MILLENNIUM BULK TERMINALS—LONGVIEW NEPA ENVIRONMENTAL IMPACT STATEMENT

NEPA WILDLIFE TECHNICAL REPORT

PREPARED FOR:

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September 2016

ICF International. 2016. *Millennium Bulk Terminals—Longview, NEPA Environmental Impact Statements, NEPA Wildlife Technical Report.* September. (ICF 00264.13.) Seattle, WA. Prepared for U.S. Army Corps of Engineers, Seattle District.

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Acronyms and Abbreviations

ACM	active channel margin
ADD	auditory deterrence device
Applicant	Millennium Bulk Terminals—Longview, LLC
BA	biological assessment
BMP	best management practice
BNSF	BNSF Railway Company
CDID #1	Consolidated Diking Improvement District # 1
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
CRC	Columbia River Crossing
CRD	Columbia River Datum
dB	decibel
dB_{RMS}	decibel root mean square
dB_{SEL}	decibel sound exposure level
DNR	Washington Department of Natural Resources
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
g/m^2/year	grams per square meter per year
GIS	geographic information system
Hz	Hertz
IHA	Incidental Harassment Authorization
IPaC	Information, Planning, and Conservation
kHz	kilohertz
LOA	Letter of Authorization
LVSW	Longview Switching Company
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
PAH	polycyclic aromatic hydrocarbon
PHS	Priority Habitat and Species
RCW	Revised Code of Washington
Reynolds facility	Reynolds Metals Company facility
SEL	sound exposure level
SEPA	Washington State Environmental Policy Act
SPLs	Sound pressure levels
UP	Union Pacific
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation

Chapter 1
Introduction

This technical report assesses the potential wildlife impacts of the proposed Millennium Bulk Terminals—Longview project (On-Site Alternative), Off-Site Alternative, and No-Action Alternative. For the purposes of this assessment, wildlife refers to terrestrial and aquatic wildlife species other than fish. This report describes the regulatory setting, establishes the method for assessing potential wildlife impacts, presents the historical and current wildlife conditions in the study area, and assesses potential impacts. Fish and their habitat are discussed in the NEPA Fish Technical Report (ICF International 2016a).

1.1 Project Description

Millennium Bulk Terminals—Longview, LLC (Applicant) proposes to construct and operate an export terminal in Cowlitz County, Washington, along the Columbia River (Figure 1). The export terminal would receive coal from the Powder River Basin in Montana and Wyoming and the Uinta Basin in Utah and Colorado via rail shipment, then load and transport the coal by ocean-going ships via the Columbia River and Pacific Ocean to overseas markets in Asia. The export terminal would be capable of receiving, stockpiling, blending, and loading coal by conveyor onto ships for export. Construction of the export terminal would begin in 2018. For the purpose of this analysis, it is assumed the export terminal would operate at full capacity by 2028. The following subsections present a summary of the On-Site Alternative, Off-Site Alternative, and No-Action Alternative.

1.1.1 On-Site Alternative

Under the On-Site Alternative, the Applicant would develop an export terminal on 190 acres (project area). The project area is located within an existing 540-acre area currently leased by the Applicant at the former Reynolds Metals Company facility (Reynolds facility), and land currently owned by Bonneville Power Administration. The project area is adjacent to the Columbia River in unincorporated Cowlitz County, Washington near Longview city limits (Figure 2).

The Applicant currently and separately operates at the Reynolds facility, and would continue to separately operate a bulk product terminal on land leased by the Applicant. Industrial Way (State Route 432) provides vehicular access to the Applicant's leased land. The Reynolds Lead and the BNSF Spur rail lines, both operated by Longview Switching Company (LVSW),[1] provide rail access to the Applicant's leased area from the BNSF Railway Company (BNSF) main line (Longview Junction) located to the east in Kelso, Washington. Ships access the Applicant's leased area including the bulk product terminal via the Columbia River and berth at an existing dock (Dock 1) operated by the Applicant in the Columbia River.

[1] LVSW is jointly owned by BNSF Railway Company (BNSF) and Union Pacific Railroad (UP).

Figure 1. Project Vicinity

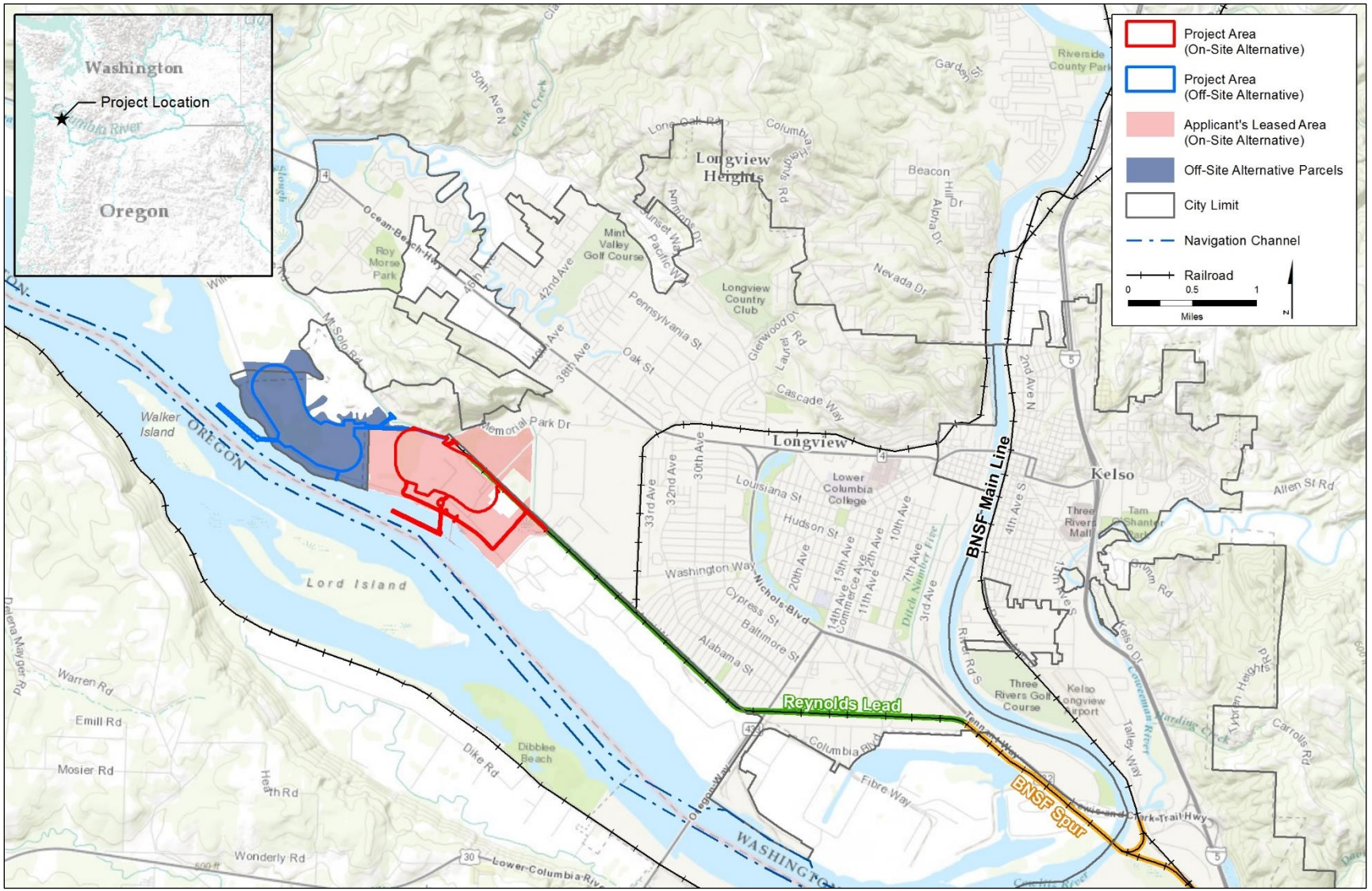
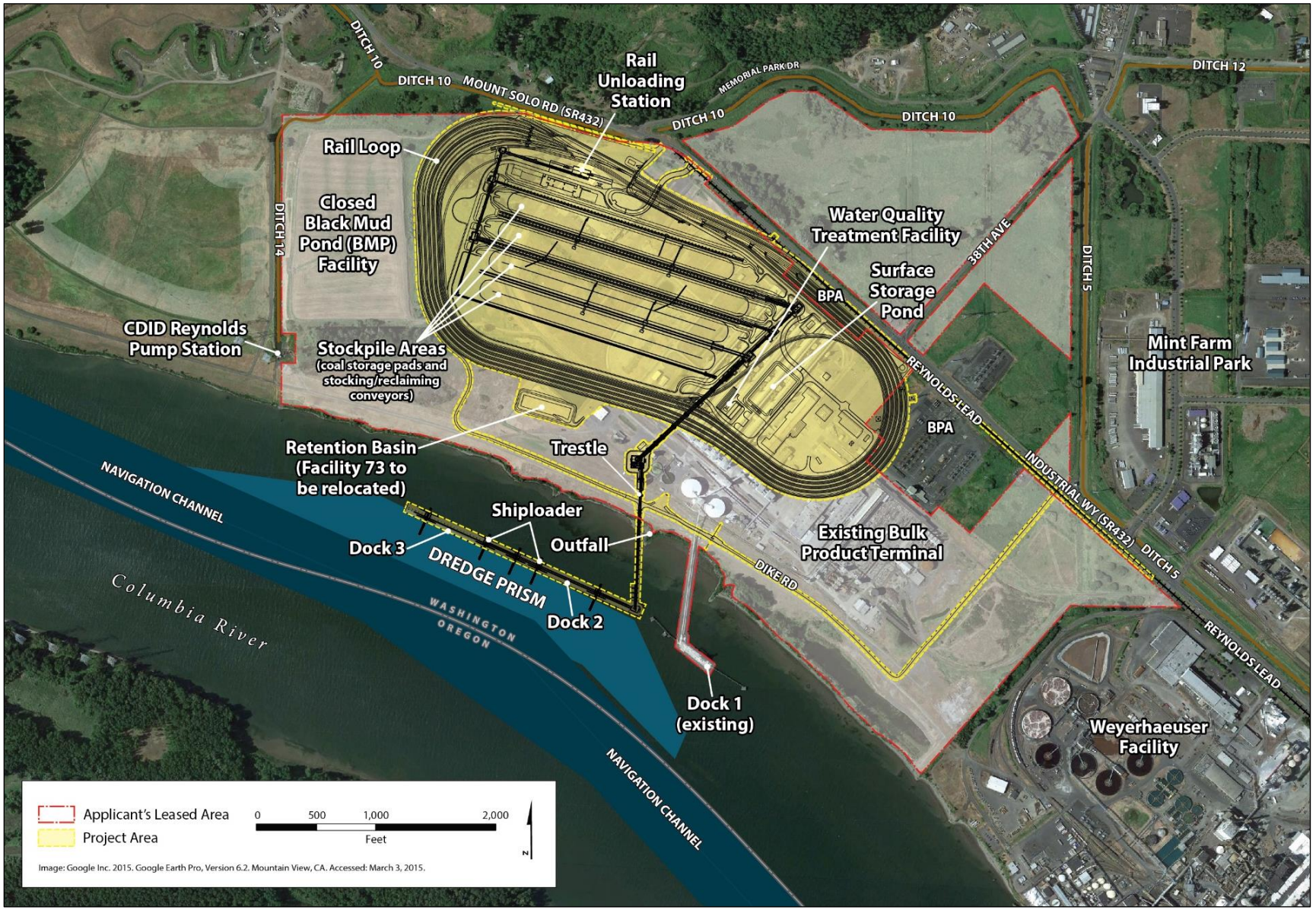


Figure 2. On-Site Alternative



Under the On-Site Alternative, BNSF or Union Pacific Railroad (UP) trains would transport coal in rail cars from the BNSF main line at Longview Junction to the project area via the BNSF Spur and Reynolds Lead. Coal would be unloaded from rail cars, stockpiled and blended, and loaded by conveyor onto ocean-going ships at two new docks (Docks 2 and 3) on the Columbia River for export to Asia.

Once construction is complete, the export terminal would have an annual throughput capacity of up to 44 million metric tons of coal.[2] The export terminal would consist of one operating rail track, eight rail tracks for the storage of rail cars, rail car unloading facilities, stockpile areas for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks 2 and 3), and ship-loading facilities on the two docks. Dredging of the Columbia River would be required to provide access to and from the Columbia River navigation channel and for berthing at the two new docks.

Vehicles would access the project area from Industrial Way (State Route 432). Ships would access the project area via the Columbia River and berth at one of the two new docks. Trains would access the export terminal via the BNSF Spur and the Reynolds Lead. Terminal operations would occur 24 hours per day, 7 days per week. The export terminal would be designed for a minimum 30-year period of operation.

1.1.2 Off-Site Alternative

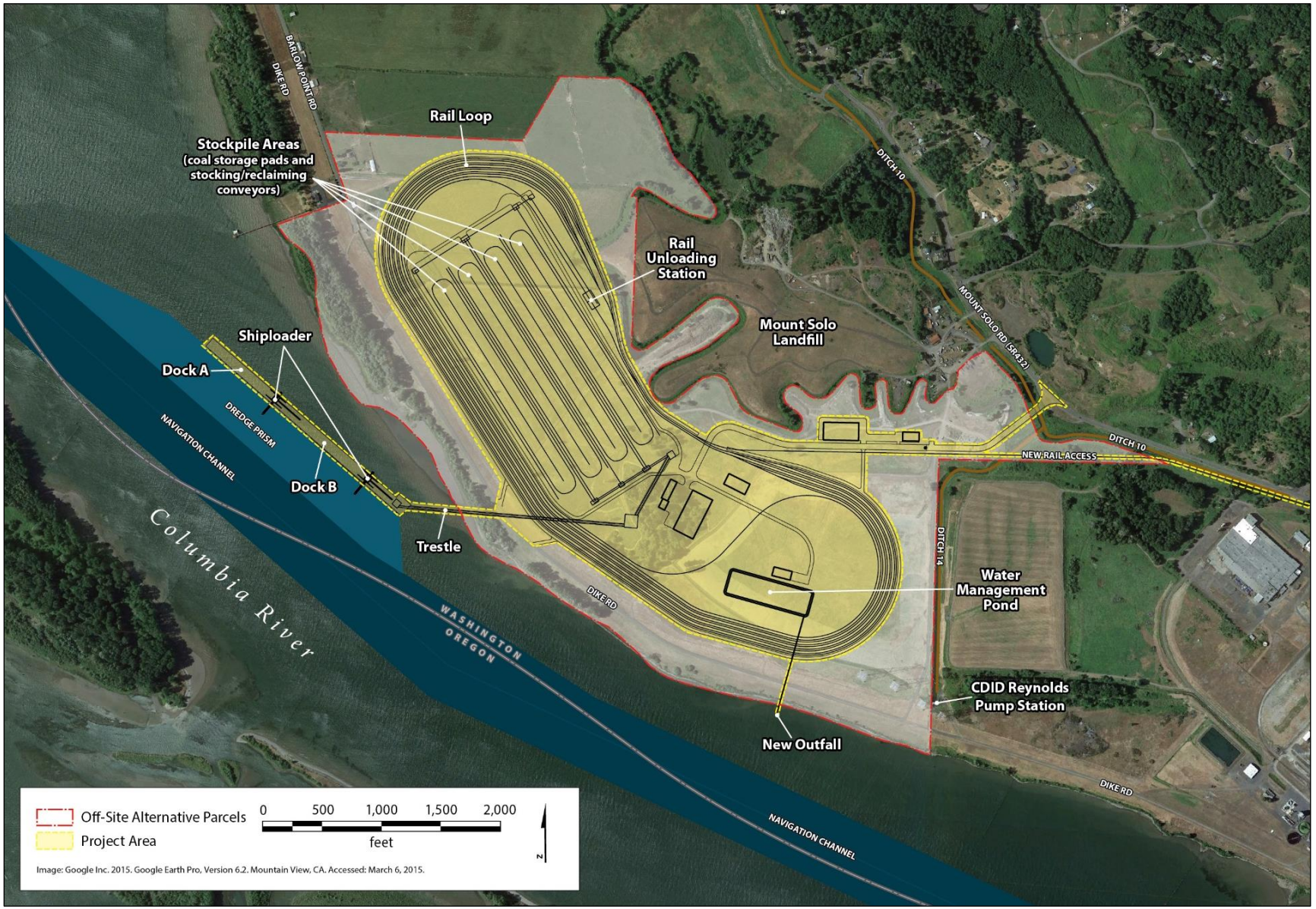
Under the Off-Site Alternative, the export terminal would be developed on an approximately 220-acre site adjacent to the Columbia River, located in both Longview, Washington, and unincorporated Cowlitz County, Washington, in an area commonly referred to as Barlow Point (Figure 3). The project area for the Off-Site Alternative is west and downstream of the project area for the On-Site Alternative. Most of the project area for the Off-Site Alternative is located within Longview city limits and owned by the Port of Longview. The remainder of the project area is within unincorporated Cowlitz County and privately owned.

Under the Off-Site Alternative, BNSF or UP trains would transport coal from the BNSF main line at Longview Junction over the BNSF Spur and the Reynolds Lead, which would be extended approximately 2,500 feet to the west. Coal would be unloaded from rail cars, stockpiled and blended, and loaded by conveyor onto ocean-going ships at two new docks (Docks A and B) on the Columbia River. The Off-Site Alternative would serve the same purpose as the On-Site Alternative.

