-water work that generates temporary noise, including temporary pile vibratory installation and removal, will occur during the published work window from November 1 to February 28 to minimize potential impacts to native fish species, and avoid 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. Drilling for casing installation may also generate underwater noise and will follow the same work window.

The Applicant has submitted a marine mammal monitoring plan (MMMP) (Appendix H.3) to EFSEC for review to address vibratory installation and removal of temporary piles and upland impact pile driving. The MMMP was developed to minimize the exposure of marine mammals to temporarily increased underwater noise levels. The plan describes procedures to identify the presence of marine mammals during construction activities, which may result in "take" and establishes actions that will be taken to minimize impacts to such marine mammals. The MMMP will include, in addition to the current plan, two additional observers to assist in monitoring the 6-mile zone where marine mammals could be affected by in-water vibratory pile driving.

The impacts of peak terrestrial construction noise have been minimized through construction sequencing that will complete work as efficiently as possible when loud noises are expected. Additionally, all noise sources occur outside of recommended management buffers for priority species; therefore, no work window is proposed for terrestrial pile driving. Species that utilize these industrialized habitats are generally well adjusted to nearly continuous human presence and activity. The Applicant has committed to also conduct upland impact pile driving associated with Area 400 elements (shore based mooring points, foundations for the mooring dolphin access points, and the trestle abutment) during the published work window from November 1 to February 28 to minimize the potential for adverse impacts to aquatic habitat. Upland impact pile driving located outside of Area 400 (e.g., Area 200 rail unloading building and Area 500 pipeline supports) would not be subject to the in-water work window.

A construction wildlife monitoring plan (Appendix H.4) has also been developed that describes the means and methods to monitor noise levels during project upland impact pile-driving in order to demonstrate that noise levels attenuate to a level of non-disturbance to PHS species potentially present in the vicinity of the construction site. See section 3.4.4.1 for additional information on species of concern.

See sections 3.4.3.3, 3.4.4.3, and 1.4.1.11 for additional details on Temporary Construction Noise.

Operation

The operation of the Facility could affect vegetation and terrestrial wildlife habitats 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. There may also be minor effects associated with the shipping traffic calling at the Facility, such as bank erosion. Effects associated with bank erosion will be minor, temporary and localized to unarmored shorelines, and will result in only minor impacts to vegetation and terrestrial wildlife habitat.

Vegetation Maintenance – Facility vegetation maintenance impacts will be minimized with the use of the following mitigation measures:

- Conduct herbicide application activities using methods and products consistent with local, state, and federal regulations.
- Vegetation maintenance will not occur outside the Facility location.

Water Quality

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, operational stormwater will be collected, treated, and conveyed in permanent constructed conveyances from source to discharge. Stormwater from Area 300 will be treated to enhanced water quality standards and discharged to the 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 six-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 vegetation and terrestrial wildlife habitat are not adversely affected by operational stormwater.

As described in section 2.10, the Facility will include design measures aimed at avoiding releases, secondary containment measures to prevent releases from reaching terrestrial and aquatic habitats, and will implement a comprehensive suite of spill response planning and response plans.

Operations at the site will be governed by an oSPCCP (Appendix B.3), 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 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.

The Applicant has committed to using a self-healing biodegradable fire-fighting foam manufactured by Solberg (see Appnedix N.1 – Fire System Operation Description,

section 6.1.1). The raw materials used in the Solberg self-healing biodegradable foam have been evaluated to the Harmonized Offshore Chemical Notification Format and this is the only foam to date that has gone through this evaluation. This evaluation, which determines the impact of products discharged into marine and freshwater environments, concluded that the Solberg self-healing biodegradable foam is acceptable for use in the North Sea and in areas that discharge into the North Sea. As well, the German Institute of Hygiene has found the Solberg self-healing biodegradable foam to be of low impact upon discharge to the environment. It should be noted that fluorinated foam products will not achieve those listings because of the persistence of the fluorine molecule. For example, Solberg self-healing biodegradable foam is permitted by the Norwegian Government to allow runoff directly into the Fiords of the North Sea. This is not permitted with fluorinated surfactant based foam products.

Shipping

Bank Erosion

As presented in section 3.4.2.2, Operation, *Bank Erosion*, impacts related to vessel wakes caused by vessels calling at the Facility are not measurably different from those already occurring on the Columbia River navigational channel and will not cause any additional adverse impact (Flint 2016). Terrestrial habitats along the shoreline are already exposed to a baseline level of vessel wakes. The impact of vessel traffic on these habitats adjacent to the Facility will be negligible and as a result there are no recommended mitigation measures.

Exotic Species

The importation of aquatic invasive species as a result of vessels calling at the Facility is minized through vessel operator compliance with applicable state and federal regulations as described above, which address hull fouling and ballast water exchanges.

Facility-specific activities involving in-water placement of equipment (e.g., booming, skiff usage, third-party vessels participating in spill response traingina and drills) would abide by applicable state regualtions and rules mandating cleaning of equipment prior to its introduction into the Columbia River if it was sourced from a location where invasive species are present.

Vessel Transit-related Spills

Loaded vessels departing from the Facility will be escorted by a suitably matched tug until the escorted vessel arrives in the vicinity of the river mouth. Once in the vicinity of the river mouth, the tug will be released from the escorted vessel and will standby as a sentinel tug until the vessel crosses the bar and is safely underway in the open ocean.

In accordance with federal requirements transport vessels calling at the Facility will be 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 shipboard oil pollution emergency plan (SOPEP) govern the operation of each ship. All ships also will be required to comply with state spill prevention and contingency plans.

As described in section 3.4.2.2 above, the likelihood of a catastrophic spill is very low, and the proposed Facility BMPs and safety and security measures will minimize the risk of impacts to vegetation and terrestrial wildlife habitat.

Cumulative Impacts
The impact minimization measures that have been incorporated into the design of the project are the same measures that will reduce the potential for cumulative impacts. The project has been designed to minimize the extent of impacts to habitat and vegetation to the extent practicable, and this will reduce the potential for cumulative effects to these resources as well. The project itself will not result in any cumulative impacts to habitat and vegetation resources.

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 3.4-6 summarizes this information.

3.4.3.2 Impacts

This section describes the direct and indirect impacts that could occur to fish or fish habitat associated with the proposed project. Due to the nature of the resource and the varying degree of use of the habitat by each species, it is not possible to meaningfully estimate the numbers of individuals that could potentially be affected. Instead, the extent of impacts to individual fish are established based on an interpretation of the extent of impact to suitable or potentially suitable habitat.

Construction

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, the generation of temporarily elevated levels of underwater noise during temporary pile installation and removal, permanent pile removal, and installation of ground improvements, and the possible introduction of exotic species. At the scale of the shipping prism, fish and fish habitat would not be permanently directly or indirectly affected by project construction.

Table 3.4-6. Special-status Aquatic 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.
Mammals								
Steller Sea Lion (*Eumatopius jubatus*)	Eastern DPS	FT	Designated	ST	1, 2	Y	Moderate/High – Aquatic portion of site is within migratory/foraging corridor	High – Columbia River and adjacent marine habitats are documented habitat.
Whales (Several species)	Varies	Varies	Varies	Varies	Varies	Varies	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/High – Aquatic portion of site is within migratory/foraging corridor	High – Columbia River is a documented migratory/foraging corridor.
Reptiles								
Sea Turtles (Various species)	Varies	Varies	Varies	Varies	Varies	Varies	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 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 Tr bal 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 associated with the project. The project proposes to remove 15 steel piles (eleven 18-inch steel pipe piles and four 12-3/4-inch steel pipe piles) restoring approximately 23 square feet of benthic habitat at the project site.

The project has been designed to minimize the extent of impact to the aquatic environment, and as such, will not require the installation of any permanent piles below the OHWM of the Columbia River. The project may, however, require the installation of up to 40 temporary piles to support the guides that will be used 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. 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 recolonize following removal.

Additionally, the project will result in a net reduction of approximately 400 square feet of solid overwater coverage, 1,370 square feet of grated overwater coverage, and a net increase of approximately 920 square feet of open truss overwater coverage associated with walkways.

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 3.4.3.1. 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 also provide these functions for returning adult ESA-listed salmon, and also provide 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 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.

Construction Lighting Impacts – During the installation of ground improvements, construction may occur at night to complete required work during the applicable fish window and would require additional temporary lighting on the shoreline, increasing the amount of light on the water. Increased light levels may affect fish by attraction.

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 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 (November 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.

Aquatic Invasive Species – Exotic and/or invasive species could be introduced during construction through the following activities. Vessels could be used to support in-water construction that could be contaminated with aquatic invasive species if it was previously used in waterbodies outside the Columbia River where such species are present and if the equipment was not properly cleaned prior to arrival at the Facility work location. Certain construction materials (e.g., temporary piles) could also have been previously used at other locations.