Once construction is complete, the Off-Site Alternative would have an annual throughput capacity of up to 44 million metric tons of coal. The export terminal would consist of the same elements as the On-Site Alternative: one operating rail track, eight rail tracks for the storage of rail cars, rail car unloading facilities, stockpile areas for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks A and B), and ship-loading facilities on the two docks. Dredging of the Columbia River would be required to provide access to and from the Columbia River navigation channel and for berthing at the two new docks.

[2] A metric ton is the U.S. equivalent to a tonne per the International System of Units, or 1,000 kilograms or approximately 2,204.6 pounds.

Figure 3. Off-Site Alternative



Vehicles would access the project area via a new access road extending from Mount Solo Road (State Route 432) to the project area. Trains would access the terminal via the BNSF Spur and the extended Reynolds Lead. Ships would access the project area via the Columbia River and berth at one of the two new docks. Terminal operations would occur 24 hours per day, 7 days per week. The export terminal would be designed for a minimum 30-year period of operation.

1.1.3 No-Action Alternative

Under the No-Action Alternative, the Corps would not issue the requested Department of the Army permit under the Clean Water Act Section 404 and the Rivers and Harbors Act Section 10. This permit is necessary to allow the Applicant to construct and operate the proposed export terminal. The No-Action Alternative also includes the Applicant's expected future development of the On-Site Alternative project area, described below. This action is analyzed as part of the No-Action Alternative because it is a foreseeable consequence of a Department of the Army permit denial.

The Applicant plans to continue operating its existing bulk product terminal located adjacent to the On-Site Alternative project area, as well as expand this business. Ongoing operations would include storing and transporting alumina and small quantities of coal, and continued use of Dock 1. Maintenance of the existing bulk product terminal would continue, including maintenance dredging at Dock 1 every 2 to 3 years. Under the terms of an existing lease, expanded operations could include increased storage and upland transfer of bulk products utilizing new and existing buildings. The Applicant would likely undertake demolition, construction, and other related activities to develop expanded bulk product terminal facilities adjacent to the proposed export terminal.

In addition to the current and planned activities, if the requested permit is not issued, the Applicant would intend to expand its bulk product terminal business onto areas that would have been subject to construction and operation of the proposed export terminal. The Applicant has described a future expansion scenario that would involve handling bulk materials already permitted for off-loading at Dock 1. Additional bulk product transfer activities could involve products such as a calcine pet coke, coal tar pitch, cement, fly ash, and sand or gravel. While future expansion of the Applicant's bulk product terminal business might not be limited to this scenario, it was analyzed to help provide context to a No-Action Alternative evaluation.

1.2 Regulatory Setting

The jurisdictional authorities and corresponding regulations, statutes, and guidance for determining potential impacts on wildlife are summarized in Table 1.

Table 1. Regulations, Statutes, and Guidelines for Wildlife

Regulation, Statute, Guideline	Description
Federal	
National Environmental Policy Act (42 USC 4321 et seq.)	Requires the consideration of potential environmental effects. NEPA implementation procedures are set forth in the President's Council on Environmental Quality's Regulations for Implementing NEPA (49 CFR 1105).
U.S. Army Corps of Engineers NEPA Environmental Regulations (33 CFR 230)	Provides guidance for implementing the procedural provisions of NEPA for the Corps. It supplements CEQ regulations 40 CFR 1500–1508.
Endangered Species Act Section 7	The federal ESA provides for the conservation of threatened and endangered species and the habitat upon which they depend. ESA Section 7 requires that federal agencies initiate consultation with the USFWS and/or NMFS to ensure federal actions are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of designated critical habitat.
Migratory Bird Treaty Act of 1918, as amended (16 USC 703–713)	Makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. Under the regulatory authority of USFWS.
Bald and Golden Eagle Protection Act of 1940, as amended (16 USC 668–668c)	Prohibits the taking of bald eagles, including their parts, nests, or eggs without a permit issued by the USFWS, and provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle... [or any golden eagle], alive or dead, or any part, nest, or egg thereof."
Marine Mammal Protection Act of 1972, as amended (50 CFR 216)	Protects marine mammals from "take" without appropriate authorization, which is only granted under certain circumstances. NMFS and the USFWS enforce the MMPA. Animals under the jurisdiction of NMFS could be present within the study area. An Incidental Harassment Authorization or Letter of Authorization (specific authorization to be determined) could be required pursuant to the MMPA.

Regulation, Statute, Guideline	Description
State	
Washington State Environmental Policy Act (WAC 197-11, RCW 43.21C)	Requires state and local agencies in Washington to identify potential environmental impacts that could result from governmental decisions.
Washington State Growth Management Act (RCW 36.70A)	Defines a variety of critical areas, which are designated and regulated at the local level under city and county critical areas ordinances.
Washington State Shoreline Management Act ((90.58 RCW)	Requires cities and counties (through their Shoreline Master Programs) to protect shoreline natural resources.
Washington State Hydraulic Code (RCW 77.55)	Designed to protect fish life. The hydraulic project approval is administered by WDFW under the state hydraulic code.
Marinas and Terminals in Freshwater Areas (WAC 220-660-160)	Applies to constructing, maintaining, and repairing marinas and terminals in freshwater areas and provides provisions intended to address fish life concerns.
Local	
Cowlitz County SEPA Regulations (CCC Code 19.11)	Provide for the implementation of SEPA in Cowlitz County.
Cowlitz County Critical Areas Protection Ordinance (19.15)	Regulates activities within and adjacent to critical areas including fish and wildlife habitat conservation areas.
Cowlitz County Shoreline Master Program	Regulates development in the shoreline zone, including the shoreline of the Columbia River, a Shoreline of Statewide Significance.
City of Longview Shoreline Master Program (17.60) (Off-Site Alternative only)	Adopts Cowlitz County Shoreline Master Program by reference.
City of Longview Critical Areas Ordinance(17.10.140) (Off-Site Alternative only)	Regulates activities within and adjacent to critical areas and in so doing regulates fish and wildlife habitat conservation areas.

Notes:
USC = United States Code; NEPA = National Environmental Policy Act; CFR = Code of Federal Regulations; Corps = U.S. Army Corps of Engineers; CEQ = Council on Environmental Quality; USFWS = U.S. Fish and Wildlife Service; NMFS = National Marine Fisheries Service; ESA = Endangered Species Act; MMPA = Marine Mammal Protection Act; WAC = Washington Administrative Code; RCW = Revised Code of Washington; WDFW = Washington Department of Fish and Wildlife; Ecology = Washington State Department of Ecology

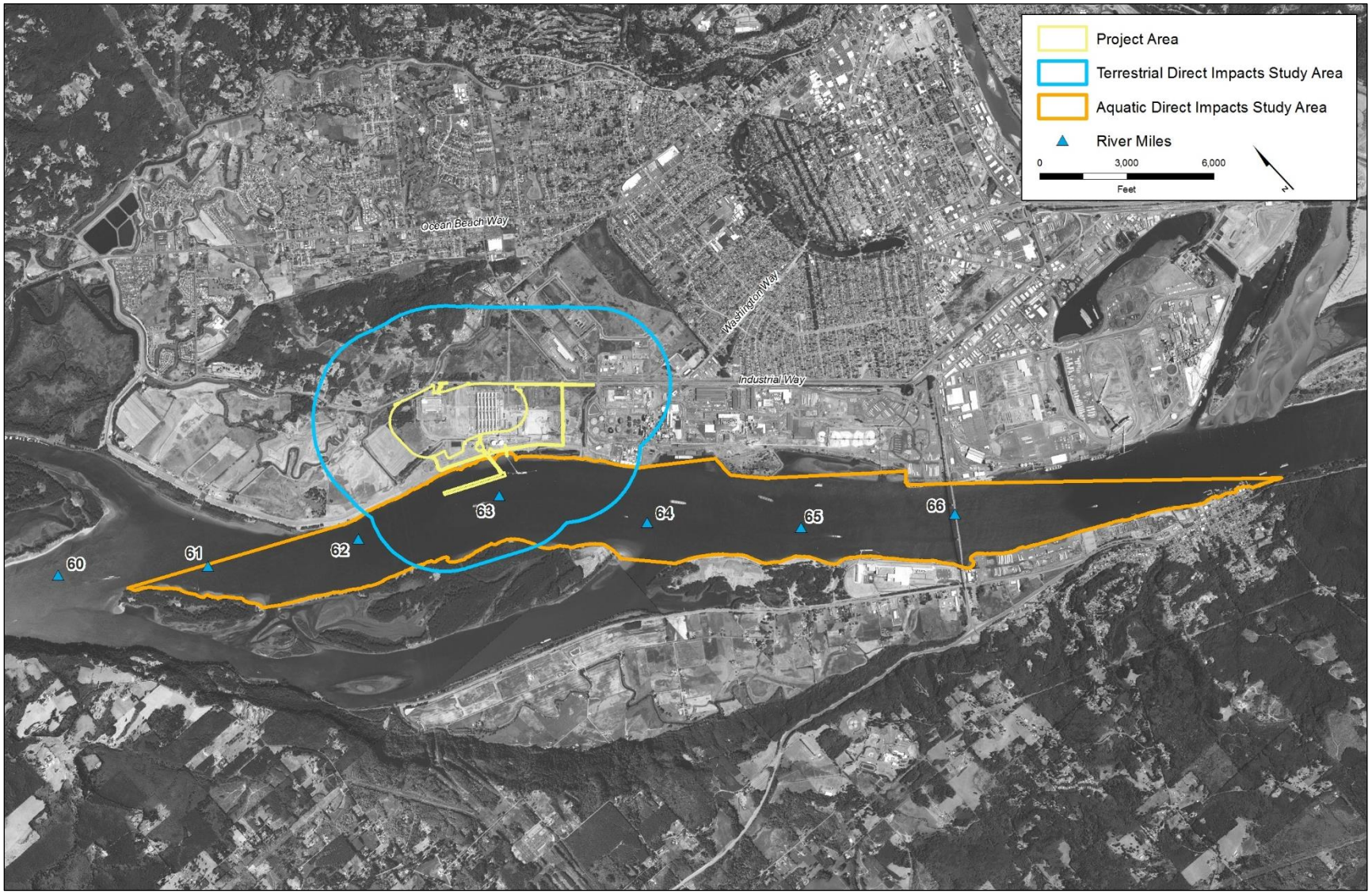
1.3 Study Area

The study areas for the On-Site Alternative and Off-Site Alternative are described below.

1.3.1 On-Site Alternative

The study area for the On-Site Alternative includes both terrestrial and aquatic habitats that could be affected by construction and operations (Figure 4). The study area is the same for both direct and indirect impacts.

Figure 4. Direct Impact Study Area Boundaries for the On-Site Alternative



1.3.1.1 Terrestrial Species and Habitats Study Area for Direct Impacts

The On-Site Alternative terrestrial study area for direct impacts on terrestrial species and habitats consists of the project area plus the area extending up to 0.5 mile beyond the project area (Figure 4), based on the sensitivity to visual disturbance of some wildlife species. This distance accommodates noise and visual disturbance thresholds set by the U.S. Fish and Wildlife Service (USFWS) for some sensitive species (2006).

1.3.1.2 Aquatic Species and Habitats Study Area for Direct Impacts

The aquatic study area for direct impacts on aquatic wildlife species and habitats includes the main channel of the Columbia River and extends approximately 5.1 miles upstream and 2.1 miles downstream in the Columbia River, measured respectively, from the upstream and downstream extents of the proposed docks (Docks 2 and 3) at the project area (Figure 4). The aquatic study area is based on the distances where underwater noise generated by construction or operation of the proposed terminal is estimated to reach harassment levels (Section 3.1, *Impacts*). These distances represent the in-water "line of site" distances from the ends of the dock that underwater noise could extend to.

1.3.1.3 Terrestrial and Aquatic Species and Habitats Study Area for Indirect Impacts

The study area for indirect impacts includes the project area and lands in the vicinity where project-related disturbance to wildlife and habitat could occur. The indirect study area also extends to the shipping corridor to the mouth of the Columbia River from the project area (Figure 5). This study area captures the potential impacts of increased vessel traffic on aquatic species and habitat that could occur because of increased vessel traffic in the lower Columbia River.

1.3.2 Off-Site Alternative

The study area for the Off-Site Alternative includes both terrestrial and aquatic habitats in and around the project area for the Off-Site Alternative that could be affected by construction and operations (Figure 6). The study area is the same for both direct and indirect impacts.

1.3.2.1 Terrestrial Species and Habitats Study Area for Direct Impacts

The Off-Site Alternative study area for terrestrial species includes terrestrial and aquatic habitats in and around the project area for the Off-Site Alternative that could be affected by construction and operations. The study area extends 0.5 mile beyond the project area to account for impacts related to construction noise and visual changes, as described for the On-Site Alternative.

Figure 5. Indirect Impact Study Area Boundaries for the On-Site and Off-Site Alternatives

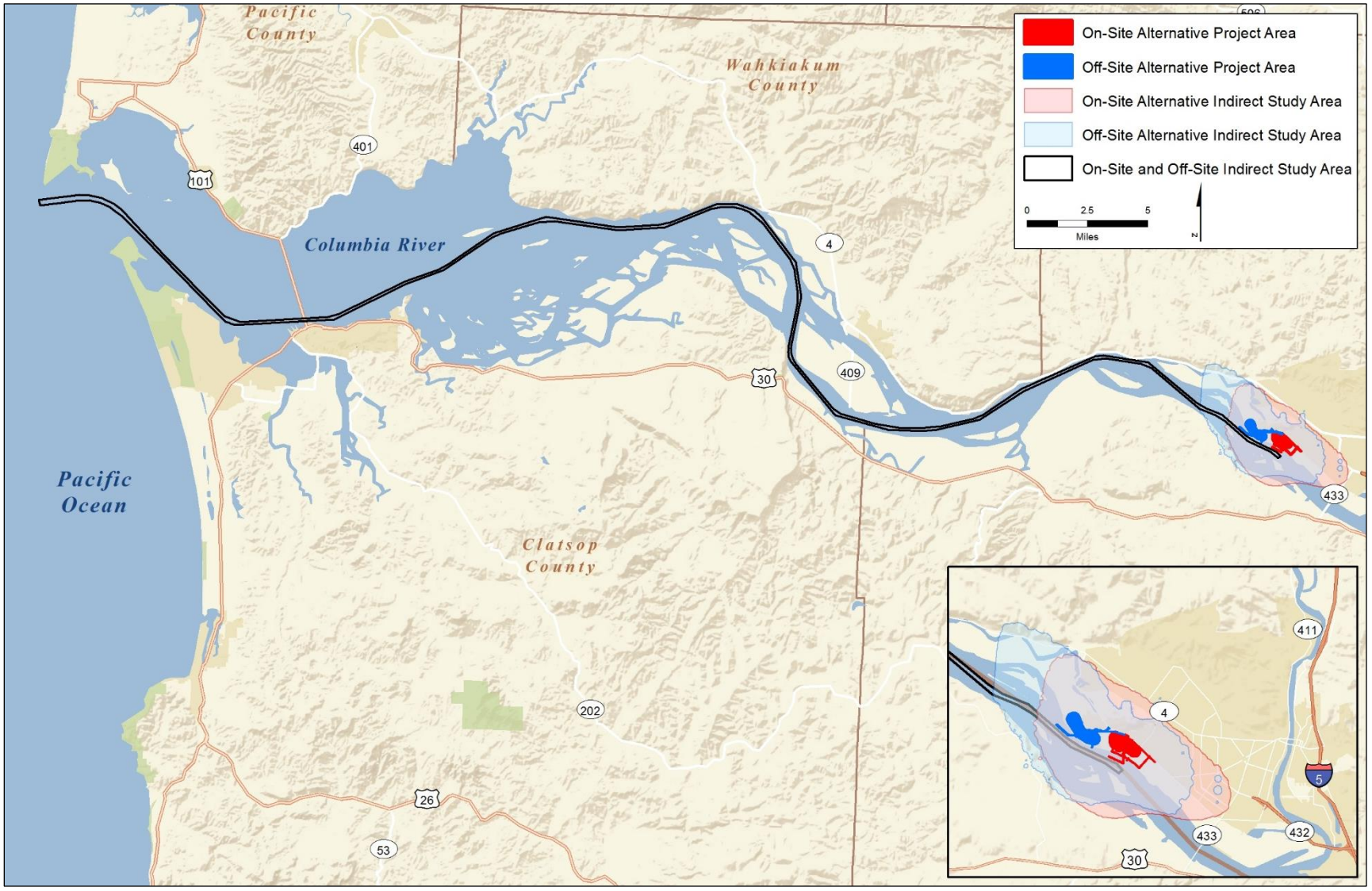
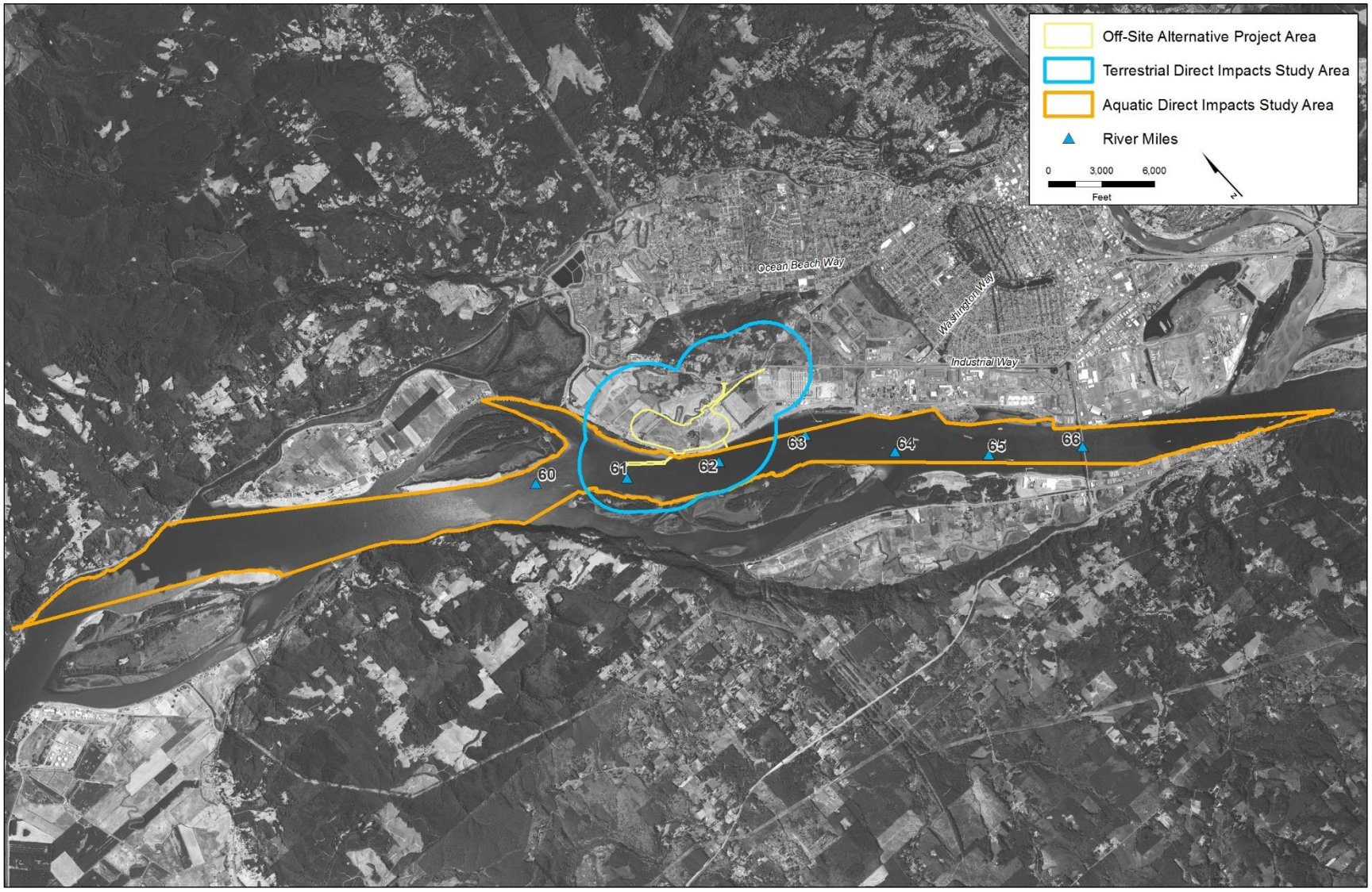


Figure 6. Study Area Boundaries for the Off-Site Alternative



1.3.2.2 Aquatic Species and Habitat Study Area for Direct Impacts

The Off-Site Alternative study area for aquatic species includes the main channel of the Columbia River and a small section of the Fisher Island Slough side channel (between Fisher Island and Washington State mainland) in which construction noise could disturb pinnipeds. The main channel study area extends 7.1 miles upstream and 6.8 miles downstream from the extents of the proposed docks in the project area, and is defined by the following approximate boundaries (Grette Associates 2014b) (Figure 6).

- **Downstream**: near Bunker Hill (river mile 54.4) on the Washington side and near Crims Island (river mile 57.9) on the Oregon side.
- **Upstream**: near the Lewis and Clark Bridge (river mile 66.0) on the Washington side and upstream from the City of Rainier (river mile 68.7) on the Oregon side.

The aquatic study area is based on the same criteria of harassment levels mentioned above for the On-Site Alternative. The distance is greater for the Off-Site Alternative, compared to the On-Site Alternative due to the location of the docks for the Off-Site Alternative.

1.3.2.3 Terrestrial and Aquatic Species and Habitats Study Area for Indirect Impacts

The study area for indirect impacts associated with the Off-Site Alternative is the same as identified above for the On-Site Alternative.

Chapter 2
Affected Environment

This chapter describes the methods for assessing the affected environment and determining impacts, and the affected environment in the study areas for the On-Site and Off-Site Alternatives as it pertains to wildlife.

2.1 Methods

This section describes the sources of information that were used to characterize the affected environment and assess potential impacts of the proposed export terminal on wildlife and wildlife habitat.

2.1.1 Data Sources

The following data sources were used to define the affected environment relevant to wildlife and wildlife habitat and to evaluate potential impacts in the terrestrial and aquatic study areas.

- Site visits to the project area for the On-Site Alternative conducted by ICF International biologists on April 8, 2014, and December 12, 2014.
- A site visit to the Mount Solo Landfill was conducted by ICF International biologists on December 12, 2014, to view the project area for the Off-Site Alternative[3] with binoculars from an elevated position. The site was also viewed with binoculars from the project area for the On-Site Alternative and from publicly accessible roads.
- Reports prepared by Grette Associates for the Applicant as part of the permit application materials.
    - *Docks 2 and 3 and Associated Trestle: Direct Effects of Construction Pile Driving and Marine Mammals* (Grette Associates 2014a).
    - *Off-Site Alternative – Barlow Point Pile Driving and Underwater Sound, Marine Mammals* (Grette Associates 2014b).
    - *Wetland and Stormwater Ditch Delineation Report – Parcel 619530400* (Grette Associates 2014c).
    - *Bulk Product Terminal Shoreline Wetland Delineation Report – Parcel 61950* (Grette Associates 2014d).
    - *Wetland and Stormwater Ditch Delineation Report – Parcel* 61953 (Grette Associates 2014e).
    - *Off-Site Alternative – Barlow Point Shoreline Habitat Inventory* (Grette Associates 2014f).
    - *Bulk Product Terminal Wetland Stormwater Reconnaissance Report – Parcel 10213* (Grette Associates 2014g).
    - *Wetland Impact Report – Parcel 619530400* (Grette Associates 2014h).

[3] Permission was not granted to visit the project site for the Off-Site Alternative directly.

- *Permanent Impacts to Aquatic Habitat* (Grette Associates 2014i).
- *Affected Environment Biological Resources. Technical Report* and associated appendices (Grette Associates 2014j).
- *Affected Environment Biological Resources. Addendum: Technical Memorandum: Streaked Horned Lark Surveys at Millennium Bulk Terminals* (Grette Associates 2014k).
- *Off-Site Alternative – Barlow Point Wetland Reconnaissance* Report (Grette Associates 2014l).
- *Docks 2 and 3 and Associated Trestle: Proposed Mitigation Measures to Minimize Construction and Long-Term Effects* (Grette Associates 2014m).
- *Docks 2 and 3 and Associated Trestle Direct Effects of Construction* (Grette Associates 2014n).
- *Off-Site Alternative – Barlow Point Permanent Impacts to Aquatic Habitat* (Grette Associates 2014o).
- *Affected Environment Biological Resources. Addendum: Technical Memorandum: Docks 2 and 3 and Associated Trestle Effects of Construction and Terminal Operations on Streaked Horned Larks and Columbian White-Tailed Deer* (Grette Associates 2014p).

- NMFS West Coast Region species list.
- U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation (IPaC) system online database (2015).
- Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) Statewide List and Distribution for Cowlitz County.
- WDFW interactive mapping for PHS spatial data provided by WDFW on May 5, 2014, for a 5-mile radius surrounding the project areas.
- Washington Department of Natural Resources (DNR) online Herpetological Atlas spatial database (2015).
- Literature relative to threatened and endangered species.
- Comments received from interested parties during the project scoping period relative to wildlife, as summarized in the Scoping Report (February 10, 2014).

2.1.2 Impact Analysis

The impact analysis involved conducting a quantitative analysis of vegetated habitats at the project areas and a qualitative analysis of wildlife species in the study areas. For the purpose of this analysis, construction impacts are based on peak construction period and operations impacts are based on maximum throughput capacity (up to 44 million metric tons per year). For direct impacts, the analysis assumes best management practices were incorporated into the design, construction, and operations of the export terminal. More information about best management practices can be found in the Draft Environmental Impact Statement (Volume I), Chapter 8, *Minimization and Mitigation* and Appendix H, *Export Terminal Design Features*.

The following methods were used to evaluate the potential impacts of the On-Site Alternative, Off-Site Alternative, and No-Action Alternative.

2.1.2.1 Vegetated Habitats

Direct impacts on habitat are based on the method outlined in the NEPA Vegetation Technical Report (ICF International 2016c). Vegetation communities were identified, characterized, and mapped for both project areas using recent and historic aerial photographs and the information gathered from the references cited in Section 2.1.1, *Impact Analysis*, of the NEPA Vegetation Technical Report. Mapped plant communities in the majority of the project area for the On-Site Alternative were ground-truthed by ICF biologists during the December 12, 2014 site visit. The vegetation types present in the project area for the Off-Site Alternative were also verified for the On-Site Alternative by observing the project area, Mount Solo Landfill, and public roads through binoculars. Visual observations of the vegetation in the study area on adjacent, off-site areas and along Industrial Way, Mt. Solo Road, and Memorial Park Drive were also documented during this site visit.

Once verified, vegetation communities were mapped on a recent aerial photograph using geographic information system (GIS) and overlain with the on- and off-site wetland boundaries delineated by Grette Associates (2014c, d, e, f, g). Direct impacts on vegetation from the clearing of land to construct the buildings and infrastructure of the On-Site Alternative and Off-Site Alternative were determined by overlaying the export terminal footprints on the vegetation maps using GIS. All vegetated areas that fell within the footprint were considered direct impacts.

2.1.2.2 Wildlife Species

Potential impacts on wildlife species were determined by considering species that are likely to occur in the study area based on field surveys, site visits, the presence of suitable habitat and geographic range, and documented species occurrences. For documented occurrences, the focus was on wildlife species identified in the WDFW Priority Habitat Species (PHS) database. The PHS program provides comprehensive information on important fish, wildlife, and habitat resources in Washington. It is the principal means by which WDFW provides wildlife and habitat information to public and private entities for planning purposes. In addition, the USFWS list of federally listed species in Cowlitz County and the NMFS West Coast Region species list of marine mammals (most of which are also included in the PHS database) were also considered.

WDFW maintains a PHS geospatial database that maps locations of priority species occurrences and priority habitats. Priority species in the PHS program include wildlife species classified under state law (Washington Administrative Code [WAC] 232-12-297) as threatened, endangered, or sensitive, as well as species that are candidates for such classification. Other PHS species include vulnerable aggregations of species or groups of animals that are susceptible to significant population declines due to their inclination to aggregate, and species of recreational, commercial, or tribal importance. The PHS database also includes state-monitored species, which are not considered special-status, but are monitored for status and distribution trends. Geospatial PHS data containing mapped locations of priority species occurrences and priority habitats were obtained from WDFW (Washington Department of Fish and Wildlife 2014).

These data were overlaid with the study area to determine presence of documented priority species and habitat occurrences.

- A list of special-status wildlife species was compiled for the study area, consisting of those species federally listed as threatened, endangered, proposed, or candidate species; wildlife species listed in the WDFW PHS database; and marine mammals.

- A list of federally listed wildlife species for Cowlitz County was generated from the USFWS iPAC online planning tool (U.S. Fish and Wildlife Service 2015).
- A list of state priority species that occur in Cowlitz County was obtained from the WDFW PHS program website (Washington Department of Fish and Wildlife 2013).
- A list of federally protected marine mammals that could occur in the study area was compiled from the NMFS (2015) West Coast Region website.

The impact analysis for wildlife habitat is quantitative; however, the impact analysis for wildlife species is qualitative because wildlife species are generally mobile and their presence in the study area cannot be predicted at any one location or time. In addition, a species' reaction to an impact mechanism, such as construction-generated noise, can be different for each species given the variability in species' hearing frequencies, mobility, vision, and overall sensitivity (e.g., juveniles could be more sensitive and susceptible to potential impacts than older animals). Therefore, impact mechanisms are identified and a qualitative impact discussion describes the potential effect an impact mechanism could have on species that could be in the study area during construction and operations.

2.1.2.3 Assessing Noise Impacts

An animal's response to sound depends on various factors, including noise level and frequency, distance and event duration, equipment type and conditions, frequency of noisy events over time, slope, topography, weather conditions, previous exposure to similar noises, hearing sensitivity, reproductive status, time of day, behavior during the noise event, and an animal's location relative to the noise source (Delaney and Grubb 2003 in Washington State Department of Transportation 2015). However, USFWS has established noise and visual distance thresholds for some sensitive species in Washington, including the bald eagle (*Haliaeetus leucocephalus*), marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), and Columbia white-tailed deer (*Odocoileus virginianus leucurus*) (U.S. Fish and Wildlife Service 2006).

USFWS has determined the distances presented in Table 2 as the point at which these species would likely experience harassment[4] from specific construction activities. Of these four sensitive species, the bald eagle can experience harassment from visual impacts at 0.5 mile from a construction site, the greatest distance of potential harassment of the four species. The remaining three species can experience harassment through either visual or noise disturbance at lesser distances (including distances for impact pile driving) than the 0.5-mile bald eagle harassment distance (Table 2). Therefore, the terrestrial study area for the On-Site Alternative extends 0.5 mile beyond the project area. Even though this distance is based on the bald eagle's sensitivities to noise and visual impacts, it is a reasonable proxy to use for terrestrial wildlife species in the absence of similar information for other wildlife species.

[4] *Harassment* under the Endangered Species Act is defined as actions that create the likelihood of injury to such an extent as to significantly disrupt normal behavior patterns, which include but are not limited to, breeding, feeding, or sheltering [50 CFR 17.3].

Table 2. Harassment Distances for Federally Listed Species in Washington State

Species	Scientific Name	Activity and Harassment Distance
Bald eagle	*Haliaeetus leucocephalus*	Noise: 0.25 mile[a] Visual: 0.5 mile[b]
Marbled murrelet	*Brachyramphus marmoratus*	Pile driving: 180 feet[c] Visual: 300 feet
Northern spotted owl	*Strix occidentalis caurina*	Pile driving: 180 feet
Columbia white tailed deer	*Odocoileus virginianus leucurus*	Noise: 0.25 mile

Notes:

[a] Noise level disturbance varies for bald eagles. It has been found that visual disturbance is more likely to provoke escape behavior than noise disturbance (U.S. Department of Transportation 2004).

[b] Visual disturbance can be caused by close visual proximity of human activities at sensitive locations (i.e., nest trees), and could result in significant disruption of normal behavior patterns.

[c] Injury would occur at 202 decibels at this distance (Washington State Department of Transportation 2015).

Source: U.S. Fish and Wildlife Service 2006.

NMFS has established standard underwater noise thresholds under the Marine Mammals Protection Act. NMFS has established Levels A and B harassment thresholds for pinnipeds (i.e., seals and sea lions) from impact and vibratory pile driving (Grette Associates 2014a) (Table 3).

Table 3. NMFS Underwater Sound Level Effect Thresholds for Marine Mammals

Effect Type	Effect Threshold (dB_{RMS})
Impulse Sound (Impact Driver Operation)	
Level A harassment	190
Level B harassment	160
Continuous Sound (Vibratory Driver Operation)	
Level B harassment	120

Notes:
Source: Grette Associates 2014a
dB_{RMS} = decibel root mean square

Pinniped harassment can occur between approximately 178 feet and the extent of the aquatic study area for direct impacts, from the noise source without attenuation, depending on the method of pile driving. Use of a bubble curtain during impact pile driving decreases the distance at which pinniped harassment can occur to between 45 feet and 4,459 feet. Harassment can include hearing-related injuries and behavior changes. These criteria were used to establish pinniped impact thresholds in the aquatic wildlife study area.

For diving birds, USFWS has established impact thresholds for the federally listed marbled murrelet (Table 2), which can provide some guidance on underwater noise thresholds for other diving birds in the aquatic study area. The USFWS recognizes a behavioral guideline of 150 decibels root mean square (dB_{RMS}), an injurious auditory threshold of 202 sound exposure level (dB_{SEL}) (i.e., permanent threshold shift in hearing due to permanent loss of ochlear hair cells), and a non-auditory injury (i.e., barotrauma) threshold of 208 dB_{SEL}; underwater noise below 150 dB_{SEL} does not cause injury (Washington State Department of Transportation 2015). These criteria were used to establish impact thresholds for diving birds in the aquatic study area.

2.2 Affected Environment

The affected environment related to wildlife in the study area is described below.

2.2.1 On-Site Alternative

The project area for the On-Site Alternative is located along the north side of the Columbia River at river mile 63, within unincorporated Cowlitz County and adjacent to the City of Longview.

2.2.1.1 Terrestrial Habitat

Terrestrial habitats in the study area are characterized by their main land cover classification and dominant form of vegetation and are described in detail in the NEPA Vegetation Technical Report (ICF International 2016c). Habitat types present in the study area include developed (disturbed), upland (forested, scrub-shrub, herbaceous, and managed herbaceous), wetland (forested, scrub-shrub, herbaceous, managed herbaceous, and disturbed), and riparian (forested, scrub-shrub, and herbaceous).