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 temporary pile installation and removal and upland impact pile driving associated with Area 400 improvments (i.e., shore-based mooring points, dolphin access points, and the trestle abutment).

Elevated underwater noise 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.

In-Water Pile Installation and Removal. As part of impact minimization, a vibratory hammer will be used for all in-water pile driving. Construction of the marine terminal is expected to install and remove up to approximately 40 temporary piles with vibratory methods. A vibratory hammer will also likely be used to remove approximately 15 existing piles from below the OHWM of the river at the marine terminal area. Some piles may also be removed through direct-pull methods, which would further reduce the potential for temporarily elevated underwater noise levels.

This analysis assumes that forty 30-inch-diameter temporary steel piles would be installed to support dock modifications. WSDOT recently published a memorandum reporting average root mean square (rms) values associated with vibratory installation of 30-inch steel piles as ranging from 164 to 176 dB_{RMS} with an overall average rms value of 171 dB_{RMS} (WSDOT 2010). WSDOT also published data in 2011 documenting average underwater sound pressure levels of 150 dB_{RMS} at a distance of 10 meters from the pile, during vibratory removal of timber piles (WSDOT 2011). For purposes of this analysis, therefore, it has been assumed that underwater noise associated with vibratory pile installation and removal will not exceed 176 dB_{RMS}.

Vibratory pile installation and removal is not expected to generate levels of underwater noise that will result in significant adverse effects to fish habitat or species. NMFS has established a disturbance threshold of 150 dB_{RMS} for fish of any size. Vibratory pile installation and removal may result in maximum underwater sound levels that meet or exceed this threshold at a distance of approximately 541 meters from the pile, respectively. Any fish that are present within this distance of the pile could be temporarily disturbed. During vibratory pile driving, 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 fish species, fish habitat, or any PCE of designated or proposed critical habitat for ESA-listed fish species.

Upland Impact Pile Installation. The project will conduct impact pile driving at the top of the bank within approximately 15 feet of the OHWM to construct several Area 400 elements, including two pile-supported shore-based mooring points, mooring dolphin access points, and strengthen the access trestle abutment. These structures would most likely be supported by 24- and/or 36-inch steel piles. Upland impact pile installation typically generates significantly lower levels of in-water noise than those generated during in-water pile driving. However, sound flanking (transmission of sound waves through substrate and into the aquatic environment) during upland impact pile driving has been documented in the literature (Batelle 2004; Caltrans 2012), and can potentially generate elevated underwater sound pressure levels in adjacent aquatic habitats. Upland impact pile driving will also occur within Area 200 (rail unloading building foundation support) and Area 500 (pipe foundation supports), but these locations are not in close proximity to OHWM and are not expected to result in sound flanking.

Underwater sound pressure levels generated by upland impact pile driving have been documented during construction of the Geyserville Bridge in Geyserville, California, in 2006 (Caltrans 2012), and during construction of a temporary work trestle for replacement of a portion of the Hood Canal Bridge in 2004 (Batelle 2004). Data collected during the Geyserville Bridge

project documented average sound pressure levels, recorded at a distance of approximately 30 to 35 meters from the pile, averaging approximately 186 dB_{PEAK}, 171 dB_{RMS}, and 162 dB_{SEL}, with maximum sound pressure levels approximately 5 dB higher (Caltrans 2012). Data collected during the Hood Canal Bridge project documented average peak sound pressure levels between approximately 164.3 and 179.6 dB_{PEAK}, and average RMS sound pressure levels ranging between approximately 147.6 and 166.2 dB_{RMS}. While site conditions are likely an important and highly variable factor in the extent to which sound pressure is transmitted to the adjacent aquatic environment, for purposes of this consultation, a worst case estimate of underwater noise levels that could be generated during upland impact pile driving of 24- and 36-inch steel piles is estimated at approximately 191 dB_{PEAK}, 176 dB_{RMS}, and 167 dB_{SEL} (Caltrans 2012).

The noise attenuation analysis indicates that the worst-case estimate of up to 6,000 strikes per day that may be necessary to drive upland piles to final elevation could exceed 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 1,338 feet of pile-driving activity. This would extend throughout the nearshore environment and approximately halfway across the Columbia River at the project site. However, these worst-case estimates result in turn from the worst-case estimate of 6,000 strikes per day, and the estimates also assume that noise is transmitted fully to the adjacent aquatic environment through the soil.

WSDOT (2014) reports that there is no approved method for calculating transmission loss (i.e., attenuation) through soil outside of the water, and then for calculating the sound level at the point at which sound is transmitted into the adjacent aquatic habitat. WSDOT has conducted monitoring on only a few projects in which piles have been driven in the dry adjacent to or within the OHWM of a river. This includes H-piles and 16-inch and 72-inch steel piles. In all cases, the pile installation did not exceed the currently established injury thresholds for fish (WSDOT 2014). Based on this information, WSDOT has concluded that pile driving in the dry is an effective means of minimizing effects to fish (WSDOT 2014).

In order to further minimize the potential for exposure of ESA-listed fish species to cumulative underwater sound pressure levels that could result in injury, upland impact pile driving associated with Area 400 improvements (i.e., mooring points, dolphin access points and trestle abutment) would be restricted to the in-water work window. Additionally, given the nature and quality of the habitat at the site, most fish are expected to be moving through the action area, and they would not be expected to be exposed to the sound from all of the impact strikes in a given day.

For these reasons, it is unlikely that any ESA-listed fish species would be exposed to cumulative underwater sound pressure levels above the established injury threshold.

Upland Ground Improvements. Temporary noise levels associated with vibratory installation of temporary sheet pile containment wall above the OHWM and installation of ground improvements will be less than those of impact-driven piles considered for possible effects. Additional impacts to aquatic species will, therefore, not be incurred. 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.

Upland impact pile driving associated with the installation of the upland mooring points, dolphin access points, and trestle abutment improvements would be restricted to the in-water work window. Additionally, given the nature and quality of the habitat at the site, most fish are

expected to be moving through the area, and would not be expected to be exposed to the sound from all of the impact strikes in a given day. For these reasons, it is unlikely that fish would be exposed to cumulative underwater sound pressure levels above the injury threshold that has been established for ESA-listed species, and this activity is not expected to result in any adverse effects to fish habitat, or to any PCE of designated or proposed critical habitat for ESA-listed fish species.

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.

Operational Water Quality Impacts – Operational water quality impacts that could be associated with the proposed project include an increased potential for impacts associated with temporary water quality during vessel berthing, 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.

During vessel berthing, temporary impacts to water quality (increased turbidity) could occur from sediment suspended by propeller wash. The impacts could occur twice per day as a vessels docks and departs. Temporary increases in turbidity are short in duration and dissipate naturally in response to river currents. Vessels will dock outside the SWH zone in deep water where any potential increase in temporary turbidity is not expected to be significant.

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 47.4 acres, and the proposed construction will result in approximately 44.4 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 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity. Spills could occur at the project site or while docking or filling, or in transit downstream on the Columbia River or in marine waters. See section 3.4.2.2, Impacts, *Operations* and Appendix P.1 for additional information on vessel and spill risk assessment conclusions.

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.

Accidental release of crude oil 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. Fish that were exposed to high concentrations of spilled crude oil or other fuels could experience a range of effects up to and including direct mortality. A spill of crude oil to the aquatic environment within the project shipping prism could potentially result in long-term adverse effects to habitat suitability for a significant distance downstream of the spill. Impacts to fish and fish habitat would be significant. 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 Appendices B.2 through B.5) will manage the risk of impacts to fish species and habitats effectively.

As described in section 2.10, and elaborated in the preliminary spill prevention and response plans (Appendices B.3 through B.5) should a spill occur, the Applicant will have in place planning and and spill response measures (such as spill planning, Geographic Response Plans, etc.) to respond to events. These spill response measures are known to be effective. As confirmed in a recent internal assessment (spill drill) for the project of spill response actions and capabilities to a worst-case discharge, the proposed equipment and personnel response times meet and/or exceed timelines to mobilize equipment to address Geographic Response Plans in a timely manner given likely oil trajectories (see Appendix B.6, Vancouver Energy Spill Response Exercise Report). The report explains in detail the exercise determined the adequacy of response action resources. The Applicant was able to locate, allocate, and deploy adequate response equipment and trained personnel in accordance with all application spill planning standards. The results of this exercise to test the adequacy of proper execution of the response actions (along with pre-booming and secondary booming) show that response actions significantly impact oil spill trajectories positively. In addition, preventative measures will be built into the design of the Facility and operating procedures including containment at the facility, automatic shut-off valves in the pipeline, tank car design standards, and vessel design.

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.

Overwater Coverage – The proposed dock improvements have the potential to affect aquatic habitat through changes in the amount and configuration of overwater coverage at the site. However, these impacts would occur in deeper water and outside of the SWH zone. There would be no increase in the number of pilings or overwater coverage through the SWH zone as a result of improvements to the access trestle. Additional information regarding the impacts of the project to aquatic habitat with respect to fish can be found in section 3.4.3.2.