Developed land includes areas where the majority of vegetation has been removed and replaced with pavement, buildings, or infrastructure associated with existing and historical industrial, agricultural, and recreational uses. Occasionally, scattered vegetation is present and typically consists of nonnative grasses, forbs, and shrubs. There is one vegetation type, disturbed, categorized in the developed areas.

Uplands include areas landward of the Columbia River levee with undeveloped vegetated areas that do not exhibit wetland characteristics. Vegetation within the uplands is categorized as forested, scrub-shrub, herbaceous, and managed herbaceous.

Wetlands include areas that exhibit the diagnostic wetland characteristics required by state and federal wetland delineation manuals (hydrophytic vegetation, hydric soils, and wetland hydrology). Wetland mapping and classifications were taken directly from the wetland delineation and determination work completed for the project areas by Grette Associates (2014c, d, e, f, g). Vegetation in the wetlands is categorized as forested, scrub-shrub, herbaceous, managed herbaceous, and disturbed.

Riparian lands include the areas along the shoreline of the Columbia River between the ordinary high water mark and the top of the Columbia River levee. Vegetation is categorized as forested, scrub-shrub, and herbaceous.

Project Area

The project area for the On-Site Alternative is located on a disturbed industrial site developed with roads and industrial buildings. Many of the surrounding areas are also highly disturbed. Of the undeveloped areas on the project area, many are small and fragmented from other similar habitat patches. The largest, contiguous areas of habitat are located on the west side of the project area and include an herbaceous wetland dominated by reed canarygrass and a forested wetland dominated by deciduous trees with an understory of shrubs and reed canarygrass. The highest quality habitat on the project area is a small forested area surrounding parallel drainage ditches, located in the southwest portion of the site. The habitat is characterized by deciduous trees along the banks of the ditches and abundant understory vegetation. In general, suitable wildlife habitat on the project area

is degraded because of past industrial uses on the property. The patches of suitable habitat support foraging and cover for small to large mammals, foraging and nesting for birds, including waterfowl, raptors, and passerine birds, and foraging, breeding, and nesting for amphibians (Grette Associates 2014c, d, e, h). However, these areas are limited in their habitat value due to their relatively small size and fragmented condition.

Study Area

The terrestrial study area for the On-Site Alternative includes land both up- and down-stream of the project area, land north of Industrial Way, a strip of land between the project area and Columbia River, and a small portion of Lord Island (Figure 4). Upstream land is predominantly disturbed with heavy industrial development and wildlife is not present due to the lack of suitable habitat.

The downstream portion of the terrestrial study area overlaps with the terrestrial study area for the Off-Site Alternative. Predominant habitat types include disturbed areas, herbaceous and managed herbaceous upland habitats, herbaceous and managed herbaceous wetland habitats, and scrub-shrub or forested riparian habitat. Habitat support for wildlife is similar to that described for the project area and includes foraging and cover for small to large mammals, foraging and nesting for waterfowl, raptors, and passerine birds, and foraging, breeding, and nesting for amphibians.

North of Industrial Way, the landscape can be generally separated into three similar habitat areas that are separated by Consolidated Diking Improvement District #1 (CDID #1) drainage ditches (Figure 4). To the northwest is Mount Solo, a forested ridge that is covered with a large area of contiguous native forest intermixed with rural residential areas and some light industrial uses. Smaller areas of scrub-shrub and managed herbaceous habitats are interspersed with the developed areas. Mount Solo is the largest contiguous forested upland habitat within 2 miles of the project area, and as such, is likely to support a greater diversity of wildlife—including small to large mammals, bird species (passerine, raptor, and owl), lizards, and snakes—than habitats on the project area.

Adjacent to the project area is a triangular area bounded by Industrial Way to the south and CDID drainage ditches to the east and west. This area primarily contains herbaceous wetland habitat dominated by reed canarygrass. Other habitats, including forested and scrub-shrub wetlands and uplands (forested, scrub-shrub, and herbaceous) are small and isolated from other similar habitat types. A small portion of the site is disturbed. The habitat likely supports foraging and cover for small to large mammals; foraging and nesting for waterfowl, raptors, and passerine birds; and foraging, breeding, and refuge for amphibians and reptiles. Land to the east is largely disturbed by the Mint Farm Industrial Park, with few small areas of herbaceous or scrub-shrub habitat.

South of the project area, the terrestrial study area consists of a levee with managed herbaceous vegetation and riparian shoreline bordering the Columbia River. The riparian area is primarily forested and scrub-shrub habitat and likely provides foraging and cover for small and large mammals, foraging and nesting for passerine, waterfowl and raptor bird species, and foraging, breeding, and refuge for amphibians (Grette Associates 2014d).

A small portion of Lord Island is located in the terrestrial study area and is approximately 0.5 mile south of the project area. The island is located within the Columbia River and was previously used for dredged material disposal. Lord Island is primarily forested and connects to Walker Island downstream, by a narrow band of sand. An embayment between the two islands contains a tidal marsh and shallows. This area provides foraging and resting habitat for waterfowl and has been

previously documented as supporting significant numbers of wintering ducks and geese (Pacific Coast Joint Venture 1994). With the exception of several transmission towers, the island is undeveloped and contains wildlife habitat. Lord Island could support Columbian white tailed deer; however, no occurrences have been documented on the island (Washington Department of Fish and Wildlife 2014). Additional wildlife species supported by Lord Island include small mammals, birds (raptors and passerine), amphibians, and reptiles.

2.2.1.2 Aquatic Habitat

Aquatic habitats in the aquatic study area include wetlands (refer to Section 5.3, *Wetlands*, in the Draft EIS for more information), the Columbia River, and smaller areas of open water within the study area, including various ditches and a pond created on the project area by the excavation of dredged materials in 2006. Ditches in the aquatic study area include those maintained by CDID and privately owned stormwater ditches.

Habitat types in the Columbia River include the deepwater zone (deeper than -20 feet Columbia River Datum [CRD]), shallow water zone (0 to -20 feet CRD), and the active channel margin (ACM) (0 to +11.1 feet CRD) (Grette Associates 2014i).

The ACM includes the shoreline and nearshore edge habitat extending waterward from the ordinary high water mark out to a depth of 11.1 feet, based on an Ordinary High Water (OHW) of +11.1 feet Columbia River Datum (CRD).[5] In general, the shoreline adjacent to the aquatic study area is sparsely vegetated and consists of sandy substrate with little organic matter (Grette Associates 2014j). The shoreline is highly modified by extensive dikes and riprap armoring with scattered large woody debris, bordered by the riparian zone.

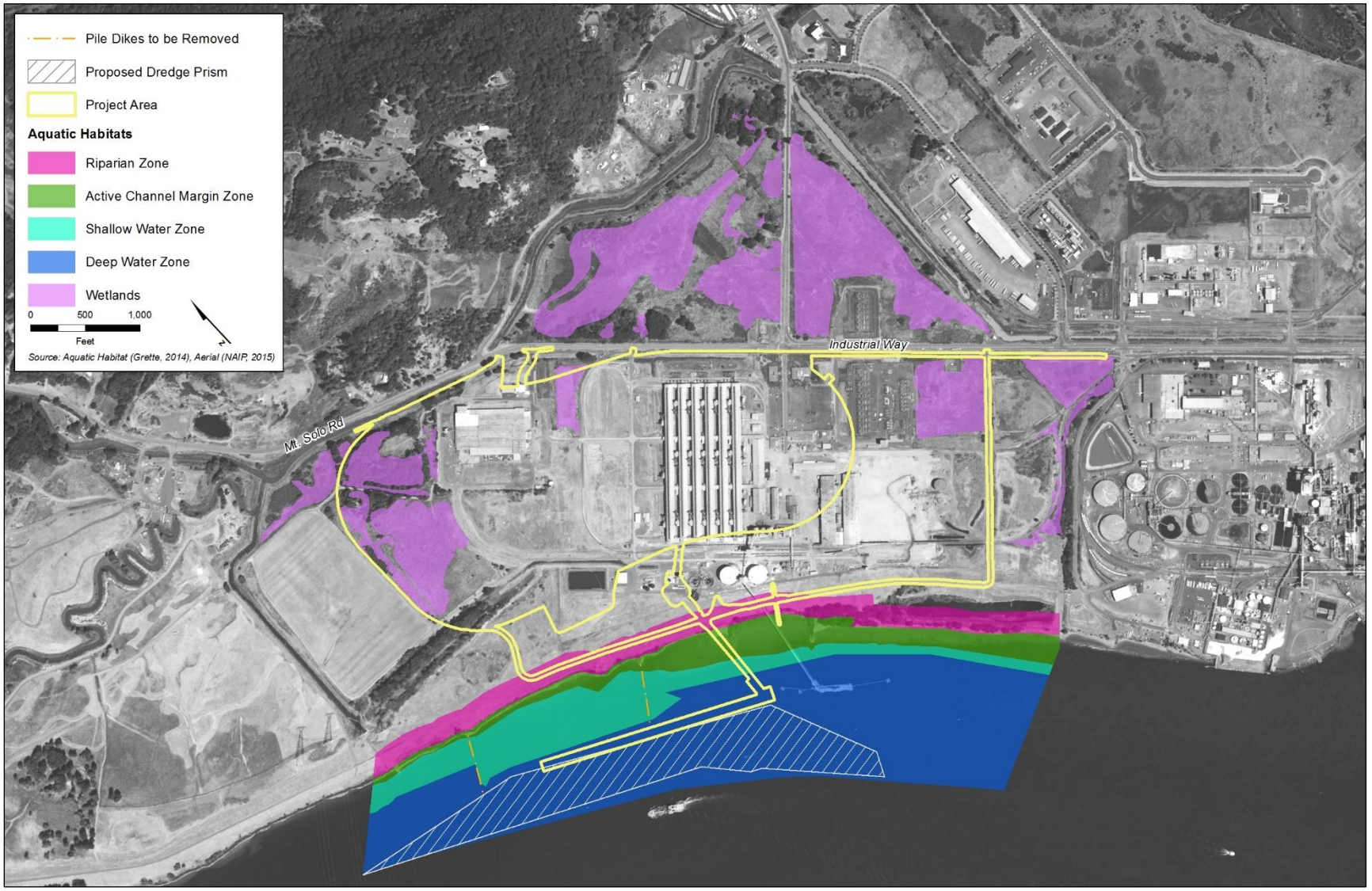
The bottom structure of the shallow water zone consists primarily (90%) of flat or shallow sloping substrate, with some moderate slopes out to depths of about 20 feet where the habitat becomes markedly steeper. There are two pile dikes and one overwater dock that extend into the shallow water zone (Figure 7). The substrates in the study area consist primarily of silty river sand with little organic matter. Little to no aquatic vegetation is expected in the shallow water zone, however, sparse vegetation could exist in the upper elevations where light could penetrate, and flow is reduced. Conditions in the shallow-water portion of the in-water footprint are narrow and more steeply sloped and are, therefore, unlikely to support aquatic vegetation (Grette Associates 2014j).

Benthic habitats in the deepwater portion of the aquatic study area are subjected to strong currents and reduced light penetration due to depth. Aquatic vegetation is not expected to occur in deepwater habitats and these areas are generally associated with low productivity.

Aquatic habitats of the Columbia River support pinnipeds, fish, birds, and a variety of invertebrates, many of which serve as forage for fish and bird species. Fish are discussed in the NEPA Fish Technical Report (ICF International 2016a). Smaller freshwater areas in the aquatic study area, such as ponds and ditches, could support common species of invertebrates and amphibians and could be used by small mammals and birds.

[5] Columbia River Datum (CRD) is a vertical datum that is the adopted fixed low water reference plane for the lower Columbia River. It is the plane of reference from which river stage is measured on the Columbia River form the lower Columbia River up to Bonneville Dam, and on the Willamette River up to Willamette Falls.

Figure 7. Aquatic Habitats for the On-Site Alternative



2.2.1.3 Wildlife

Wildlife includes terrestrial and marine mammals, birds, reptiles, amphibians, and invertebrates, including species that are currently protected or proposed for protection under the federal Endangered Species Act (ESA) or other federal and state regulations. Fish are discussed in the NEPA Fish Technical Report (ICF International 2016a).

Based on the data sources described in Section 2.1.1, *Impact Analysis*, wildlife likely to be found in both the terrestrial and aquatic study areas include common species of birds (waterfowl, raptors, shorebirds, marine birds, and passerine birds), rodents, frogs, salamanders, snakes, lizards, and invertebrates. Larger and highly mobile species of mammals that are habituated to disturbed environments could also be present in the study area, including coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*) and deer (*Odocoileus* sp.).

During the December site visit, two Columbian black-tailed deer (*Odocoileus hemionus columbianus*) were observed in the forested wetland area (Wetland A) at the northwest portion of project area, and two nutrias (*Myocastor coypus*) were observed on the sloped bank of the CDID Ditch 10, on the north side of Industrial Way. Other signs of mammal presence were observed during both site visits, including several unidentified small mammal scats, a coyote scat along the dike road, a beaver (*Castor canadensis*)-chewed tree in the riparian habitat along the Columbia River, and an unidentified species of sea lion heard barking from the Columbia River.

Several common bird species were recorded in the terrestrial study area during the site visits, including red-winged blackbird (*Agelaius phoeniceus*), sparrows (*sp*.), robins (*Turdus migratoius*) and other songbirds, American coot (*Fulica Americana*), bufflehead (*Bucephala albeola*), mallards (*Anas platyrhnchos*) and other unidentified ducks, Canada geese (*Branta Canadensis*), cormorants (*sp*.), scaup (*sp*.), gulls (*sp*.), and great blue heron (*Ardea herodias*). A turkey vulture (*Cathartes aura*), red-tailed hawk, kestrel (*Falco sparverius*), and bald eagle (*Haliaeetus leucocephalus*) were observed flying overhead. A small flock of Canada geese were also observed grazing on wetland grasses at the project area, and several unoccupied raptor nests were also observed in the forested habitat adjacent to the stormwater ditches on the southwest side of the project area and on an electrical tower near the west side of the dike road.

Grette Associates biologists conducted surveys for the federally threatened and state endangered streaked horned lark in the project area during the 2013 (July 12, 2013) and 2014 breeding season (May 15, June 11, and July 10, 2014). The focus of these surveys was to detect the presence of streaked horned lark; however, other bird species were recorded during the surveys (Table 4). A few of the bird species recorded during these surveys are also special-status species, which are addressed in more detail in Section 2.2.1.4, *Special-Status Wildlife Species*. Surveys were conducted in all areas of suitable streaked horned lark breeding habitat on the west side of the project area and immediately adjacent land (Grette Associates 2014k). Streaked horned lark are discussed further in Section 2.2.1.1, *Terrestrial Habitat*.

Table 4. Bird Species Observed at Project Area during 2013–2014 Surveys

Common Name	Scientific Name
Osprey	*Pandion haliaetus*
Red-tailed hawk	*Buteo jamaicensis*
Bald eagle	*Haliaeetus leucocephalus*
Northern harrier	*Circus cyaneus*
Great blue heron	*Ardea Herodias*
Canada goose	*Branta Canadensis*
Mallard	*Anas platyrhynchus*
Turkey vulture	*Cathartes aura*
Killdeer	*Charadrius vociferous*
Sandpiper	Scolopacidae
Common raven	*Corvus corax*
American crow	*Corvus brachyrhynchos*
Brewer's blackbird	*Euphagus cyanocephalus*
Red-winged blackbird	*Agelaius phoeniceus*
American robin	*Turdus migratorius*
European starling	*Sturnus vulgaris*
Lesser goldfinch	*Carduelis psaltria*
American goldfinch	*Spinus tristis*
Common yellowthroat	*Geothlypis trichas*
White-crowned sparrow	*Zonotrichia leucocephalus*
Savannah sparrow	*Passerculus sandwicensis*
Vesper sparrow	*Pooecetes gramineus*
Song sparrow	*Melospiza melodia*
Mourning dove	*Zenaida macroura*
Rock dove	*Columba livia*
Barn swallow	*Hirundo rustica*
Violet-green swallow	*Tachycineta thalassina*
Tree swallow	*Tachycineta bicolor*
Cliff swallow	*Petrochelidon pyrrhonota*
Western bluebird	*Sialia Mexicana*
Swainson's thrush	*Catharus ustulatus*
Purple martin	*Progne subis*
Black phoebe	*Sayornis nigricans*

Notes:
Source: Grette Associates 2014j, k

Wildlife likely to be found only in aquatic habitats include three species of pinnipeds, which could be present in the aquatic study area within the Columbia River: harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), and Steller sea lion (*Eumetopias jubatus*) (Jeffries et al. 2000). Because these marine mammals are all protected under the Marine Mammal Protection Act, they are described in more detail in Section 2.2.1.4, *Special-Status Wildlife Species*. Various bird species, including waterfowl, raptors, and shorebirds are supported by the Columbia River's aquatic habitats

in the aquatic study area, as well as numerous fish species. Freshwater insects and other invertebrate species (e.g., mollusks, crayfish) inhabit the upper layers of the benthos and provide forage for many species of fish and birds. Fish and their habitats, are discussed in the NEPA Fish Technical Report (ICF International 2016a).

2.2.1.4 Special-Status Wildlife Species

Special-status wildlife species are those listed as threatened, endangered, proposed for listing, or candidate species under the ESA or listed as a WDFW priority species.

Table 5 provides a list of special-status wildlife species that are likely to occur in the terrestrial or aquatic study areas. Some of the PHS listings are not for individuals of a species (PHS Criteria 1) but for vulnerable aggregations (PHS Criteria 2) of individuals, such as Western Washington nonbreeding concentrations. The likelihood of each species or vulnerable aggregation occurring in the terrestrial or aquatic study areas is listed as either *Yes* (known to occur), *Possibly* (likely to occur due to presence of suitable habitat but not documented), or *Unlikely* (individuals could occur in the study area but vulnerable aggregations are not documented in the PHS database) (Washington Department of Fish and Wildlife 2014). A complete list of all special status species that could occur in Cowlitz County is located in Appendix A, *Special-Status Wildlife Species in Cowlitz County,* including species that do not occur or are unlikely to occur in the terrestrial or aquatic study areas.

Table 5. Special-Status Wildlife Species that Could Occur in the Study Area—On-Site Alternative

Wildlife Species	Potential for Occurrence[a]	Potential Habitat	State Priority Species Criteria[b]	Federal Status[c]	State Status[d]
Mammals					
Columbian black-tailed deer (*Odocoileus hemionus columbianus*)	Yes	Species documented on project area. Limited habitat on project area. May use forested portions of terrestrial study area.	3	N/A	N/A
Columbian white-tailed deer (*Odocoilieus virginianus leucurus*)	Yes	Species documented on project area.[e] Limited forage and cover on project area. Suitable habitat available on Lord Island.	1	E	E
Harbor seal (*Phoca vitulina*)	Yes	Present in Columbia River	2	N/A	N/A
California sea lion (*Zalophus californianus*)	Yes	Present in Columbia River	2	N/A	N/A
Stellar Sea lion (*Eumetopias jubatus*)	Yes	Present in Columbia River	1, 2	SC	T

Wildlife Species	Potential for Occurrence[a]	Potential Habitat	State Priority Species Criteria[b]	Federal Status[c]	State Status[d]
Birds					
Streaked horned lark (*Eremophila alpestris strigata*)	Possibly	Not documented during surveys on project area. Potential suitable habitat on Lord Island.	1	T	E
Bald eagle (*Haliaeetus leucocephalus*)	Yes	Forested wetlands could provide roosting habitat. Suitable habitat on Lord Island.	1	SC	S
Peregrine falcon (*Falco peregrinus*)	Possibly	Potential foraging habitat	1	SC	S
Barrows Goldeneye (*Bucephala islandica*)	Possibly (Nonbreeding Concentrations Unlikely)	Open water	2, 3	N/A	N/A
Common Goldeneye (*Bucephala clangula*)	Possibly (Nonbreeding concentrations Unlikely[f])	Open water	2, 3	N/A	N/A
Bufflehead (*Bucephala albeola*)	Yes (Nonbreeding Concentrations Unlikely[f])	Open water	2, 3	N/A	N/A
Waterfowl concentrations	Yes	Suitable habitat documented in terrestrial and aquatic study areas.	2, 3	N/A	N/A
Vaux's swift (*Chaetura vauxi*)	Possibly	No large snags for nesting or roosting identified on project area but possible in terrestrial study area.	1	N/A	C
Pileated woodpecker (*Dryocopus pileatus*)	Possibly	Possible in forested habitat.	1	N/A	C
Purple martin (*Progne subis*)	Yes	Species documented in terrestrial study area, possible foraging habitat.	1	N/A	C

Notes:

[a] The likelihood of each species or vulnerable aggregations occurring in the terrestrial and aquatic study areas is listed as follows (Washington Department of Fish and Wildlife 2013).
- *Yes* (known to occur)
- *Possibly* (likely to occur due to presence of suitable habitat, but not documented)
- *Unlikely* (individuals may occur in the terrestrial or aquatic study areas but vulnerable aggregations are not documented in the PHS database).

[b] State PHS Species Criteria: 1 – State-listed or candidate species; 2 – Vulnerable aggregation; 3 – commercial, recreational, or tribal importance

[c] Federal Status under the U.S. Endangered Species Act:E = Endangered; T = Threatened; SC = Species of Concern

[d] State Status: E = Endangered; T = Threatened; C = Candidate; S = Sensitive

[e] Grette Associates 2014j

[f] Western Washington Nonbreeding Concentrations

[g] Willapa Hills Audubon Society 2014

Terrestrial Mammals

Columbian White-tailed Deer (*Odocoilieus virginianus leucurus*)

The Columbia River population of the Columbian white-tailed deer is a federal and state listed endangered species. The Columbia River population is one of only two extant populations in the United States (i.e., the lower Columbia River population and the Douglas County population). The lower Columbia River population occurs in Wahkiakum and Cowlitz Counties, Washington, and Clatsop and Columbia Counties, Oregon. The other, in Douglas County Oregon, was delisted by USFWS in 2003, when population recovery goals were attained. The Columbia River population inhabits the Lower Columbia River floodplain and islands within the river channel. The current range of the Columbian white-tailed deer overlaps with the study area, including Barlow Point and Fisher, Walker, and Lord Islands (Washington Department of Fish and Wildlife 2013). The current population is estimated at 582 deer (Washington Department of Fish and Wildlife 2013).

WDFW has identified specific locations along the Columbia River for recovery (Washington Department of Fish and Wildlife 2013) based on the availability of secure habitat. The nearest recovery location to the study area is the upper estuary islands downstream of Longview (Figure 4), which includes Fisher, Hump, Lord, and Walker Islands (Washington Department of Fish and Wildlife 2013). Lord Island is approximately 0.5 mile from the project area and is visible from and directly across the Columbia River channel. Although 66 individuals have been translocated to these islands to date, WDFW estimates the population on these four islands totals only 10 deer (Washington Department of Fish and Wildlife 2013).

Historically, the Columbia River population has inhabited the river bottomlands, where riparian habitat dominated by Sitka spruce, alder, cottonwood, and willow provided a desirable mix of cover and forage (U.S. Fish and Wildlife Service 1983). The Columbia River floodplain has been drastically altered from historic times, with diking, road building, and conversion of forestlands to pasturelands among the most prominent changes. Although deer will forage in maintained pastures (U.S. Fish and Wildlife Service 1983), studies on the Julia Butler Hanson National Wildlife Refuge in the 1970s show that deer preferred to forage where vegetation was over 70 centimeters high and rarely foraged greater than 250 meters from woodland cover (U.S. Fish and Wildlife Service 1983).

Because of its proximity to the upper estuary islands and Barlow Point, portions of the study area could be occupied by the upper estuary islands subpopulation of Columbia River Columbian white-tailed deer. On the project area, cover habitat is limited to the forested wetland in the northwest portion of the site. Industrial Way separates this forested patch from other cover habitat within the study area located further north. Most of the “forage” habitat on the project area and within the study area consists of managed herbaceous habitat, where mowed grasses are less than 70 centimeters high. In spite of this, Columbia white-tailed deer have been observed on the project area (Grette Associates 2014j). While the project area does not provide optimal habitat conditions, the presence of white-tailed deer on the site has been documented. Occurrences within the study area have been documented in the PHS database (Washington Department of Fish and Wildlife 2014).

Columbian Black-tailed Deer (*Odocoileus hemionus columbianus*)

Unlike the endangered Columbian white-tailed deer that inhabit the river bottoms, black-tailed deer use upland slopes and closed-canopy coniferous forests. They require a mix of forest and openings for cover and forage, and browse on common shrubs and trees such as vine maple, red alder, and serviceberry (Washington Department of Fish and Wildlife 2014). Columbian black-tailed deer have

been observed on the project area. The high level of human activity on the site, lack of well-distributed cover and forage areas, and general lack of preferred habitat (coniferous forest with brushy openings), indicate that the site could be used for travel, migration, and resting, but is not suitable for supporting a black-tailed deer population. The nearest black-tailed deer population documented by WDFW (as cited in Grette Associates 2014j) is 10 miles from the project area.

Birds

Streaked Horned Lark (*Eremophila alpestris strigata*)

The streaked horned lark is a federally threatened and state endangered species. The Pacific Northwest subspecies was once widespread throughout western Washington, Oregon, and British Columbia. Due primarily to habitat loss, this subspecies now breeds and winters over a fraction of its former range. USFWS estimated the overall population of streaked horned larks between 1,170 and 1,610 individuals, and listed the species as threatened on October 3, 2013 (U.S. Fish and Wildlife Service 2012, 2013).

The breeding range for this species historically ranged from southern British Columbia south through the Puget lowlands; Washington Coast; Lower Columbia River, Willamette, Rogue and Umpqua River valleys; and the Oregon Coast (U.S. Fish and Wildlife Service 2012). It has been eliminated as a breeding species from at least half of that range and is no longer found in southern British Columbia, the San Juan Islands, the northern Puget Trough, the Washington coast north of Grays Harbor, the Oregon coast, and the Rogue and Umpqua River valleys in Oregon (Pearson and Altman 2005; U.S. Fish and Wildlife Service 2012).

Historic breeding range consisted primarily of prairie and open coastal habitats (Pearson and Altman 2005). Over the past 150 years, prairie lands in Washington and Oregon have declined by 90% to 95% (U.S. Fish and Wildlife Service 2012). Streaked horned larks are now found nesting in both traditional and some nontraditional habitats, including agricultural fields, wetland mudflats, Christmas tree farms, gravel roads, airports, and dredge deposition sites in the Lower Columbia River (U.S. Fish and Wildlife Service 2012; Pearson and Altman 2005). Active establishment of territories and breeding occurs from late March until early August. During this time, streaked horned larks are susceptible to human activities that can jeopardize successful nesting. Human activities can disturb larks by causing them to become alert, fly, or directly destroy their nests. These activities include moving vehicles, gatherings of people and/or vehicles, fireworks, dog walking, flying model airplanes, construction activities, and mowing. Disruptive activities that keep larks away from their nests for more than one hour could result in nest abandonment. In general, activities occurring within approximately 100 feet (30 meters) are more likely to cause larks to flush than activities located farther away (Pearson and Altman 2005).

Streaked horned larks prefer wide-open spaces characterized by flat, treeless landscapes of 300 acres or more, sparse grass/forb vegetation, and few or no shrubs. They will use smaller habitat patches if there is an adjacent open landscape, such as agricultural fields or water (U.S. Fish and Wildlife Service 2012). In the Lower Columbia River, they were historically known to nest on sandy beaches and spits. Now, they can be found nesting on dredge spoil depositions, which provide the open expanses of bare ground preferred by this species. At the project area and in the study area, a few small areas containing potentially suitable habitat (low vegetative cover and no woody vegetation) are adjacent to the Columbia River: near the closed Reynolds landfill and along the edges

of roadbeds. These areas are regularly disturbed by maintenance (mowing) and operations (Grette Associates 2014j, k).

Adult streaked horned larks feed mainly on grass and weed seeds, but could feed insects to their young (U.S. Fish and Wildlife Service 2012). They typically establish nests in areas of extensive bare ground next to a clump of bunchgrass (U.S. Fish and Wildlife Service 2012). Habitat within the study area contains extensive areas of short (mowed) grass and forb vegetation, but relatively little bare ground and even less undisturbed vegetation as most of the grass/forb areas are maintained by mowing.

Critical habitat has been designated for the streaked horn lark, but none of these designated areas are in the terrestrial study area. All critical habitat areas within the Lower Columbia River are located downstream from the study area, with the exception of one area. The closest designated critical habitat is on Crims Island, approximately 5 miles downstream of the direct impact terrestrial study area for the On-Site Alternative. The only critical habitat upstream of the study area is on Sandy Island, Columbia County, Oregon at river mile 76, approximately 13 miles upriver of the direct impact terrestrial study area for the On-Site Alternative (U.S. Fish and Wildlife Service 2012).

Grette Associates biologists conducted surveys for streaked horned larks in the project area during the breeding season in 2013 (July 12, 2013) and 2014 (May 15, June 11, and July 10, 2014). The surveys were conducted within the open, grassy areas that most closely resemble streaked horned lark habitat onsite. No streaked horned larks were observed during the surveys (Grette Associates 2014j, k). Standardized monitoring protocols were developed by WDFW for streaked horned larks, which require surveys on 3 separate days during the breeding season (Washington Department of Fish and Wildlife 2013).

Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles nest and forage for fish along the Lower Columbia River. They build their nests in the tops of large trees, typically using the nests year after year. Nests could weigh up to 0.5 ton and span 10 feet in diameter (U.S. Fish and Wildlife Service 2007). There are no documented bald eagle nests in the study area and no suitable nesting habitat in the project area. The nearest documented nest sites are located approximately 2 miles downstream and 4 miles upstream of the study area (Washington Department of Fish and Wildlife 2014). The study area provides foraging habitat for this species. Bald eagles could perch in riparian vegetation or manmade structures over the water to forage for fish. Salmon and other fish within the Columbia River provide an important source of food for this species. Lord Island also provides suitable habitat for bald eagles (Pacific Coast Joint Venture 1994).

Bald eagles were observed soaring over the study area during the April 8, 2014 site visit. Bald eagles were also observed in the study area during the July 12, 2013 streaked horned lark surveys (Grette Associates 2014j).

Peregrine Falcon (*Falco peregrinus*)

Peregrine falcons nest on cliff ledges but also use tall manmade structures such as bridges, overpasses, buildings, and power plants (Oregon Department of Transportation undated). They prey primarily on other birds, including songbirds, shorebirds, ducks, pigeons, and starlings (Washington Department of Fish and Wildlife 2013). The nearest documented nest location is approximately 3 miles south of the study area (Washington Department of Fish and Wildlife 2014). A study of

peregrines nesting in quarries in Ireland found that peregrines will use industrial areas if nesting requirements are met and sufficient prey is available (Moore et al. 1997). Peregrine falcons nesting within a few miles of the study area could potentially use the study area for foraging.

Waterfowl

Nonbreeding concentrations of Barrows goldeneye (*Bucephala islandica*), common goldeneye (*B. clangula*), and bufflehead (*B. albeola*) are considered priority species (vulnerable aggregation) by WDFW. A few individual bufflehead were observed resting on open water (both in wetlands and on the Columbia River) in the study area during the April 8, 2013 site visit. However, within the study area there are no vulnerable concentrations of waterfowl documented by WDFW in the PHS database (Washington Department of Fish and Wildlife 2014). The nearest documented vulnerable concentration is located approximately 0.25 mile north of the study area, east of Willow Grove. Lord Island and adjoining Walker Island support waterfowl and suitable habitat is located just outside of the study area in the tidal marsh area between the islands south of the sand spit (Pacific Coast Joint Venture 1994). This area provides foraging and resting habitat for waterfowl and has been previously documented as supporting significant numbers of wintering ducks and geese (Pacific Coast Joint Venture 1994). Within the study area (Figure 4), Lord Island is documented in the PHS database as supporting nesting Canada goose (Washington Department of Fish and Wildlife 2014).

Purple Martin (*Progne subis*)

The purple martin is a state-listed species of concern. Purple martins were observed on the project area during the streaked horned lark surveys in July 2013 (Grette Associates 2014j). Several nest sites are documented in the Coal Creek Slough, approximately 3 to 4 miles downstream of the study area (Washington Department of Fish and Wildlife 2014). Purple martin nest in natural cavities found in tree snags and crevices, as well as in artificial nest boxes and gourds provided by humans for this purpose (Washington Department of Fish and Wildlife 2014). Nesting habitat is unlikely on the project area; however, other forested areas in the study area could contain this habitat. Purple martins forage for insects while in flight and individuals could occasionally use the study area for this purpose. However, they are more likely to use areas such as Coal Creek Slough, where insect concentrations would be more abundant in herbaceous wetlands, forests, or marshes (Grette Associates 2014j).

Vaux's Swift (*Chaetura vauxi*)

The Vaux's swift is a state candidate species. They are summer (June to mid-August) residents in Washington, migrating north to Washington during the spring (April to late May) and south during the fall (mid-August to late September). They spend winters in central Mexico, Central America, and Venezuela. The species has a strong association with old-growth coniferous forests, using large hollowed-out trees and snags for nesting and roosting. They spend the majority of their day foraging in the air for flying insects over forests, grasslands, and aquatic habitats (Washington Department of Fish and Wildlife 2013). There is no suitable nesting or roosting habitat on the project area; however, other forested areas in the study area could contain suitable habitat. Vaux's swifts may fly through the study area during migrations or while foraging. They are commonly observed at the Mint Farm (Willapa Hills Audubon Society 2014) east of the study area (Figure 4).

Pileated Woodpecker (*Dryocopus pileatus*)

Pileated woodpeckers inhabit mature deciduous or mixed deciduous-coniferous forests. They are also found in younger forests containing scattered, large, dead trees or decaying, downed wood, and in suburban areas containing large trees and woodland patches. Dead wood is an important component of their habitat, including snags, stumps, and downed logs. They forage for insects in the bark and use snags or dead branches of live trees for nesting (Cornell Lab of Ornithology 2015). There is no suitable nesting habitat in the project area. Limited foraging habitat could be available in the forested areas onsite. Forested portions of the study area could contain suitable habitat for nesting and foraging.