Operational Lighting Impacts – Vessel loading operations will occur 24 hours per day. Increased nighttime light levels may affect fish by attraction.

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 project will result in approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity. 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* – Wake stranding occurs when fish are caught in the wave created by a passing ship and deposited on shore by the wave the wake generates. An analysis pertinent to vessel wakes and fish stranding within the Vessel Corridor area was completed for the project (see Appendix H.5) and provides a review of wake stranding as the mechanism which could cause mortality for juvenile salmonids and eulachon as a result of wakes caused by deep-draft vessels. The focus of this review is the lower 104 miles of the Columbia River, between the Pacific Ocean and Vancouver, Washington. The study concluded wake stranding occurs on a small subset of the shoreline beaches of the vessel corridor. Pearson et al. (2008) predicted that 16 percent or about 33 miles of non-contiguous beaches had some potential to strand fish. When additional beach morphology criteria (i.e. beaches with slopes flatter than about 5 or 6 percent) were included, Person et al. (2008) predicted that about 4 percent or about 8 miles of beaches had a high susceptibility to stranding. All the beaches in this 8 mile total are located upstream of RM 33. These results indicate that stranding risk is relatively high only in a very small portion of the 208 miles of shoreline in the Vessel Corridor and all these beaches are upstream of the lower 33 miles of the Columbia River.

  With respect to stranding of Chinook salmon, only small (35mm to 80mm) fish of one age group (0+ subyearlings) is at risk of stranding and only when present in shallow water. During the Pearson et al. (2006) study, a total of 126 ship passages were observed at the three study sites (County Line Park, Barlow Point, and Sauvie Island), and 46 passages resulted in the stranding of 520 fish of all species. The majority (426 fish, 82 percent) of stranded fish were small subyearling (age-0+) Chinook salmon. A total of eight juvenile chum salmon and seven juvenile coho salmon were stranded, for a combined total of 441 juvenile salmon (85 percent of all fish). Non-salmon comprised 15 percent of the observed stranded fish. Although yearling (age-1+) Chinook salmon, juvenile steelhead, and sculpin were detected in beach seines nets at the study sites in very low numbers, they were not observed in stranding events.

  Overall, subyearling (age-0+) Chinook salmon are the species that are most often stranded by vessel wakes. That species and life stage was also the most common fish captured in beach seine nets at the study sites, indicating they were highly available to be stranded. Based on

these results, no generalized conclusions about moderate to major long-term effects to nearshore fish can be supported by the data.

As indicated above, wake stranding does not pose a risk to all juvenile salmonids but rather only to small subyearling Chinook salmon. Extensive studies at specific locations on the Columbia River where wake stranding occurs have shown that ship wakes primarily result in stranding when small subyearling Chinook are present in the shallow water margin near the shore, and the majority of shorelines where wake stranding may occur are within the tidal freshwater region (Bauersfeld 1977, Ackerman 2002, Pearson et al. 2006, Pearson et al. 2008). This area is roughly defined as occurring from RM 34 to RM 104.

Finally, the vessels that would call at the Facility terminal are within the size range of current vessels and would be piloted at similar speeds and course through the navigation channel. Therefore, the wakes from these vessels would be similar to current wakes, and the effects of wakes on salmonids potentially stranded would be the same as stranding occurring presently. The potential for any additional impacts resulting from Facility related vessel trips also must be placed in the context of whether these trups even cause a measurable increase in the normal ebb and flow of the Columbia River vessel transportation system.

- *Bank Erosion* – The risk of adverse effects to shoreline habitat from increased bank erosion caused by vessels calling at the Facility is minimal. See section 3.4.2.2, Operation, *Bank Erosion* for detailed information on bank erosion.
- *Exotic Species* – See section 3.4.2.2, Operation, *Exotic Species* for detailed information on exotic species. Vessels calling at the Facility are expected to be crude oil tankers and articulated tug barges operating within the Exclusive Economic Zone (EEZ). These vessels will be subject to the U.S. Environmental Protection Agency's Vessel General Permit (VGP) (EPA 2013) issued under the National Pollutant Discharge Elimination System (NPDES) for discharges incidental to operation of such vessels, including ballast water discharges[11]. The Washington State ballast water requirements added to the VGP as 401 WQC conditions include the state requirements codified in Chapter 220-150 WAC, administered by WDFW. These requirements include technology-driven treatment requirements and management practices so that vessel discharges meet state water quality standards, Chapter 173-201A WAC.

Furthermore, ballast water discharges, if not treated, would be of saltwater to freshwater (because of the 401 WQC requirements to perform, at least, open sea ballast water exchange), which has less propensity to introduce invasive species than if the exchange is salt-to-salt or fresh-to-fresh water[12]. Because of this, only negligible impacts would be anticipated as a result of ballast water discharge. See also section 3.4.2.2.

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[11] See: http://www.epa.gov/npdes/vessels-incidental-discharge-permitting-2.
[12] See, for example, the discussion of the increasing risk for invasive introduction when the source and discharge waters share environmental similarity here:
http://www.reabic.net/journals/mbi/2016/Accepted/MBI_2016_Verna_etal_correctedproof.pdf.

With respect to Facility-owned and operated equipment, the skiff and mobile booms will be on a regular basis during vessel loading operations, as well as for spill response training and drills. The Applicant may enter into mutual aid agreements with other facilities; in the event of drills or incidents at such other facilities the skiff and booms could be dispatched to those locations to participate in response; it is anticipated that mutual aid agreements would primarily be entered into with facilities located along the Columbia River.

3.4.3.3 Mitigation Measures

The project will implement several minimization measures and BMPs to minimize the potential for impacts to fish and fish habitat as described below.

Construction

Direct Habitat Modification – Construction of the project will result in no net new direct, permanent impacts to fish habitat in the Columbia River. Design modification to the existing dock will only require temporary support pilings during construction. No new structures, no new permanent piles below the OHWM and no net increase in overwater structure will be installed. Fifteen existing piles will be removed from the river to mitigate for temporary support pilings. The removal of piles and existing overwater coverage will further minimized the extent of potential impacts.

All in-water construction activities, temporary pile installation, and removal activities below the OHWM will be conducted within the published in-water work period for the project (November 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 November 1 and February 28 avoids the peak migratory periods for adult fish and out-migrating juveniles of most populations.

Following the installation of ground improvements, the shoreline where construction occurred will be returned to its previous condition.

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.

See section 1.4.1.11, Fish, Construction, for a complete description of the following BMPs and mitigation measures that will be implemented to further protect fish and fish habitat:

- Pile removal
- Pile installation
- Overwater concrete work
- Additional construction mitigation measures and BMPs
- Washington State Water Quality Standards (WAC 173-201A)

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

Construction Lighting Impacts – If ground improvement installation requires the use of temporary lighting at night, all lights will be shielded and directed away from the water to the extent practicable nstallation of jet grout columns directly adjacent to the shoreline will be scheduled for daylight hours to the extent practicable.

Temporary Water Quality Impacts – The project has the potential to result in temporary water quality impacts during pile removal, which could affect aquatic habitat by temporarily disturbing sediments and elevating levels of turbidity during construction. There is also the potential for construction related leaks or spills.

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 resuspend 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.

A WQPMP (Appendix F.2) has been developed and describes how the project will monitor and control releases of turbidity, suspended sediment, concrete, and other construction-related materials that may be generated during Facility construction activities in, over, and adjacent to the Columbia River and other adjacent water bodies. The plan describes water quality protection measures; monitoring parameters, methods, evaluation criteria; and contingency response and notification procedures in the event a water quality criterion is exceeded during such construction activities.

All in-water temporary pile installation and removal below the OHWM will be conducted within the published in-water work period for the project (November 1 to February 28). This work window has been established to minimize potential impacts to aquatic habitat and native fish species and avoids the peak migration timing for marine mammals in the Lower Columbia River.

In response the Advisory HPA dated April 16, 2015 (Howe, D. 2015), the Applicant is also providing the following mitigation during in-water construction to protect fish and fish habitat:

- Work below the OHWM shall only occur between November 1 to February 28[13].
- If at any time the stone column seismic stability work is expected to cause release of sediments below the high waterline, this work shall also adhere to the above-mentioned work window.
- The Region 5 Habitat Program Manager will be notified in writing (e-mail, FAX, or mail) from the agent/contractor no less than three working days prior to the start of construction activities. The notification will include the contractor's name, project location, and starting date for work.

[13] U.S. Army Corps of Engineers. (USACE). 2015. Approved Work Windows For Fish Protection For Waters Within National Park Boundaries, Columbia River, Snake River, And Lakes By Watercourse. Available at: http://www.nws.usace.army mil/Portals/27/docs/regulatory/ESA%20forms%20and%20templates/work_windows%20Waters_in_NPs_CR_SR_Lakes.pdf

- If at any time, as a result of project activities, fish are observed in distress, a fish kill occurs, or water quality problems develop (including equipment leaks or spills), immediate notification will be made to the Washington Military Department's Emergency Management Division at 1-800-258-5990, and to the Region 5 Habitat Program Manager.
- Work will be accomplished per plans and specifications entitled “Tesoro Savage Vancouver Energy Distribution Terminal – Dock Maintenance and Utility Infrastructure” project, dated February 2014, except as modified by these provisions. A copy of these plans will be available on site during construction.
- Extreme care will be taken to ensure that no petroleum products, hydraulic fluid, fresh cement, sediments, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into the stream.
- Equipment used for this project will operate stationed on a barge, boat, bank, or pier.
- All work operations will be conducted in a manner that causes little or no siltation to adjacent areas.
- Piling installation or removal in-water will be accomplished primarily by vibratory methods. If and where necessary, an impact hammer may be used for "proofing." Any use of an impact hammer for in-water proofing will occur only when sound attenuation devices, such as a "bubble curtain" are employed.
- Any impact hammer pile driving will be accomplished during daytime hours to avoid attracting fish to lights at night.
- The existing piling will be removed and disposed of in an upland location such that they do not enter waters of the state. In the event that the piles cannot be completely removed then the remainder of the piles will be removed with a clamshell bucket, chain, or similar means, OR cut off 2 feet below the mudline.
- All holes or depressions will be backfilled with clean native bed materials to reduce leaching of residual chemicals into the water column.
- Replacement grating for walkways will be designed to pass a minimum of 60 percent sunlight in areas over shallow-water habitat (less than 30 feet deep).

Construction at the site will be governed by an cSPCCP, which the Applicant has submitted to EFSEC for review (Appendix B.2). The cSPCCP will be implemented during construction and defines specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. The plan also outlines responsive actions in the event of a release, and notification and reporting procedures. See the Spill Containment and Control section in Habitat and Vegetation above for additional information.

Aquatic Invasive Species – WDFW hydraulic code rules require that the transportation and introduction of aquatic invasive species be prevented by thoroughly cleaning vessels, equipment, boots, waders, and other gear before removing the gear from a job site [WAC 660-120 (7)(j)]. Contractors would be required to provide documentation that all equipment and materials that will be used in- and over-water have be cleaned to comply with applicable aquatic invasive species statutes and rules, including WAC 660-120 (7)(j). This would include providing documentation that in-water equipment and construction materials have either not been in contact with waters containing state prohibited aquatic invasive species which could be potentially transferred to the Columbia River, or that equipment and materials have been

appropriately decontaminated from potentially transferrable aquatic invasive species prior to arrival at the project site.

Temporary Construction Noise – The proposed project has the potential to result in elevated underwater noise during in-water vibratory pile installation and removal, and impact pile driving of Area 400 improvements (i.e., shore-based mooring points, dolphin access points, and the trestle abutment), which can temporarily affect fish and fish habitat quality.

The dock modifications have been designed to require no in-water impact pile driving, which will greatly reduce the extent of underwater noise generated during construction. Temporary support piles for dock modifications will be installed and removed with vibratory methods. This will reduce the intensity of underwater noise, and will limit the potential for adverse effects to fish.

In addition, all in-water work below the OHWM will be conducted within the published in-water work period for the project (November 1 to February 28). The upland impact pile driving for the mooring points and other elements within Area 400 located above the OHWM will also be conducted within the in-water work window to minimize the potential for effects from potential sound flanking. 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 completely absent from the project vicinity, the window between November 1 and February 28 avoids the peak migratory periods for adult fish and out-migrating juveniles of most populations. Upland impact pile driving for elements outside of Area 400 improvments are not subject to the in-water work window.

A MMMP will be implemented for vibratory installation and removal of temporary piles, and upland impact pile driving associated with Area 400 improvemens to minimize the exposure of fish to temporarily increased underwater noise levels. See the Temporary Construction Noise Impacts in section 3.4.2.2, Habitat and Vegetation for additional information.

Operation

Operational Water Quality – 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 Area 300 will be treated to enhanced water quality standards and discharged to the Terminal 4 stormwater system. Stormwater from Areas 200, 500, and 600 and the rail improvements will be treated to meet the water quality benchmarks established in the Industrial Stormwater General Permit and prior to its discharge 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. The following standard operational BMPs will be implemented to minimize potential impacts to fish and fish habitat during operation of the Facility.

- Location of crude oil unloading areas that ensure oil never comes into contact with unprotected ground surfaces that could runoff to aquatic systems. Use containment pans and berms would be used to capture unanticipated leaks.
- Construct transfer piping such that crude oil exposure to the ambient atmosphere is minimized. Design the transfer pipelines in conformance with applicable industry standards.
- Equip transfer pipelines and the associated pumping systems with flow and pressure sensors to identify out-of-the-ordinary operating conditions that could be the result of a pipeline or pump failure and potential risk of crude oil discharge.
- Equip transfer pipelines with valves at the exit of and entry to the unloading area, the storage area, and the marine vessel loading area. These valves would include 30-second shut-offs to stop the flow of product should anomalous flow and pressure conditions related to a product spill occur, or in response to operations personnel triggering the shutoff.
- Install transfer piping aboveground when possible to facilitate inspections and maintenance. Where road or rail crossings occur, house the piping in underground steel casings or raised orraised a minimum of one foot aboveground. Design and install pipelines at each railroad, highway, or road crossing and to withstand the dynamic forces exerted by anticipated traffic or rail loads.
- Coat and cathodically protect transfer pipelines to prevent corrosion.
- Install sections of transfer pipelines constructed underground so that they are not in electrical contact with any metallic structures. This requirement would not preclude the use of electrical bonding to facilitate the application of cathodic protection. Tests would be carried out to determine the presence of stray currents and protective measures provided when stray currents are present.
- Equip transfer pipelines with leak detection systems meeting regulatory standards.
- Equip the trestle at Berth 13 with piping and hoses to transfer the crude oil from the transfer pipeline system to the receiving marine vessel. In accordance with 33 CFR § 154.530, a facility transferring oil or hazardous materials to or from a vessel with a capacity equal to or greater than 250 barrels (bbl) must have fixed catchments, curbing, or other fixed means for small discharge containment of materials at the hose handling and loading arm area, each hose connection manifold area, and under each hose connection that would be coupled or uncoupled as part of the transfer operation. For the Facility, it is anticipated that the hose diameter would be between 6 and 12 inches, requiring that discharge containment capacity must be at least 3 bbl.
- Construct a catchment and sump at Berth 13, at or below the deck level of sufficient capacity to hold the small discharge containment in addition to stormwater that may fall in the catchment area. The containment would be discharged within 1 hour of completion of any transfer by pumping into the return line.

The following design elements will be used to prevent discharges of oil during conveyance, including:

- Design hoses and their supporting equipment to meet the applicable hose protection requirements of WAC 173-180 Part B and 33 CFR 156.
- Design vessel mooring systems to meet the applicable requirements of 40 CFR 156.

As described in section 2.10.3 plans will be prepared and implemented to comply with state and federal requirements, including:

- Operations oSPCCP, prepared under 40 CFR 112 and WAC 173-180, Part F
- Safe and effective threshold determination report, prepared under WAC 173 180 224
- Pre-loading Transfer Plan according to WAC 173-180-230
- Facility operations manual in compliance with WAC 173-180 400 to -435
- Oil transfer training program in compliance with WAC 173-180, Part E
- Certification program in compliance with WAC 173-180, Part E
- Spill Contingency Plan in compliance with WAC 173-182, 40 CFR 112, Subpart D and 33 CFR 154, Subpart F

The Applicant has also committed to using using a self-healing biodegradable fire-fighting foam manufactured by Solberg to minimize impacts to surface water resources, as described in section 3.4.2.3 above.

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

Operational Lighting Impacts – Facility lighting impacts will be minimized with the use of the following mitigation measures:

- Provide directional lighting in areas adjacent to sensitive wildlife areas, including the north side of Area 300 to ensure lights are not pointed in the CRWMB and Area 400 to minimize the amount of light in aquatic habitats.
- Aim direction lighting away from sensitive habitats to the extent possible to minimize nightlight and glare.
- Incorporate LED bulbs that fall within optimum wavelengths in area lighting to reduce light pollution impacts where practicable and within safety regulations.
- In the Marine Terminal loading area, use spot lighting only during loading operations if approved by the USCG in compliance with 33 CFR Part 105 and/or Part 154.

Shipping - The proposed project will result in approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity. 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. During vessel berthing, temporary impacts to water quality (increased turbidity) could occur from sediment suspended by propeller wash. Temporary increases in turbidity are likely to be short in duration and dissipate naturally in response to river currents.