Marine Mammals

Pinnipeds

Three species of pinniped are found in the Lower Columbia River in the study area: California sea lions (*Zalophus californianus*), Steller sea lions (*Eumetopias jubatus*), and harbor seals (*Phoca vitulina*). Sea lions use the Lower Columbia River for foraging on fish and resting at haulout sites. Breeding areas (both mating rookeries and pupping sites) for California sea lions are located in California and Mexico. Only males are present in the Columbia River and primarily during the nonbreeding season, fall through spring (Jeffries et al. 2000). Steller sea lions in Washington come from rookeries in Oregon and British Columbia, but pupping sites have increased along the outer Washington Coast in recent years (Washington Department of Fish and Wildlife 2013). Breeding does not occur in the Columbia River, thus, Steller sea lions are primarily present during the nonbreeding season.

Since 2002, California and Steller sea lions have greatly increased in abundance below the Bonneville Dam, which is approximately 80 miles upstream of the study area. Migrating salmon and steelhead collect in a bottleneck below the dam, providing an abundant source of food for the sea lions (Washington Department of Fish and Wildlife 2013).

Sea lions use jetties, shoals, concrete slabs, rock rubble, marina floats, log booms, and other manmade structures as haulout sites along the Columbia River. Surveys conducted in the 1990s identified four haulout sites used by sea lions between the mouth of the Columbia River and its confluence with the Cowlitz River (Jeffries et al. 2000), which is approximately 4.5 miles upstream of the project area. There are no documented sea lion haulout sites in the study area, but individuals likely swim through the study area as they migrate up and down the Columbia River. The nearest California sea lion haulout site to the project area is near the mouth of the Cowlitz River (Washington Department of Fish and Wildlife 2014), approximately 1 mile upstream of the study area. The nearest Steller sea lion haulout site to the project area is approximately 48 miles downstream in the east mooring basin in Astoria, Oregon (Jeffries et al. 2000).

Harbor seals are the most numerous of the pinnipeds found in Washington waters. Like sea lions, they forage and rest along the Lower Columbia River, with dozens of haulout sites identified between the mouth of the river and the study area. Harbor seals use shoals, beaches, sandbars on islands, and the main shoreline as haulouts (Jeffries et al. 2000). There are no documented seal haulout sites in the study area, but individuals swim through the study area as they migrate up and down the Columbia River. The nearest haulout site to the study area is approximately 1 mile upstream from the study area at Carroll Slough, near the confluence of the Columbia and Cowlitz Rivers (Washington Department of Fish and Wildlife 2014). Harbor seal breeding and pupping takes

place in the Columbia River estuary and nursery areas are present downstream from the study area in Cathlamet Bay. Haulouts located further upriver are used primarily in the winter and spring (Jeffries et al. 2000).

Pinniped use and abundance in the study area is expected to vary seasonally as they transit between areas of known use at the mouth of the Columbia River, haulout sites upstream of the study area, and foraging areas farther upstream at the Bonneville Dam. For California sea lions, seasonal use is largely informed by the annual U.S. Army Corps of Engineers pinniped observation program at the Bonneville Dam during salmonid fish passage season (typically January through May, with some observations as early as August). This Corps program began in 2002 and is scheduled to end in 2016. California sea lions typically are not observed at the dam prior to January; they have been observed foraging below Bonneville Dam in very low numbers as early as August. Harbor seals are relatively rare at Bonneville Dam, but are known to haul out at a number of other locations upstream of the study area.

4.8.1.1 Vessel Corridor in the Lower Columbia River

The indirect study area includes wildlife habitats along the vessel corridor in the lower Columbia River.

Vessel Corridor

Forest and shrublands are the most prevalent terrestrial wildlife habitats in the Lower Columbia River, along the route vessels transiting to/from the project areas will navigate. Other habitats common along the Lower Columbia River include intertidal wetlands, coastal dunes, and mudflats. These habitats also support a diverse variety of wildlife species, including terrestrial wildlife species listed as either threatened or endangered under the federal ESA.

2.2.2 Off-Site Alternative

The project area for the Off-Site Alternative is located at approximately river mile 61 on the Columbia River in Cowlitz County, downstream and adjacent to the project area for the On-Site Alternative. The project area is located mostly within Longview city limits and encompasses approximately 277 acres. Historically, the project area contained a combination of meadow, wetland, floodplain, and riparian forest associated with the Columbia River. As Longview began to develop, the habitat was modified. A system of levees and dikes was developed in the 1920s by CDID #1 for flood protection.

2.2.2.1 Wildlife Habitat

Terrestrial and aquatic habitats in the study area are described below.

Terrestrial Habitat

Terrestrial habitat types found in the study area are characterized by their main land cover classification and dominant form of vegetation as described in Section 2.2.1, *Project Area for the On-Site Alternative*, and described in detail in the NEPA Vegetation Technical Report (ICF International 2016c). Habitat types present in the study area include developed (disturbed), upland (forested, scrub-shrub, herbaceous, and managed herbaceous), wetland (forested, scrub-shrub, herbaceous,

managed herbaceous, and disturbed), and riparian (forested and scrub-shrub). Terrestrial habitats characterized on the project area are displayed in Figure 8.

Project Area

The project area for the Off-Site Alternative is located on previously disturbed lands adjacent to upstream industrial developments. Prior to 2000, the project area was used primarily for agriculture and grazing and a small portion of the site continues to be used for agricultural activities. In the northwest portion of the site, there is a small developed area containing an agricultural building (likely a pole barn) surrounded by areas where the vegetation has been disturbed. In approximately 2003, less than one-fifth of the site was developed into a motocross track consisting of several winding dirt tracks, dirt roads, a drag strip, and buildings. This area is currently undeveloped; buildings associated with the motocross trails are no longer present and vegetation on the property is mostly overgrown, consisting of dense shrub vegetation and grassy areas that extend to the shoreline. The majority of the site consists of herbaceous habitat.

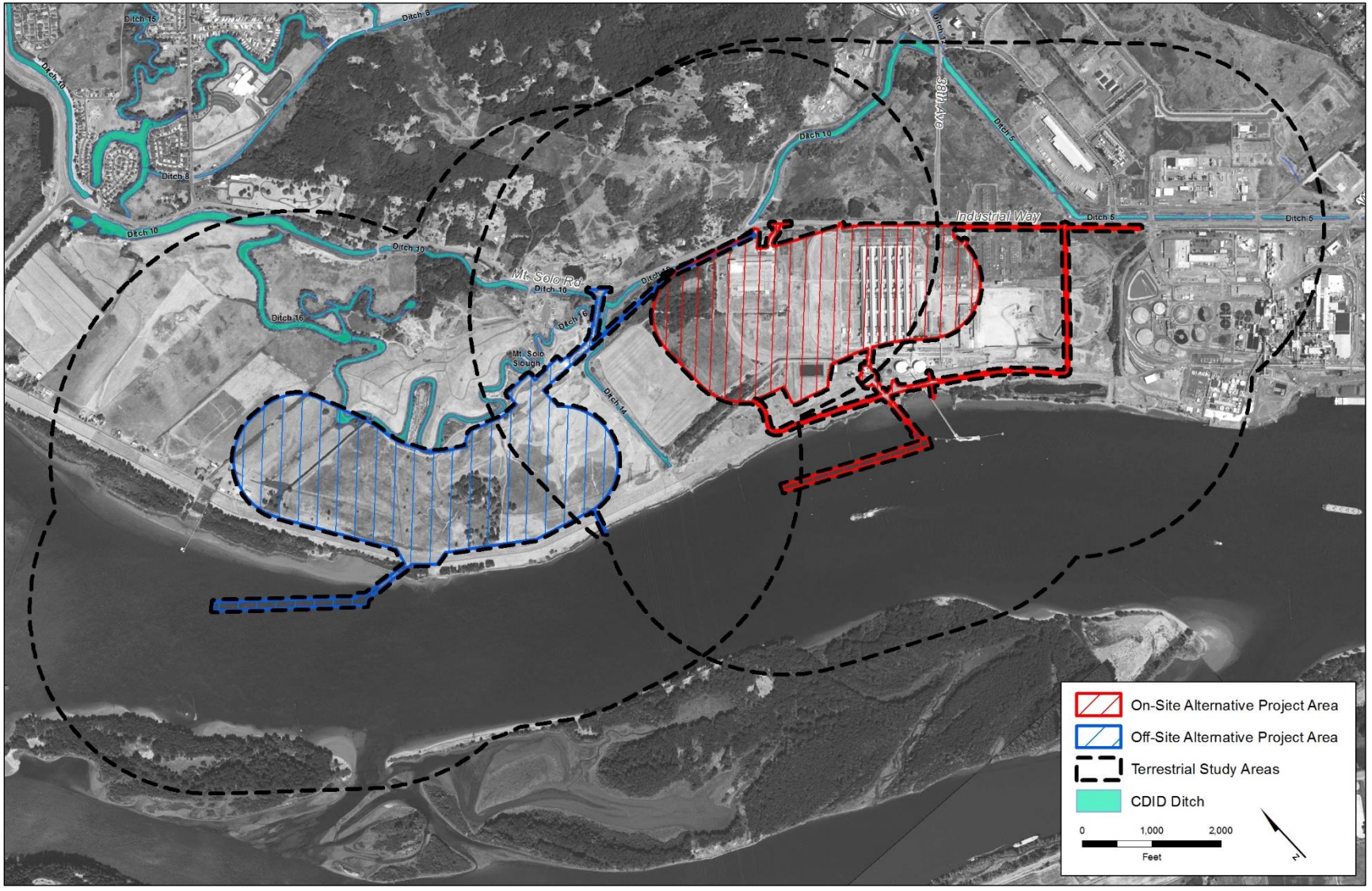
At the northern end of the project area, the habitat is predominantly herbaceous uplands with smaller herbaceous seasonal wetlands. This habitat supports waterfowl and has been documented in the PHS database as supporting regular concentrations of wintering waterfowl, including Canada Geese (Washington Department of Fish and Wildlife 2014). Other wildlife that could be supported by herbaceous habitats at the site includes foraging and cover for small to large mammals and foraging by raptors.

The majority of wetland habitats on the project area is in the southern part of the site and includes both forested and herbaceous wetland areas. The forested wetlands are dominated by deciduous trees, particularly black cottonwood (*Populus balsamifera*), and the herbaceous wetlands are dominated by reed canarygrass (*Phalaris arundinacea*). Wetlands on the project area likely support foraging and cover for small to large mammals, foraging and nesting for raptors, waterfowl, and passerine birds, and foraging, breeding, and nesting for amphibians (Grette Associates 2014i, l).

Study Area

The study area includes lands both up- and downstream from the project area, areas landward from the site (north/northeast), a strip of land between the project area and the Columbia River, and Walker Island. Approximately one-half of the peripheral lands in the study area for the Off-Site Alternative overlap with the study area for the On-Site Alternative (Section 2.2.1, *Project Area for the On-Site Alternative*). A large portion of the landward study area habitats overlap with the study area for the On-Site Alternative (Section 2.2.1, *On-Site Alternative*). In addition to these previously described landward habitats is the Mount Solo Landfill, located adjacent to the project area. The landfill habitat is classified as disturbed and likely to provide some wildlife habitat, including foraging and cover for small to large mammals, and foraging for bird species, including raptors and waterfowl.

Figure 8. Terrestrial Habitats in the On-Site and Off-Site Alternative Project Areas



Upstream habitats are described in Section 2.2.1.1, *Terrestrial Habitat*. Downstream habitats are similar to those described at the downstream end of the project area, consisting of herbaceous agricultural fields that support regular concentrations of wintering waterfowl (Washington Department of Fish and Wildlife 2014), foraging and cover for small to large mammals, and foraging for raptors. There is a small disturbed area close to the Columbia River containing houses and other small buildings associated with the residences and agricultural fields. A levee with managed herbaceous vegetation spans the length of the study area.

The riparian area in the downstream portion of the study area is dominated by densely forested trees and shrubs and likely provides high-quality habitat for wildlife. Moving upstream, the riparian area transitions to scrub-shrub habitat and is more sparsely vegetated. Support for wildlife in the riparian area includes foraging and cover for small and large mammals, foraging and nesting for waterfowl, raptors, and passerine birds, and foraging, breeding and nesting for amphibians.

Walker Island is located offshore from the project area in the Columbia River (Figure 6). The island was previously used for dredged-material disposal; however, it contains high-quality habitat for wildlife. Walker Island is predominantly forested and connects upstream to Lord Island by a narrow sand bar. An embayment between the two islands contains a tidal marsh and shallows. This area provides foraging and resting habitat for waterfowl and has been previously documented as supporting significant numbers of wintering ducks and geese (Pacific Coast Joint Venture 1994). Walker Island has been documented by WDFW as supporting nesting Canada Geese (Washington Department of Fish and Wildlife 2014). Columbian white-tailed deer have not been documented on this island; however, suitable habitat is present for this species. Additional wildlife species supported by Walker Island include mammals, birds (raptors and passerine), amphibians, and reptiles.

Aquatic Habitat

Aquatic habitats include wetlands (refer to Section 5.3, *Wetlands*, in the Draft EIS for more information), the Columbia River, and smaller open-water areas, such as ponds and drainage ditches, throughout the study area.

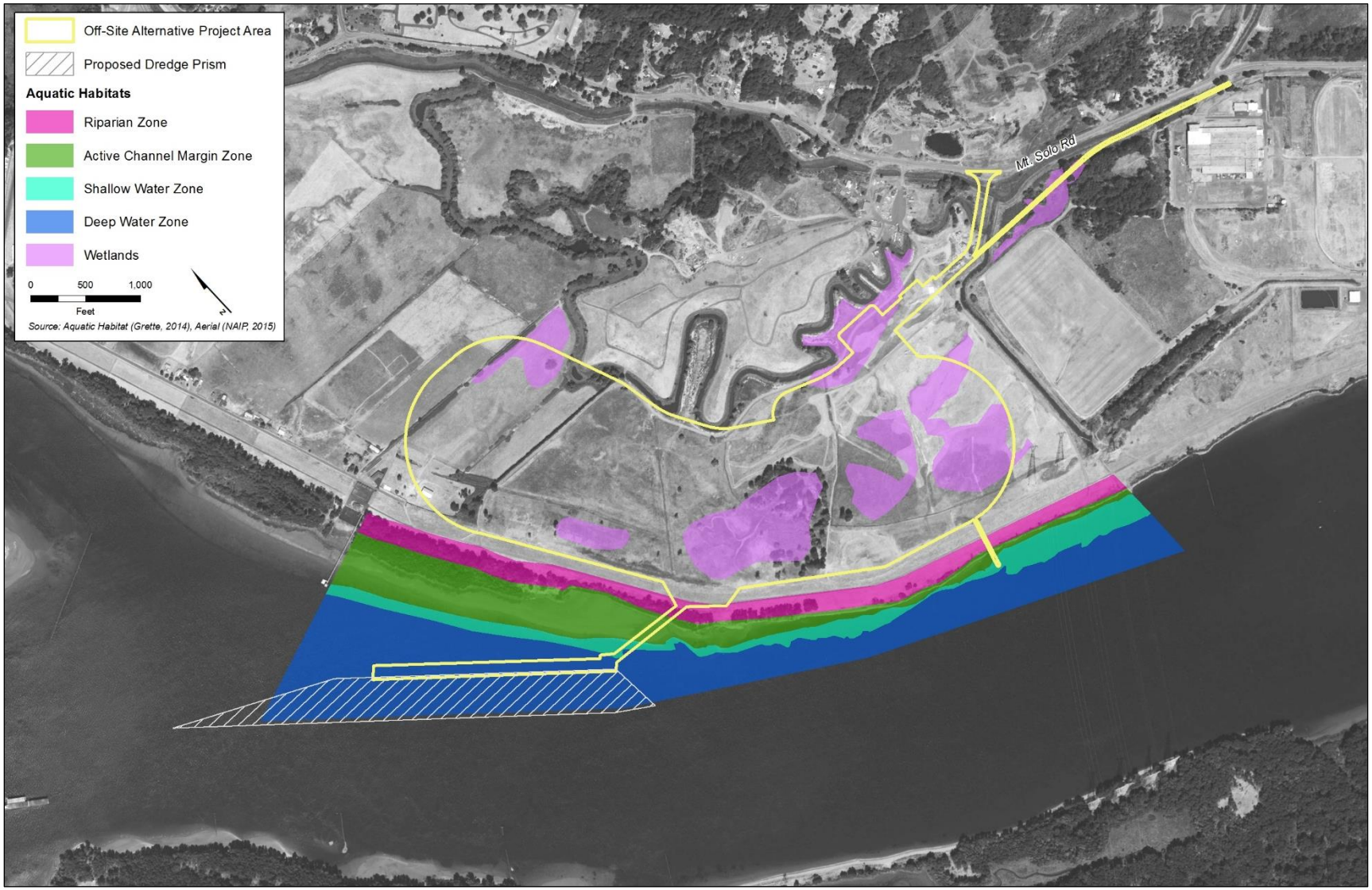
The majority of wetland habitats in the project area are in the southern portion of the project area, and include both forested and herbaceous wetland areas. Wetlands in the project area likely support foraging and cover for small to large mammals, foraging and nesting for a variety of birds, and foraging, breeding, and nesting for amphibians (Grette Associates 2014f, and 2014l).

Habitat types in the Columbia River are described in Section 2.2.1.1, *Terrestrial Habitat*, and include the deep-water zone, shallow-water zone, and the ACM (Figure 9).

Much of the ACM adjacent to the project area is modified with shoreline armoring and the dike that extends the length of the shoreline (Grette Associates 2014f).

The bottom structure of the shallow-water zone varies from steep at the downstream end to flat at the upstream end. Substrates in this area consist of silty river sand. Similar to the project area for the On-Site Alternative, little to no aquatic vegetation is expected; however, sparse vegetation could exist in the upper elevations where light could penetrate and flow is reduced (Grette Associates 2014f).