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 vessel wakes. Because shoreline erosion is a natural phenomenon at susceptible locations and vessel wakes from existing shipping activity also occur, the ESA-listed fish that use these habitats have typically adapted to the conditions that attend the erosion, primarily temporary, localized turbidity. Effects associated with bank erosion would be temporary and localized, and would result in only minor negative impacts to fish and fish habitat (Flint 2016).

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.

Vessels calling at the Facility will comply with state and federal requirments for ballast water treatment and discharge.

Furthermore, ballast water discharges, if not treated, would be of saltwater to freshwater (because of the 401 WQC requirements to perform, at least, open sea ballast water exchange), which has less propensity to introduce invasive species than if the exchange is salt-to-salt or fresh-to-fresh water[14]. Because of this, only negligible impacts would be anticipated as a result of ballast water discharge.

During operations, the Facility may source spill response equipment from other locations in the event of larger and more complex spill drills or response activities. In such cases, contractors and mutual aid providers will comply with applicable state statutes and rules aimed at preventing the introduction of such species, as identified above.

In accordance with federal regulations oil tankers and ATBs calling at the facility will be 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 are required to develop spill contingency plans in accordance with state and federal regulations (see Appendix B.1).

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

[14] See, for example, the discussion of the increasing risk for invasive introduction when the source and discharge waters share environmental similarity here: http://www.reabic.net/journals/mbi/2016/Accepted/MBI_2016_Verna_etal_correctedproof.pdf.

Cumulative Impacts

The impact minimization measures that have been incorporated into the design of the project are the same measures that will reduce the potential for cumulative impacts. The project has been designed to minimize the extent of impacts to fish and fish habitat resources to the extent practicable, and this will reduce the potential for cumulative effects to these resources as well. The project itself may affect, but is not likely to adversely affect fish or fish habitat resources.

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). WDFW PHS Management Recommendations (available at http://wdfw.wa.gov/conservation/phs/mgmt_recommendations) have been reviewed, including recommended protection buffers. In general, the management recommendations focus on protecting nesting area and other important wildlife habitats.

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 3.4-7 for wildlife terrestrial species and in Table 3.4-8 for aquatic species.

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 3.4-7. Special Status Wildlife Terrestrial 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).

Table 3.4-8. Special Status Aquatic 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
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.
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.
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

This section describes the direct and indirect impacts that could occur to wildlife or wildlife habitat associated with the proposed project. Due to the nature of the resource and the varying degree of use of the habitat by each species, it is not possible to meaningfully estimate the numbers of individuals that could potentially be affected. Instead, the extent of impacts to individuals of each species are established based on an interpretation of the extent of impact to suitable or potentially suitable habitat. WDFW PHS Management Recommendations (available at http://wdfw.wa.gov/conservation/phs/mgmt_recommendations) have been reviewed. Proposed project activities occur outside all recommended protection buffers for the species addressed in this Application.

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 42,000 square feet (0.96 acre) square feet of ruderal grass-forb and approximately 3,252 square feet (0.07 acre) square feet of upland cottonwood stands are expected to result in only minor potential impacts to bald eagle, peregrine falcon, and gray-tailed vole.

No purple martin or nest boxes would be directly affected by the construction of the proposed project. The construction activities do not include removal of any creosote-coated wood piling. All existing piles at the marine terminal are steel and do not contain cavities for nesting wildlife. Furthermore, purple martin have a low suspected occurrence within the Facility site as noted in DEIS Table 3.5-3.

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 marine mammals. 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 the proposed dock modification.

Construction Lighting Impacts – During the installation of ground improvements, construction may occur at night to complete required work during the applicable fish window and would require additional temporary lighting on the shoreline, increasing the amount of light on the water. Increased light levels may affect wildlife by attraction.

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 marine mammals.

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 marine mammals.

Similarly, temporarily elevated levels of turbidity that could result during pile installation 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 installation and removal activities. Pile installation and removal includes both in-water temporary piles that would be installed and removed with vibratory methods. Upland pile installation for shore-based mooring points, trestle abutment and movable walkways, building foundation/support at Area 200, and pipeline foundation supports within Area 500 would be completed with impact hammers.

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). Noise generating activities are expected to occur during all phases of construction between October and July.

Terrestrial noise levels will peak within the vicinity of the project site during impact pile installation, but these sound levels will be expected to decrease to ambient conditions within approximately 5,000 feet 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).

As stated above, the baseline noise levels associated with the project site and vicinity are relatively high, and this terrestrial noise attenuation analysis assumes baseline noise levels similar to those associated with a high density urban area (70 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 vibratory impact pile driving is expected to attenuate to ambient conditions between 3,200 and 6,400 feet from the location of project activities. The following equation was used to determine the distance at which terrestrial noise will attenuate to the baseline noise level of 70 dBA:

$TL = 20*Log(R_1/R_2)$

TL = amount of spreading loss (known noise level – ambient noise level)

R_1 = distance where noise attenuates

R_2 = range of known noise level (50 feet in this case)

$R_1 = (10^{(TL/20)})(R2) = (10^{(110-70/20)})(50) = 5{,}000$ feet

This indicates that terrestrial noise associated with impact pile driving would be expected to attenuate to baseline noise levels within a maximum of 5,000 feet from the location of project activities. Most of the terrestrial habitat within approximately 5,000 feet of the project site includes Urban/Mixed Environs and is of low quality and low suitability for terrestrial wildlife. 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 construction noise levels could extend beyond the project site onto portions of the CRWMB and associated wetlands and forested habitats on the Shillapoo NWR - Vancouver Lake Unit. Modeled noise levels in the vicinity of the CRWMB and Shillapoo Vancouver Lake Unit would range between 65 dB at the north end and 75 dB at the south end during impact pile driving. 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 periods of elevated terrestrial noise levels. Terrestrial noise from impact pile driving will have attenuated significantly by the time it reaches these habitats. These habitats also receive noise from other temporary sources not accounted for in the noise model, including

adjacent port activities at other terminals, SR 501 road noise, and seasonal hunting noise (firearms).

The modeled noise levels may potentially be of sufficient intensity to generate a behavioral responses, such as changes in alertness, 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.

Direct impacts to special status species have been minimized by locating all project activities within an existing industrial site. According to WDFW Priority Habitats and Species (PHS) data, there are no occurrences of special status species within the project site. Within the project vicinity, there are several occurrences of PHS points, including bald eagle nests (approximately 1.2 miles to the west), bald eagle concentration areas (approximately 1.2 miles northwest), sandhill crane concentrations (approximately 3,000 feet west), and great blue heron breeding (approximately 4,000 fee northeast). Waterfowl concentrations are also known to occur on Vancouver Lake, approximately 1 mile north of the project.

Temporary construction noise has been minimized to the extent practical through equipment selection and construction timing to reduce impacts to special status species using habitats (e.g., foraging and resting) within the project vicinity. Peak construction noise would be generated by impact pile driving for the shore-based mooring points and rail unloading facility and is located outside of WDFW- and USFWS-recommended management buffers for bald eagle nest (660 feet and 0.5 mile, respectively) and great blue heron rookeries (656 feet). Foraging or resting species may be temporarily displaced from habitats within the project vicinity during periods of construction noise. These impacts have been minimized during construction sequencing to complete the noise generating aspects of construction as efficiently as possible.

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 marine mammals. Shorebirds and waterfowl will avoid the area in the immediate vicinity of pile installation and removal 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. WSDOT recently published a memorandum reporting average root mean square (rms) values associated with vibratory installation of 30-inch steel piles as ranging from 164 to 176 dB_{RMS} with an overall average rms value of 171 dB_{RMS} (Laughlin 2010). WSDOT also published data in 2011 documenting average underwater sound pressure levels of 150 dB_{RMS} at a distance of 10 meters from the pile, during vibratory removal of timber piles (WSDOT 2011). For purposes of this analysis, therefore, it has been assumed that underwater noise associated with vibratory pile installation and removal will not exceed 176 dB_{RMS}.

Vibratory pile installation and removal is not expected to generate levels of underwater noise that will result in significant adverse effects to marine mammals. NMFS has established a disturbance threshold of 120 dB_{RMS} for pinnipeds. Vibratory pile installation and removal may result in underwater sound levels that meet or exceed this threshold throughout the project vicinity. Additionally, proposed upland impact pile driving for Area 400 improvements (shore-based mooring points, dolphin access points, and trestle abutment) would also generate underwater noise levels that exceed the disturbance threshold for pinnipeds. Any marine mammals that are

present within the project vicinity could be temporarily disturbed. The extent of effects associated with vibratory pile installation and removal and upland impact driving would not be expected to exceed mild disturbance. Marine mammals are also not expected to occur in great numbers within the portion of the project site and vicinity that could potentially receive elevated underwater noise levels during the in-water work period. For these reasons, marine mammals are not expected to be significantly affected by underwater construction noise.

Aquatic Invasive Species - During construction, small vessels, tugs, and work barges will be used in support of in-water construction activities. This equipment would be furnished and operated by contractors to Vancouver Energy. This equipment could be contaminated with aquatic invasive species if it was previously used in waterbodies outside the Columbia River where such species are present and if the equipment was not properly cleaned prior to arrival at the Vancouver Energy Terminal work location. Certain construction materials (e.g., temporary piles) could also have been previously employed at other locations and may transport invasive species if not properly cleaned.

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 accidental spills during unloading of rail cars, transfer to storage, or loading of vessels.

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.

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. As discussed above in section 3.4.2.2, the Applicant conducted a vessel traffic risk assessement to quantify the risk of incidents resulting in realeses of crude oil.

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

Operational Lighting - 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.

- **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 project will result in approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity.Increased marine traffic on the Columbia River, from vessels calling at the Facility, has the potential to result in minor effects to wildlife through minor increases in the potential for shoreline erosion associated with propeller wash and wake, 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 a minor increase in erosion along unarmored sections of shoreline. See section 3.4.2.2, Operation, *Bank Erosion* for detailed information on bank erosion and minimal impacts.

  The fish and marine mammals that use these habitats have typically adapted to the existing conditions that include bank erosion, and temporary, localized turbidity. Benthic organisms could also be affected, as they are known to be more abundant in shallow water than in deep water. These organisms, however, typically recolonize disturbed areas very quickly.
- *Exotic Species* – Ships in transit could potentially import exotic and/or invasive species on their hulls and exterior equipment and/or in ballast water. Similarly, spill response equipment may be contaminated if it is brought from off-site locations where it may have contacted waters known to contain aquatic invasive species. See Fish Impacts, section 3.4.3.2, Operations, Exotic Species for more detailed information.
- *Ship Strikes* – The proposed project will result in approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacity 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. The potential for vessel strikes to affect sea turtles, marine mammals, and/or cetaceans is relatively low. While sea turtles, marine mammals, and cetaceans all may be at risk for propeller or collision injuries, these injuries are most frequently caused by small, fast-moving vessels (FERC 2008). In contrast, because of their design and large displacement tonnage, the ships that will dock at the Facility produce a bow wave. This wave pushes in-water objects away from the vessel.

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.

Construction

Direct Wildlife Impacts – 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.

Tree removal will be performed outside of the nesting season (February 15 to September 1) to avoid potential impacts to active nests of protected migratory birds. If trees are to be removed during the nesting season, complete a preconstruction nesting survey no more than two weeks prior to removal to ensure that no active nests are present. If active nests of protected migratory birds are found, suspend tree removal activities until after nests have hatched and young have fledged.

The approximate 2.2 acres of landscape plantings will be monitored for two years after planting and all trees that do not become successfully established will be replaced.

The Applicant will include measures in the construction waste management plan to control and contain food waste, and educate workers on the risk to native wildlife from supplemental feeding and the importance of disposing of all garbage in secured containers to prevent supplemental feeding of wildlife.

See the Direct Habitat Modification in sections 3.4.2.3 above and 1.4.1.11 Habitat and Vegetation for mitigation measures and BMPs.

Nuisance wildlife – As part of the construction waste management plan, measures will be implemented to control and contain food waste, including worker education on the risk to native wildlife from supplemental feeding and the importance of disposing of all garbage in secured containers to prevent supplemental feeding of wildlife.

Construction Lighting Impacts– If ground improvement installation requires the use of temporary lighting at night, all lights will be shielded and directed away from the water to the extent practicable nstallation of jet grout columns directly adjacent to the shoreline will be scheduled for daylight hours to the extent practicable.

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. . The Applicant submitted a preliminary cSPCCP to EFSEC for Review (Appendix B.2), The plan defines 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.

A WQPMP (Appendix F.2) has been developed and describes how the project will monitor and control releases of turbidity, suspended sediment, concrete, and other construction-related materials that may be generated during Facility construction activities in, over, and adjacent to the Columbia River and other adjacent water bodies. The plan describes water quality protection measures; monitoring parameters, methods, evaluation criteria; and contingency response and notification procedures in the event a water quality criterion is exceeded during such construction activities.

In addition, all work below the OHWM will be conducted within the published in-water work period for the project (November 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 peak within the vicinity of the project site during impact pile driving of the shore-based mooring points and rail unloading facility, but these sound levels will be expected to decrease to ambient conditions within a distance maximum of approximately 5,000 feet from the immediate project site. Most of the terrestrial habitat within approximately 5,000 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.

Temporary construction noise has been minimized to the extent practical to reduce impacts to special status species using habitats (e.g., foraging and resting) within the project vicinity. Peak construction noise would be generated by impact pile driving for the rail unloading facility, pipeline foundations, and Area 400 improvements. These areas are located outside of WDFW- and USFWS-recommended management buffers for bald eagle nests (660 feet and 0.5 mile, respectively) and great blue heron rookeries (656 feet). Foraging or resting species may be temporarily displaced from habitats within the project vicinity during periods of construction noise. These impacts have been minimized during construction sequencing to complete the noise generating aspects of construction as efficiently as possible. See section 1.4.1.11, Habitat and Vegetation, Temporary Construction Noise, for additional detail on mitigation measures and BMPs.

A construction wildlife monitoring plan (Appendix H.4) has also been developed. It describes the means and methods to monitor noise levels during project upland pile-driving activities in order to demonstrate that noise levels attenuate to a level of non-disturbance to PHS species potentially present in the vicinity of the construction site. The PHS species of concern include the bald eagle, sandhill crane, great blue heron, and the Oregon spotted frog. The plan will be implemented during impact pile driving for Area 200 rail unloading facility foundation support and Area 400 upland mooring points, and during vibratory pile installation and removal for Area 400 marine terminal modifications. Wildlife monitoring will only occur in areas of potentially suitable habitat and construction noise monitoring will be conducted to determine what actual noise levels are observed.

The proposed project has the potential to result in temporarily elevated terrestrial and underwater noise levels at the project site and with the project vicinity during in-water pile installation and removal activities, and during impact pile driving of upland piles. These activities have the potential to temporarily affect marine mammals and the quality of their habitat within the project vicinity during construction. The project has been designed to minimize the likelihood of any impacts resulting from underwater noise during in-water pile installation and removal activities by using vibratory methods. The dock modifications have been designed so as to require no in-water impact pile driving, which will greatly reduce the extent of underwater noise generated during construction. This will reduce the intensity of underwater noise, and will limit the potential for adverse effects to marine mammals.

A MMMP has been developed and submitted to EFSEC for review. The MMMP describes procedures to identify the presence of marine mammals during construction activities, which may result in "take" and establishes actions that will be taken to minimize impacts to such marine mammals. The plan will be implemented during in-water construction activities related to Area 400 modifications, including removal of existing piles, temporary pile installation and removal, and pile strengthening; and upland work related to impact pile driving of shore-based mooring points. Monitoring will be conducted prior to and during the activities listed above with the potential to impact marine mammals. Work activities will be stopped when a marine mammal is detected within the monitoring area and will not restart until after the marine mammal has left the monitoring area.

In addition, all in-water work below the OHWM will be conducted within the published in-water work period for the project (November 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.

Aquatic Invasive Species - WDFW hydraulic code rules require that the transportation and introduction of aquatic invasive species be prevented by thoroughly cleaning vessels, equipment, boots, waders, and other gear before removing the gear from a job site [WAC 660-120 (7)(j)]. Contractors would be required to provide documentation that all equipment and materials that will be used in- and over-water have be cleaned to comply with applicable aquatic invasive species statutes and rules, including WAC 660-120 (7)(j). This would include providing documentation that in-water equipment and construction materials have either not been in contact with waters containing state prohibited aquatic invasive species which could be potentially transferred to the Columbia River, or that equipment and materials have been appropriately decontaminated from potentially transferrable aquatic invasive species prior to arrival at the project site.

Operation

Direct Wildlife Impacts – The Applicant will include measures in the operation waste management plan to control and contain food waste, and educate workers on the risk to native wildlife from supplemental feeding and the importance of disposing of all garbage in secured containers to prevent supplemental feeding of wildlife.

The Area 300 secondary containment berm will be designed to avoid permanent pooling of stormwater within the berm which can be an attractant to aquatic birds.

Operational Water Quality Impacts – The operation of the Facility could affect wildlife habitats 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.

As described in sections 2.11 and 3.4.2.3, a permanent stormwater collection, conveyance and treatment system will be established. The proposed stormwater treatment system will provide treatment to a level that is consistent with the discharge permits applicable to the Facility and and so that wildlife are not adversely affected by operational stormwater discharges.

As described in section 2.10, the Facility will include design measures aimed at avoiding releases, secondary containment measures to prevent releases from reaching terrestrial and aquatic habitats, and will implement a comprehensive suite of spill response planning and response plans.