Figure 9. Aquatic Habitats for the Off-Site Alternative



Benthic habitats in the deep-water portion of the study area for the Off-Site Alternative are similar to those in the study area for the On-Site Alternative. They are subjected to strong currents and reduced-light penetration due to depth. Aquatic vegetation is not expected to occur in deep-water habitats and these areas are generally associated with low productivity.

Aquatic habitats of the Columbia River support pinnipeds, fish, birds, and a variety of invertebrates, many of which serve as forage for fish and bird species. Fish are discussed in the NEPA Fish Technical Report (ICF International 2016a).

Smaller open-water areas, such as ponds and drainage ditches, could support common species of invertebrates and amphibians and could be used by small mammals and birds.

2.2.2.2 Wildlife

The project area for the Off-Site Alternative is adjacent to the project area for the On-Site Alternative and the two study areas overlap. Due to its proximity and similar habitat types and characteristics, wildlife species that could occur in the study area for the Off-Site Alternative are expected to be similar to those described for the On-Site Alternative (Section 2.2.1, *On-Site Alternative*).

The following species were documented on the project area. During the December 12, 2014 site visit to adjacent Mount Solo Landfill, a few bird species were observed through binoculars at the project area: a red-tailed hawk was seen flying over the site; a great blue heron was observed in the herbaceous habitat at the south end of the site; and mallards were observed in the drainage ditch that meanders through the site. An unoccupied raptor nest was observed within the forested wetland habitat.

Columbian white-tailed deer have been documented on the project area (Washington Department of Fish and Wildlife 2014).

2.2.2.3 Special-Status Wildlife Species

Special-status wildlife species described in this section are those listed as threatened, endangered, proposed, or candidate species under the ESA or listed as a WDFW priority species. Descriptions of special-status wildlife species that could occur in the study area for the Off-Site Alternative are the same as those described for the On-Site Alternative (Section 2.2.1.3, *Wildlife*).

Table 5 contains a list of special-status wildlife species that are likely to occur in the study area. Some of the PHS listings are not for individuals of a species (PHS Criteria 1) but for vulnerable aggregations (PHS Criteria 2) of individuals, such as Western Washington nonbreeding concentrations. The likelihood of each species or vulnerable aggregation occurring in the study area is listed as either *Yes* (known to occur), *Possibly* (likely to occur due to presence of suitable habitat but not documented), or *Unlikely* (individuals are known to occur or possibly occur in the study area but vulnerable concentrations are not documented in the PHS database [Washington Department of Fish and Wildlife 2014]). A listing of *No* does not mean individuals of that species could not occur in the study area; it only signifies there are no documented vulnerable concentrations.

Chapter 3
Impacts

This chapter describes the impacts on wildlife that would result from construction and operations of the proposed export terminal.

3.1 On-Site Alternative

This section describes the impacts on wildlife and their habitat that could result from the proposed export terminal at the On-Site Alternative location.

The following construction activities could affect wildlife.

- Permanent removal of habitat and wildlife displacement or mortality in terrestrial and aquatic habitats associated with clearing and construction of the export terminal.
- Noise impacts and visual disturbance on terrestrial and aquatic wildlife associated with operation of construction equipment, general construction related noise and pile driving.
- Spills and leaks associated with the use of construction equipment and materials.

The following operation activities could affect wildlife.

- Noise impacts on wildlife associated with operations such as train movements, managing the coal stockpile, transfer of coal to vessels, and general industrial operations.
- Spills and leaks from trains, vehicles, or equipment.
- Vessel strikes of marine mammals.
- Underwater vessel noise impacts on pinnipeds and diving birds.
- Removal of benthic habitat during maintenance dredging impacting wildlife and habitat.
- Coal dust deposition affecting terrestrial, wetland, and aquatic habitats and wildlife.

3.1.1 Construction: Direct Impacts

Construction of the On-Site Alternative would result in the following direct impacts.

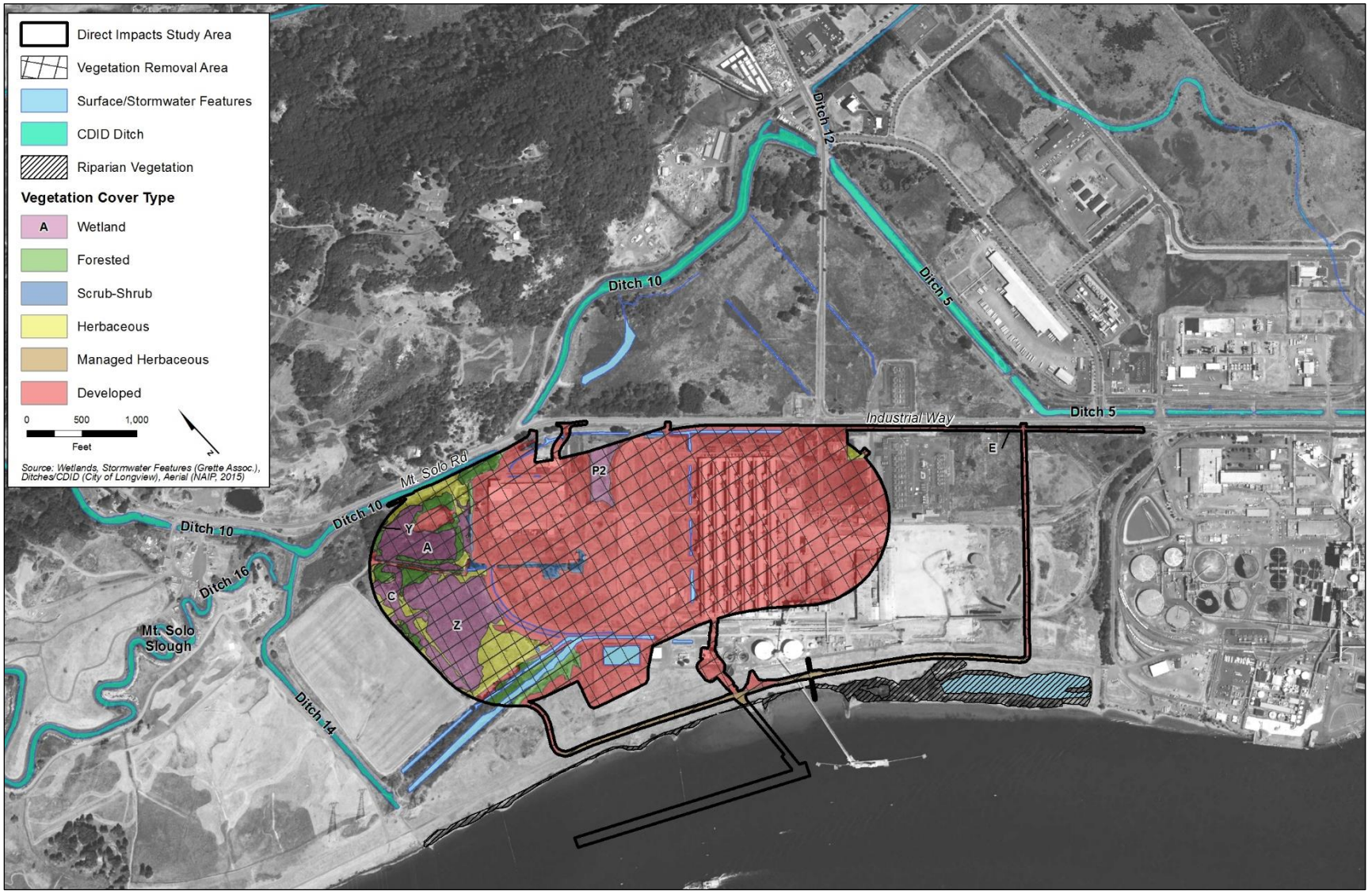
3.1.1.1 Permanent Impacts on Terrestrial Habitat and Wildlife

Permanently Remove Habitat and Cause Associated Wildlife Mortality

Construction of the On-Site Alternative would result in the permanent removal of wildlife habitat within the limits of the project area.

A total of 201.5 terrestrial acres would be permanently removed during construction grading and clearing activities (Figure 10). The majority (151.14 acres) of these impacts would occur in previously developed lands in which industrial buildings, pavement, and infrastructure currently exist with scattered areas of vegetation surrounding the developed areas, or sparsely

Figure 10. Existing Land and Vegetation Cover Types Affected during Construction



vegetated areas that previously served as material storage or disposal sites associated with past industrial uses of the property. In general, these developed lands provide degraded wildlife habitat conditions that do not provide suitable habitat for many species of wildlife, but may support bats, birds, rodents, and insects.

Construction of the On-Site Alternative would result in the permanent loss of 26.26 acres of upland and 24.10 acres of wetland habitats containing forested, herbaceous, managed herbaceous, and scrub-shrub vegetation and a small area (0.05 acre) of forested riparian habitat (Table 6). Animals inhabiting these areas could be displaced to other habitats outside of the project area and mortality of some less mobile individual species could occur. Highly mobile wildlife species, such as larger mammals and birds, would likely leave the terrestrial study area for the On-Site Alternative during construction activities. Some mortality of less mobile species could occur, such as burrowing mammals, reptiles, amphibians and insects. Typically, these species reproduce rapidly and any losses due to mortality would not be expected to affect the viability or fitness of the species at the population scale.

Table 6. Permanent Direct Impacts by Terrestrial Habitat Type in the Project Area—On-Site Alternative

Habitat Type	Direct Impact Area (acres)
Disturbed	151.14
Developed	*151.14*
Riparian	0.05
Forested	*0.05*
Upland	26.26
Forested	*8.90*
Herbaceous	*10.88*
Managed Herbaceous	*4.37*
Scrub-Shrub	*2.11*
Wetland	24.10
Total	**201.5**

3.1.1.2 Temporary Impacts on Wildlife Habitat

Construction activities could temporarily affect wildlife habitat adjacent to the project area, including riparian vegetation along the shoreline of the Columbia River. Temporary disturbance could occur through soil disturbance, stockpiling, and erosion. These disturbances could temporarily increase total suspended sediments in the Columbia River and freshwater ditches on and adjacent to the project area. The potential for these types of impacts would be avoided or greatly reduced given protective measures to guard against these risks, including construction best management practices, avoidance and minimization measures, and regulatory requirements, such as those associated with 401 Water Quality Certification and hydraulic project approval that would be required for the On-Site Alternative. The NEPA Water Quality Technical Report (ICF International 2016d) includes a detailed discussion on the potential impacts on water quality associated with the On-Site Alternative.

Displace Wildlife

Construction of the On-Site Alternative would be limited to the project area, including the aquatic portions of the project area. Aquatic and terrestrial wildlife species present in the project area could be at risk of displacement during construction activities. Wildlife present at the project area during construction could be displaced from increased human activity, elevated underwater and terrestrial noise levels, and/or ground-disturbing activities.

Approximately 71% or 151 acres of the project area is currently developed and many species of wildlife would likely not be present in these areas due to the lack of suitable habitat. The areas of the project area that are vegetated and could provide suitable habitat (approximately 50 acres) are generally degraded because of past industrial uses of the property. Although construction could affect a relatively small area of potentially suitable but degraded habitat, most wildlife species are mobile; construction activities could result in the displacement. The On-Site Alternative would be consistent with the general character and land uses of surrounding areas, particularly the shoreline within the study area. Other heavy industrial sites are located along the shoreline to the east of the project area. Overall, the potential displacement of wildlife during construction would not be expected to have a measurable affect to wildlife species at the population scale or in terms of overall population fitness.

Result in Construction Noise and Visual Impacts on Wildlife

Construction-related noise and human presence at the project area could affect wildlife in the aquatic and terrestrial study areas during construction activities (Tables 4 and 5). While wildlife in and around the terrestrial and aquatic study area are likely habituated to human activity and noise levels associated with industrial and developed areas, noise levels at the project area would increase above ambient levels for the duration of construction, especially during impact pile-driving activities associated with dock and trestle construction. Wildlife species exhibit different hearing ranges and all wildlife do not respond the same way to similar sound sources or levels. Even within a species, individuals do not necessarily respond the same way. Wildlife response to sounds depends on numerous complicated factors, including noise level, frequency, distance and event duration, equipment type and conditions, frequency of noise events over time, slope, topography, weather conditions, previous exposure to similar noises, hearing sensitivity, reproductive status, time of day, behavior during the noise event, and the animal's location relative to the noise source (Delaney and Grubb 2003 in Washington State Department of Transportation 2015). Therefore, an animal's reaction to elevated noise levels could range from mild disturbance with little or no reaction to escape behavior, which would displace individuals by forcing them to abandon the area of elevated noise levels, potentially resulting in significant impairment or disruption of normal behavioral patterns. Such displacement and disruption of behavior could reduce productivity and survival of individuals as the individual would likely expend more energy relocating to new suitable habitat, and would be less familiar with new habitat areas and at an increased risk of predation, potentially limiting survival of individual adults or offspring (e.g., abandoning young). These impacts would be exacerbated where there is no adjacent or nearby suitable habitat that is easily accessible. In addition, visible construction equipment, materials, and an increase in infrastructure could cause displacement because some species would avoid areas within the line-of-sight of construction equipment operations.

Dredging and the associated noise could affect birds, including streaked horned larks, during the nesting season. There are no studies that specifically identify noise level sensitivities of the streaked horned lark. Noise sensitivity studies have been conducted for the marbled murrelet. These studies found that marbled murrelets are very sensitive to underwater noise such as pile driving and prolonged terrestrial noise that lasts longer than 10 to 15 minutes (Mountain Loop Conservancy 2010). Little information is available on the impacts of noise on birds. Shorebird sensitivities are more closely related to those of sea lions because they spend most of their time above water and generally stay in the shallow water while hunting (Science Applications International Corporation 2011). Dredging related activities have been shown to generate in-air noise levels of 72 decibels in commercial or industrial areas (Epsilon Associates 2006). Terrestrial noise levels in this range could disturb birds but would not be expected to result in injury.

Additionally, construction-related noise impacts and the presence of construction equipment and materials would be temporary, lasting the estimated 6 years required for project construction. In addition, there is a lower density of development to the northwest of the study area where connectivity to other potentially suitable wildlife habitat exists, and where wildlife could relocate during and after construction. Given that the wildlife present in the study area are likely habituated to noise levels associated with industrial areas and are generally mobile, it is anticipated that construction-related noise would affect individuals of a species, but would not affect a species' whole population or the overall fitness of a population.

3.1.1.3 Aquatic Habitat and Wildlife Impacts

The following section describes potential impacts on aquatic habitat and wildlife.

Remove and Alter Aquatic Habitat and Impacts on Aquatic Wildlife

Project construction would result in the alteration and removal of aquatic habitat in the Columbia River and open freshwater areas (e.g., ditches) located in the project area.

Construction of the On-Site Alternative would result in the permanent loss of approximately 10.78 acres of aquatic habitat (ditches and ponds) and 24 acres of wetlands, which would reduce suitable habitat available to wildlife species throughout the the project area. These open areas of freshwater habitats and wetlands support common species of amphibians and could be used by small mammals and birds. Mammals and birds are highly mobile species and are expected to leave the vicinity during construction activities.

Habitat in the Columbia River would be permanently altered and removed by the placement of piles. A total of 603 of the 622 36-inch-diameter steel piles required for the trestle and docks would be placed below the ordinary high water mark, permanently removing an area equivalent to 0.10 acre (4,263 square feet) of benthic habitat. The majority of this habitat is located in deep water (Grette Associates 2014i). The placement of piles would displace benthic habitat and the areas within each pile footprint would cease to contribute toward primary or secondary productivity. Individual pile footprints would be relatively small (7.07 square feet) and would be spaced throughout the dock and trestle footprint. Benthic organisms (i.e., benthic, epibenthic, and infaunal organisms) within the pile footprint at the time of pile driving would likely perish.

Creosote-treated piles would be removed from the deepest portions of two existing timber pile dikes. The piles would be removed using vibratory extraction as feasible, or cut, pull and cap

methods, depending on the condition of the piles (Grette Associates 2014n). In total, approximately 225 lineal feet of the pile dikes would be removed from the waterward end of the pile dikes. Approximately 125 linear feet would be removed from the western, or downstream, pile dike and approximately 100 linear feet would be removed from the eastern, or upstream, pile dike. Pile dikes were installed throughout the Lower Columbia River between 1889 and 1969. The specific year the pile dikes to be partially removed as part of the proposed project were installed is unknown, but their degraded condition indicates that they've been in the river for considerable time. Overall, removing creosote-treated piles from the Columbia River would result in an improvement in water quality, as most remaining creosote in those piles would be removed from the aquatic environment. However, removing the piles could result in temporary increases in suspended sediments, short-term water contamination, and long-term sediment contamination from creosote released during extraction. Those portions of the creosote treated piles that have been exposed to water and air have little creosote remaining. Those portions of the treated piles below the mud line likely have more creosote remaining, which would become exposed during extraction. Backfilling the holes left after extracting the piles with clean-sand would avoid and minimize exposure to the water column of the creosote that may be present in the surrounding soils. Creosote contains a mixture 200 to 250 compounds, with primary components composed of polycyclic aromatic hydrocarbons (PAHs) (Brookes 1995; National Marine Fisheries Service 2009). PAHs are known to be toxic to aquatic organisms including invertebrates and fish and can cause sublethal and lethal effects (Eisler 1987; Brooks 1997).