As described in section 3.4.2.3, the Applicant has committed to using a self-healing biodegradable fire-fighting foam manufactured by Solberg. Use of this foam will reduce adverse impacts to wildlife in the event of a fire.

Operational Lighting Impacts – Facility lighting impacts will be minimized with the use of the following mitigation measures:

- Provide directional lighting in areas adjacent to sensitive wildlife areas, including the north side of Area 300 to ensure lights are not pointed in the CRWMB and Area 400 to minimize the amount of light in aquatic habitats.
- Aim direction lighting away from sensitive habitats to the extent possible to minimize nightlight and glare.
- Incorporate LED bulbs that fall within optimum wavelengths in area lighting to reduce light pollution impacts where practicable and within safety regulations.
- In the Marine Terminal loading area, use spot lighting only during loading operations if approved by the USCG in compliance with 33 CFR Part 105 and/or Part 154.

Aquatic Invasive Species – During operations, the Facility may source spill response equipment from other locations in the event of larger and more complex spill drills or response activities. In such cases, contractors and mutual aid providers will comply with applicable state statutes and rules aimed at preventing the introduction of such species, as identified above.

Shipping – The proposed project will result in approximately 140 ship trips per year in the first full year of operations and up to 365 ship trips per year at full capacitythrough the project shipping prism. As discussed in the impacts section, increased marine traffic on the Columbia River has the potential to result in minor impacts to wildlife and wildlife habitat through increased potential for shoreline erosion. The Applicant does not control the operation of these vessels. As described below, vessel operators are either already required to comply with state and

federal regulations mitigating certain impacts. As has been demonstrated elsewhere, impacts related to vessel wakes caused by vessels calling at the Facility are not measurably different from those already occurring on the Columbia River navigational channel and will not cause any additional adverse impact (Flint 2016).

The risk of adverse effects to wildlife 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 marine mammal habitat.

As has been demonstrated elsewhere, impacts related to vessel wakes caused by vessels calling at the Facility are not measurably different from those already occurring on the Columbia River navigational channel and will not cause any additional adverse impact (Flint 2016).

As described in section 3.4.2.3 above, the USCG has developed mandatory practices for all vessels with ballast tanks in all waters of the United States. Washington has developed similar requirements. These practices include requirements 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. Vessels calling at the Facility are expected to be crude oil tankers and articulated tug barges operating within the Exclusive Economic Zone (EEZ). These vessels will be subject to the U.S. Environmental Protection Agency's Vessel General Permit (VGP) issued under the National Pollutant Discharge Elimination System (NPDES) for discharges incidental to operation of such vessels, including ballast water discharges. The Washington State ballast water requirements added to the VGP as 401 WQC conditions include the state requirements codified in Chapter 220-150 WAC, administered by WDFW. These requirements include technology-driven treatment requirements and management practices so that vessel discharges meet state water quality standards, Chapter 173-201A WAC.

Furthermore, ballast water discharges, if not treated, would be of saltwater to freshwater (because of the 401 WQC requirements to perform, at least, open sea ballast water exchange), which has less propensity to introduce invasive species than if the exchange is salt-to-salt or fresh-to-fresh water. Because of this, only negligible impacts would be anticipated as a result of ballast water discharge.

Finally loaded vessels departing from the Facility will be escorted by a suitably matched tug until the escorted vessel arrives in the vicinity of the river mouth. Once in the vicinity of the river mouth the tug will be released from the escorted vessel and will standby as a sentinel tug until the vessel crosses the Bar and is safely underway in the open ocean. Tug escort will further reduce the risk of vessel-traffic related incidents.

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

Cumulative Impacts

The impact minimization measures that have been incorporated into the design of the project are the same measures that will reduce the potential for cumulative impacts. The project has been designed to minimize the extent of impacts to wildlife and wildlife habitat resources to the extent

practicable, and this will reduce the potential for cumulative effects to these resources as well. The project itself will not result in any cumulative impacts to wildlife and wildlife habitat resources.

3.4.5 Federal Approvals

Federal approvals anticipated for the project are identified in section 2.23. As noted a permit or authorization 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 or authorization will require compliance with the ESA, NEPA, and NHPA. A Joint Aquatic Resource Permit Application (JARPA) (Appendix H.2) has been prepared for the project and was submitted on February 14, 2014 to the USACE for review and potential issuance of the Section 10[15] permit or acknowledgement that the work is authorized through one or more nationwide permits. The JARPA was submitted with applicable reports and studies completed for the project to demonstrate how the project complies with the permitting requirements. A revised JARPA was submitted to the USACE in July 2015.

The Applicant has developed and submitted to the USACE for review a MMMP (Appendix H.3) for vibratory installation and removal of temporary piles and upland impact pile driving. The MMMP was developed to minimize the exposure of marine mammals to temporarily increased underwater noise levels. The plan describes procedures to identify the presence of marine mammals during construction activities, which may result in “take” and establishes actions that will be taken to minimize impacts to such marine mammals. With these measures to avoid work in the presence of marine mammals a take permit under the MMPA is not required.

3.4.5.1 ESA Consultation

Throughout the development and design of this proposed action, the Applicant, has coordinated with the USFWS and NOAA Fisheries. A Biological Evaluation (BE) was prepared and initially submitted to the USACE in September 2014. The BE was revised in December 2014 to respond to comments received from the USACE in a Memorandum for the Record (MFR), dated November 19, 2014. A final August 2015 revision responds to comments received from the USACE, USFWS, and NMFS, in a letter from the USACE, dated May 28, 2015, regarding the effects analysis, effects determinations, and extent of the action area in which the impacts are evaluated. Federal agency concurrence with the BE was obtained from USFWS on March 16, 2016.

[15] The USACE issued public notice for review of an individual permit application in July 2015. The USACE Public Notice references review under Section 404 of the CWA for placement of fill inside existing piles. The Applicant has provided comments to the USACE that Section 404 does not apply in this situation (Carson 2015).

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. Areas within 300 feet of the project site were visually assessed for the presence of wetlands in accordance with the City of Vancouver's Critical Areas Protection Ordinance (VMC Chapter 20.740).

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. A series of shallow, linear, stormwater swales are located in the southwest corner of Parcel 1A. These features were excavated from uplands for the purpose of stormwater treatment, and would not be considered wetlands by the City code, which exempts artificial wetlands intentionally created from non-wetlands sites for stormwater treatment. 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 and within 300 feet 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 within 300 feet 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, but extend past the 300-foot limit specified in City code. 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 and removal.

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. 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.

While the mitigation bank wetlands are hydrologically connected to the Columbia River via the Vancouver Lake Flushing Channel, a spill that reaches the Columbia River would not reach those wetlands via the flushing channel. Specifically, the Vancouver Lake Flushing Channel is equipped with tidal gates to control flows and could be closed to block the flow of water and oil from a flooding event back into the lake and adjacent wetlands, further protecting them in the unlikely event of an oil spill.

Because the Facility includes secondary containment designed to prevent crude oil from leaving the area it is extremely unlikely that crude oil spills would reach wetlands. Portions of the facility

are located at a greater distance and downslope from these resources, making it extremely unlikely for crude oil to travel the distance needed uphill to impact them (Flint 2016). In the event of a spill to the Columbia River, spill response measures would be deployed at the Vancouver Lake flushing Channel to reduce the risk of crude oil spills reaching wetlands adjacent to Vancouver Lake during a flooding event. 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

Construction

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 direct impact wetlands.

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

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 will only occur within the marked construction boundaries at the Facility site and will be governed by a cSPCCPlan (Appendix B.2). The cSPCCP will define specific BMPs to minimize the potential for leaks and spills from construction equipment and the extent of damage from any unavoidable leaks or spills and related impacts to wetlands. BMPs 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 sensitive areas include wetlands and regulated wetland buffers that are present within 300 feet of the proposed Facility site as described above.

The cSPCCP will also outline responsive actions in the event of a release, and notification and reporting procedures. For additional information see section 2.10, Spill Prevention and Control, and Appendix B.2, cSPCCP.

The Applicant will also implement the following additional mitigation measures to address temporary water quality impacts to wetlands:

- Wick drains will be used between areas of ground improvement (stone columns, soil mixing, jet grouting, etc.) and surface waters and wetlands. At Area 300, wick drains will be installed at a minimum of 16 feet on center where ground improvements are within 150 feet of the adjacent wetlands to the north and east. At areas 400 and 500, wick drains will be installed along the top of bank at 8 feet on center for the entire bank area receiving ground improvement. Visual monitoring of turbidity within the wetlands will occur daily during ground improvement. If any turbidity is observed as a result of ground improvement, ground improvement activities will be stopped and additional mitigation measures will be installed, including additional wick drains, turbidity curtains, or change in ground improvement methods will be considered.
- Cutoff channels would be installed in Area 300 – Storage tanks along the downslope construction area to capture construction stormwater where existing site grading is insufficient to direct stormwater into conveyances for the construction stormwater. These channels would also be used to contain ground improvement runoff where necessary. Channel lining and check dams would be used to protect channel from erosion, and checkdams to assist in flow control.

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

Operation

Operational Water Quality – The 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 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.

As described in section 2.10, the Facility will include design measures aimed at avoiding releases, secondary containment measures to prevent releases from reaching terrestrial and aquatic habitats, and will implement a comprehensive suite of spill response planning and response plans.

Operations at the site will be governed by an oSPCCP (Appendix B.3), which will define specific BMPs to minimize the potential for leaks and spills and the extent of damage from any unavoidable leaks or spills. The oSPCCP will also outline responsive actions in the event of a release, and notification and reporting procedures.

In the event of a spill to the Columbia River, spill response measures would be deployed at the Vancouver Lake flushing Channel to reduce the risk of crude oil spills reaching wetlands adjacent to Vancouver Lake during a flooding event.

The Applicant has also committed to using using a self-healing biodegradable fire-fighting foam manufactured by Solberg to minimize impacts to surface water resources, as described in section 3.4.2.3 above.

Shipping – Wetlands are unlikely to be affected by an increase in shipping traffic. Wetland resources within the project vicinity or downstream in the shipping prism could be impacted through the introduction of exotic species, but there is little risk of ships increasing the transport of exotic species. See the Shipping section in Habitat and Vegetation, section 3.4.2.3 for additional information.

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 calling at the Facility 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 will 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[16].

- Electricity: Construction will consume electricity to provide temporary construction site lighting and heat buildings, and to power tools and equipment. The amount of electricity consumed would be similar to other medium-sized industrial construction projects, and would not be significant in terms of overall regional supply.
- 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. The amount of transportation-related petroleum products consumed would be similar to other medium-sized industrial construction projects, and would not be significant in terms of overall regional supply. Incidental use of propane during construction (for temporary space heating, powering of mobile construction equipment such as fork lifts, or heating of cooking grills for authorized construction staff events[17] (e.g., BBQ) is possible. Such use of propane would be in limited quantities, which will not be significant in terms of regional propane supply.

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, product and natural gas piping, operations access structures (catwalks and gangways), rail additions, and dock improvements.

[16] EFSEC's Draft Environmental Impact Statement, November 2015, provided estimates for construction electricity and fuel usage at Section 3.7.3.1, and made similar conclusions regarding the negligible impact to regional supplies.
[17] Such activities would be conducted at locations permitted under applicable fire codes, for example only in areas that are not rated Class 1 div-2 or Class 1 div-1 (i.e., office areas or parking lots).

- Aggregates[18]: Approximately 160,000 cubic yards of aggregate materials would be required for ground improvements (stone columns).
- 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.
- Cement: To supply an on-site batch plant, approximately 18,000 tons of cement would be required for ground improvements (grout for jet grouting and deep soil mixing)
- Rail Ballast: Shifting existing tracks 4106 and 4107 would require the placement of new track ballast, approximately 6,500 cubic yards. Additional materials for sub-ballast and site preparation may also be required. Construction of the new track (4101) would also require ballast, approximately 4,750 cubic yards.
- 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 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 suitable or permitted to be used for 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 1,000 cubic yards of asphalt will be required to construct new hard surfaces planned throughout the Facility for parking and ground stabilization.
- 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 will 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.

[18] As used herein, aggregates are defined as coarse materials, including sand, gravel, and crushed rock. Weights by size class, which are typically specified in detailed construction plans, cannot be accurately established at the current level of Facility design.

3.6.1.2 Operation

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

- Natural Gas: Approximately 1,188,576 MMBtu/year or 1,189million 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, as well as in the dock safety skid and MVCU to ensure safe and appropriate operating conditions while marine vessels are being loaded. Gas service is expected to be interruptible; if gas supply is lost, operations where it is in use will be shut down.
- Fuel: Gasoline and diesel will be used in small amounts to fuel maintenance vehicles, and fuel-powered maintenance equipment, and portable power generators (emergency engines). Low sulfur diesel will be used for emergency firing and testing of fire pumps; it is estimated that normal maintenance and testing of fire pumps will consume approximately 1,250 gallons of ultra-low sulfur diesel per year total. The emergency engines would be fueled by ultra-low sulfur diesel or biodiesel.
- Electricity: Electricity will be used to heat and light indoor spaces and for outdoor lighting and to power facility equipment and control systems. Two of the storage tanks in Area 300 will be electrically heated. Facility load at full operation is estimated to be 231,100 kilowatt hours per day.
- Emergency Engines: in the event of a power failure, the Facility will have leased, portable power generators (emergency engines) available to operate critical safety, security, and environmental equipment. Maintenance of the emergency engines would be performed by the leasing company at an off-site location. The emergency engines would be subject to horsepower limitations, operational hour limitations, and other permit conditions to ensure operation does not cause an exceedance of applicable air quality standards.

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.
- Natural gas will be provided by and purchased from Northwest Natural Gas; Northwest Natural has the capacity to serve the Facility without affecting other purchasers and locally available natural gas supplies.
- Gasoline and diesel fuel will be purchased from local and regional distributors; and Electricity will be provided by and purchased from CPU.
- Portable power generators (emergency engines) will be leased and maintained by the leasing company.

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.

Clark County has 27,729 acres of identified gravel resources and 7,297 acres of bedrock resources (DNR 2005). While not all of these resources can necessarily be developed due to environmental and other constraints, available geologic data suggest rock aggregate resources are plentiful in the County. The most abundant gravel deposits lie in the southern portion of the county (Orchards, East Mill Plain) (Clark County 2012). In total, there are 34 entities with Sand and Gravel General Permits from Ecology in Clark County (Ecology 2014). Specific sand and/or gravel suppliers located in Clark County include the following:[19]

- Stone NW, Inc., located at State Route 14, Exit 10
- Pacific Rock Products, located at 18208 SE 1st Street
- East County Materials, located at 913 NE 172nd Avenue
- Fazio Brothers Sand Co Inc., located at 12112 NW Lower River Road

The amount of electricity consumed during construction and operations will not affect other users or locally available electricity supplies. Electricity for industrial consumers at the Port is provided by CPU. The major fuel sources for electricity generation by the utility in 2012 were hydroelectric (76 percent) and natural gas (15 percent). Coal accounted for approximately 1 percent of electricity generation and nuclear accounted for 7 percent (Washington Department of Commerce 2013a). Hydropower is obtained through purchase agreements with Bonneville Power Administration, and the River Road Generating Plant in Vancouver is the main source of energy produced from natural gas. Total energy supplied by CPU in 2012 was 4,568,431 megawatt hours (Washington Department of Commerce 2013). CPU's base case forecast of future energy demand assumes an average annual rate of growth of 1.5 percent over the next 20 years (consistent with the forecasted rate of population growth for the state). This translates to an increase in demand of 183 MW between 2013 and 2032 (Clark Public Utilities 2012). The utility has sufficient capacity to meet this demand on an annual average basis, but will need to incorporate additional conservation measures and new supplies to meet peak demand in the future (Clark Public Utilities 2012).

[19] Based on Google maps search, February 27, 2014, and presence of recent mining confirmed by aerial photography.

The amount of natural gas consumed during operations will not affect other users or locally available natural gas supplies. Northwest Natural Gas' 2014 Integrated Resource Plan (IRP), identifies annual base case firm load (including residential, commercial, and industrial users, but excluding firm transportation users) for the period 2013-2014 is estimated at 7,380.33 MMDT at the Vancouver hub, and 76.865.03 MMDT system wide (NW Natural 2013). Industrial usage for the same forecast period is 308.91 MMDT at the Vancouver hub and 3,282.86 system-wide. Thus the Facility usage would represent approximately 0.4 percent of Northwest Natural's industrial-based consumption at the Vancouver hub, 0.04 percent industrial-based, system-wide, and 0.0015 percent of all firm consumption (excluding transportation-related) system-wide. Northwest Natural's IRP identifies long-term load and supply forecasts; the percentage use by the Facility is negligible in comparison with other areas of anticipated growth, including residential, commercial, industrial transportation and emerging markets. As a regulated utility in the state of Washington, Northwest Natural is required to provide cost-effective service, and would implement the necessary supply solutions to serve its customer base, including the Facility.

The amount of water to be used at the Facility (to be provided by the City) will not affect other users or locally available water supplies; the City is sourcing its water under the requirements of its water rights.

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

Construction

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

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.

The Applicant will construct buildings compliant with the 2012 Washington State Energy Code (or current version at the time the project is permitted).

3.6.5 Scenic Resources

A scenic resource can generally be defined as a unique combination of visual elements yielding exceptionally high aesthetic values (Sacamano, D. 2014). 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.