Creosote and associated chemicals, particularly those that are water-soluble and that persist in the water column are known to bioconcentrate in many aquatic invertebrates (Eisler 1987; Brooks 1997). This could expose higher trophic level species such as fish, birds, and pinnipeds to creosote/PAH compounds through the food chain. Many vertebrates, including fish, however, metabolize PAHs and excrete them, reducing the potential risk to higher trophic-level species (Varanasi et al. 1989 in National Marine Fisheries Service 2009; Strauss 2006 in National Marine Fisheries Service 2009).

Most of the components of creosote are heavier than water and sink in the water column. PAHs from creosote accumulate in sediments and are likely to persist at the site of pile removal or wherever they settle after suspension until they degrade (National Marine Fisheries Service 2009). However, PAHs from sediment are less bioavailable to aquatic species and thus these organisms are not likely to bioaccumulate PAHs from sediments (Brooks 1997).

Over the long term, the source of creosote would be removed or capped by the sediment falling into the hole left by the extracted pile. Water quality would improve, the concentration of creosote in the sediment would be expected to decrease, and the potential pathway of exposure for wildlife through contamination of prey would be reduced.

Dredging would permanently alter a 48-acre area of deepwater habitat (below -20 feet CRD) by removing approximately 500,000 cubic yards of benthic sediment to achieve a depth of -43 feet CRD, with a 2-foot overdredge allowance. Within the proposed dredged area) (Figure 2), the amount of deepening would depend on existing depths, varying from no removal up to a depth of approximately 16 feet of removal. Most benthic organisms are stationary or slow moving and would likely perish during dredging. Benthic organisms typically recolonize disturbed areas within 30 to 45 days. The majority of the area of the proposed dredge prism is at or below a depth of -31 feet CRD. It is anticipated that sediment within the dredge prism for Docks 2 and 3 would be deemed suitable for flow-lane disposal or beneficial use in the Columbia River based

on past sediment sampling near the project area. However, prior to obtaining permits for the On-Site Alternative, including dredging permits, the Applicant would conduct site-specific sediment sampling to characterize the proposed dredge prism and ensure compliance with the Dredged Materials Management Plan (Grette Associates 2014i, m). This flow lane disposal area would likely be located within an area of approximately 80 to 110 acres between approximately river miles 60 and 66 (Figure 6).

The majority of benthic, epibenthic, and infaunal organisms are nonmotile or slow moving and become entrained during dredging. Benthic, epibenthic, and infaunal organisms in the proposed dredge prism above -43 feet CRD would be removed during dredging, likely resulting in mortality. These organisms often serve as prey for larger animal species. Most of the habitat in the proposed dredge prism is in deep water where benthic productivity is expected to be low relative to shallower habitat. Deep-water channels are subjected to higher water velocities, which periodically scour bottom sediments, limiting the standing crop of invertebrates and the buildup of detritus and fine materials that support these invertebrates (McCabe et al. 1997). Dredging activities are not typically associated with long-term reductions in the availability of prey resources and impacts on benthic productivity are expected to be temporary. Benthic organisms typically recolonize disturbed areas within 30 to 45 days. Disturbed habitats are expected to return to reference conditions with rapid recolonization by benthic organisms (McCabe et al. 1996).

Dredging activities could affect pinnipeds. In *A Review of Impacts of Marine Dredging Activities on Marine Mammals*, Todd et al. (2014) states that potential direct impacts on marine mammals include collisions, turbidity, and noise. Collisions between dredging vessels and pinnipeds are possible but unlikely to occur given the slow speeds of dredging vessels. Information on turbidity is limited; however, existing research indicates that dredge-related turbidity is not likely to cause substantial impacts on pinnipeds since they often inhabit naturally turbid or dark environments and are likely to use senses in addition to their vision (Todd et al. 2014). Noise could cause masking and behavioral changes but is unlikely to cause auditory damage to pinnipeds (Todd et al. 2014). Dredging would be conducted using a clamshell dredger; however, a hydraulic dredger could also be used (Grette Associates 2014n). Sound pressure levels (SPLs) can vary widely, based on dredger type, operations stage, or environmental conditions (Todd et al. 2014). The operations stage is an important component of noise levels produced by a clamshell (grab) dredger. Dickerson et al. (2001) measured the entire clamshell dredge process at increasing distances from the dredge operation. The loudest measurement, 124 dB_{RMS}, was recorded at a distance of 518 feet from the dredge operation. This measurement is consistent with SPLs that could result in behavioral changes in pinnipeds, but likely would not cause auditory damage. Hydraulic dredges typically produce higher SPLs than clamshell dredges but these SPLs would be unlikely to reach levels that could cause auditory damage (Central Dredging Association 2011; Todd et al. 2014).

Dredging and Underwater Construction Noise Impacts on Pinnipeds

Dredging activities could affect pinnipeds through collisions with vessels and dredge-related increases in turbidity. Collisions with vessels and dredging equipment are possible but unlikely given the slow speeds of dredging vessels. Information on turbidity is limited; however, existing research indicates that dredge-related turbidity is not likely to cause substantial impacts on pinnipeds since they often inhabit naturally turbid or dark environments and are likely to use senses in addition to their vision (Todd et al. 2014). Noise generated during dredging activities

could cause masking and behavioral changes but is unlikely to cause auditory damage to pinnipeds (Todd et al. 2014). Increases in turbidity and underwater noise associated with dredging would be short-term and localized. Dredging would not likely cause long-term or negative impacts on pinnipeds.

Potential underwater noise impacts on pinnipeds could also occur during in-water installation of the trestle and dock piles. NMFS has established standard underwater noise thresholds for marine mammals for purposes of determining take (through harassment) under the Marine Mammal Protection Act. Table 7 summarizes NMFS' marine mammal noise thresholds and the distances from the pile-driving activity at which these thresholds would extend (Grette Associates 2014a).

Table 7. Underwater Sound Level Effects Thresholds and Distances to Threshold

Effect Type	NMFS Threshold	Distance to Threshold	
		No Attenuation[a]	With Bubble Curtain[a]
Impulsive Sound (Impact Pile Driver)			
Level A Harassment: Hearing-related injury	190 dB_{RMS}	178 feet	45 feet
Level B Harassment: Behavioral disruption	160 dB_{RMS}	3.36 miles	4,459 feet
Continuous Sound (Vibratory Pile Driver)			
Level B Harassment: Behavioral disruption	120 dB_{RMS}	5.4 miles based on landmass	N/A

Notes:
[a] Grette Associates 2014a

Level A harassment and Level B harassment are defined in more detail under Impact Pile Driving below. Construction of the trestle and dock could include both vibratory pile driving for installation and impact pile driving for proofing. For purposes of this analysis, it is assumed that pile-driving activities would occur during approved in-water work windows. Based on in-water work windows established by NMFS, USFWS, and WDFW for the protection of other aquatic species, in-water pile installation could occur from September 1 to February 28 for vibratory pile driving and September 1 through December 31 for impact pile driving. Actual dates of pile-driving activities would be outlined in permits issued for the project from both the Corps and WDFW. Pile installation and the applicable work window(s) would be provisioned in the hydraulic project approval. Pile installation would occur over two in-water work window construction periods, due to the number of in-water piles required for the dock and trestle. To reduce underwater sound pressure levels from impact pile-driving operations, a confined bubble curtain system or similar noise attenuation technology would be used. Whether or not in-water pile driving would affect pinnipeds depends on timing of pile driving and whether pinnipeds are in the aquatic study area during this time. Impact pile driving is proposed from September 1 through December 31, which would be prior to the beginning of seasonal use of the study area by California sea lions and harbor seals; it is unlikely that individuals would be present during impact pile driving. Steller sea lions have been observed at the Bonneville Dam from September through December, but in low numbers. Eleven individuals were observed from October through December 2011 (Stansell et al. 2012); no regular observations were reported

in October through December 2012. Therefore, individual Steller sea lions could be transiting through the aquatic study area during pile-driving activities.

Grette Associates (2014a) assessed the direct effects of in-water pile driving on marine mammals at the project area in its *Millennium Coal Export Terminal Docks 2 and 3 and Associated Trestle: Direct Effects of Construction, Pile Driving and Marine Mammals* report. Multiple sources were reviewed for comparable reference of underwater sounds levels during vibratory and impact installation of the 36-inch-diameter steel piles, including sound level data on pile installations compiled by the Washington State Department of Transportation (WSDOT), Caltrans, Port of Seattle, Port of Kalama, and the Columbia River Crossing (CRC) Test Pile Project. After reviewing all applicable information, sound levels from the CRC 48-inch-diameter test pile were selected as reference levels for the 36-inch-diameter steel pile proposed for the project area. While these piles are larger than those proposed, the proximity of the CRC site to the project area (less than 50 miles apart) and similar conditions are expected to be more comparable than more distance locations elsewhere in Washington and California. Using these reference levels provides for a liberal assessment of sound (i.e., estimating at the high end for impact area), and therefore, presents a conservative evaluation that is protective of marine mammals because it considers relatively louder sounds, and therefore, larger potential impact areas than other reference values.

Impact Pile Driving

Level A Harassment

Level A harassment could occur up to a radius distance of 178 feet from active impact pile driving without any sound attenuation in place. With implementation of a bubble curtain to attenuate noise levels during impact pile driving, there would be a reduction of at least 9 decibels (dB) at the source, which would decrease the Level A harassment area to a 45-foot radius around each pile as it is driven. This estimate is based on a review of the Columbia River Crossing Test Pile Project (CRC), which was conducted in the Columbia River at river mile 106.5, approximately 43 miles upstream of the project area. The CRC found bubble curtains around 48-inch-diameter steel piles attenuated sound by 10 dB, and for 24-inch-diameter steel piles between 6 and 11 decibels. In addition, at a WSDOT project downstream of Puget Island, bubble curtains attenuated sound levels by 13 decibels. Therefore, assuming sound values would be attenuated by 9 decibels during use of a confined bubble curtain is considered realistic and achievable, and likely conservative. Because the Columbia River is approximately 3,000 feet wide at the point where pile driving would occur, there would be a wide area of the river that pinnipeds could utilize and avoid exposure to the small area where underwater noise reaching Level A harassment would be generated.

Based on the seasonal use patterns for California sea lion, Steller sea lion, and harbor seals in the study area and based on the proposed work window for in-water impact pile installation (i.e., September 1 through December 31), presence of individual pinnipeds during impact pile driving would be unlikely. In addition, given the small potential noise impact area around each pile for Level A harassment, the adherence to in-water work windows, and the use of bubble curtains to reduce noise and the potential impact distance, the three pinniped species are not expected to experience underwater noise in excess of the Level A harassment threshold.

Level B Harassment

It is estimated that Level B harassment could occur up to a radius distance of 3.36 miles from active impact pile driving without any sound attenuation in place. With implementation of a bubble curtain to attenuate sounds, it is estimated that there would be a reduction of at least 9 decibels at the source, which would decrease the Level B harassment area to a 0.84 mile radius (4,459 feet) around each pile as it is driven. The Columbia River is approximately 3,000 feet wide at the point where pile driving would occur, so in either case sound would extend across the river's entire width, although not to the side channel on the Oregon side of Lord Island.

Based on the seasonal use patterns for California sea lions and harbor seals in the study area, presence of individuals of these species during impact pile driving would be unlikely. Steller sea lions are known to occur in the study are during the period when impact pile driving would occur, (September through December), but in very low numbers. In the event these pinnipeds pass through the study area during impact pile driving, they would be exposed to sound in excess of the Level B harassment threshold. However, it is so unlikely that California sea lions or harbor seals would be transiting through the area on their way to upstream locations such as haulouts or the Bonneville Dam that few, if any, individuals would be expected to experience sound in excel of the Level B harassment threshold. A relatively small number of Steller sea lions (less than 20) could experience sound in excess of the Level B harassment threshold.

The NMFS 160- dB_{RMS} effect threshold for Level B harassment is for all marine mammals (cetaceans and pinnipeds). According to Southall et al. (2007), there is limited potential for pinnipeds exposed to multiple pulses between approximately 150 and 180 dB_{RMS} to respond with avoidance. The majority of individual documented behavioral responses at these levels are related to alert or orientation response, which could result in changes or interruption in feeding or diving, to cessation of vocalizations, to temporary displacement from habitat.

The relatively small number of Steller sea lions that would potentially experience pulsed sound above the Level B harassment threshold are not expected to significantly alter their behavior. Based on an average swim speed of approximately 3 meters per second (Stelle et al. 2000), a Steller sea lion would traverse the study area in approximately 20 minutes (assuming pile driving at any/all locations). Based on observations of swimming speeds in the Columbia River determined through telemetry, this speed could be somewhat high, particularly during upstream migration (Brown et al. 2011). However even for speeds at the low end of those reported by Brown et al. (2011) (more than1 meter per second), it is expected that the study area would be traversed in less than one hour. The lower-end estimates from Brown et al. (2011) are applicable to California sea lions and have been applied to harbor seals as well. For all three species, additional alert or orientation responses over the duration of the construction period would not be expected to impede transit through the area or otherwise significantly disrupt behavioral patterns. In the unlikely event a significant disruption of behavior were to occur to an individual during pile driving, effects could range from startle responses to changes or interruption in feeding or diving, to cessation of vocalizations, to temporary displacement from habitat.

The estimated distance to the 180 dB_{RMS} level, above which the likeliness of avoidance behavior as opposed to an alert or orientation response increases (Southall et al. 2007), is estimated to be approximately 200 feet from impact pile-driving activities. Should an individual pinniped be present to experience this sound, avoidance of the area within 200 feet of impact pile driving (which represents less than 15% of the Columbia River's width where pile driving would occur)

would not impede transit through the study area and would not otherwise adversely affect individuals or significantly disrupt behavioral patterns.

Vibratory Pile Driving

Vibratory pile driving could occur during much or all of each working day during the proposed September 1 through February 28 in-water work window. Vibratory pile driving would be used to drive the pile to the greatest extent possible. Final driving and/or proofing would require an impact pile driver to achieve bearing strength, depending upon the level of embedment achieved during vibratory installation. The contractor would determine sequencing and the need for multiple pile-driving rigs. It is possible that vibratory pile driving could occur at any time during the proposed in-water work window (September 1 through February 28), and it could be continuous during working days (Monday through Friday), particularly if multiple pile-driving rigs are operating. However, given the likely use of multiple pile-driving rigs, variable subsurface conditions, vibratory pile driving might not occur throughout the working day. Therefore, it is possible that some or all of the pinnipeds transiting through the study area would not experience Level B harassment from vibratory pile driving.

Aside from the vibratory pile-driving schedule and sequence of events during the in-water work window, individual California sea lions, Steller sea lions, and harbor seals are considered unlikely to be present during much of the vibratory pile-driving period, based on their seasonal occurrence and the in-water pile-driving construction timing. This would minimize the likelihood that individual pinnipeds would experience sound in excess of the 120 dB_{RMS} Level B harassment threshold for continuous pile-driving sound. However, some California sea lions and harbor seals are expected to pass through the study area during the latter part of the vibratory driving period (mid-January through February) on their way to upstream haulouts and the Bonneville Dam. Steller sea lions could pass through the study area throughout the vibratory pile-driving period, but in relatively small numbers (less than 20) prior to January 1, with increasing numbers possible thereafter.

NMFS applies the 120 dB_{RMS} effect Level B harassment threshold for continuous sound to all marine mammals. As noted in Southall et al. (2007), the 120 dB_{RMS} value is primarily based on data from two field studies observing the response of baleen whales (gray and bowhead whales) to continuous industrial sound (e.g., drilling or icebreaking). Southall et al. (2007) also states the effects of continuous sound exposures on pinnipeds are poorly understood, and existing data do not indicate strong behavioral responses to sounds between 90 and 140 dB_{RMS}. As such, the application of the 120 dB_{RMS} threshold for pinnipeds is considered a conservative analysis that is protective of the species.

The assertion that the 120 dB_{RMS} is considered conservative could be further supported by observed responses of sea lions, including Steller sea lions, to auditory deterrence devices (ADDs) employed at the Bonneville Dam (Stansell et al. 2010). The ADDs were installed in 2008 at most of the fishway entrances to deter pinniped foraging in these areas. Each ADD consisted of an Airmar decibel Plus II acoustic deterrent system emitting a 205-decibel sound in the 15-kilohertz (kHz) frequency range, placed within the tailrace of the dam (Stansell et al. 2010). The ADDs are marketed as pinniped deterrents and are set to a frequency within the range of greatest hearing sensitivity for pinnipeds. Steller sea lion hearing sensitivity peaks between 1 and 16 kHz for males and between 16 and 25 kHz for females (Kastelein et al. 2005). California sea lion hearing sensitivity peaks between 1 and 28 kHz with a peak at 16 kHz (Schusterman et

al. 1972). Harbor seal hearing sensitivity peaks between approximately 10 and 40 kHz (Mohl 1968 in Richardson et al. 1995).

The ADDs were left on continuously for the entirety of the 2008 observation season (January through May), turned on or off randomly in 2009, and on or off for random two-day periods in 2010 to mitigate against habituation (Stansell et al. 2010). According to observations, the ADDs had no detectable effect on sea lions when they were on continuously in 2008 or when they were randomly on or off in 2009 and 2010. Pinnipeds have been observed each year since 2008 swimming and foraging within 20 feet of the active ADDs, and many of the same individuals present in 2008 returned the following 2 years. Due to the ineffectiveness of the ADDs as deterrents at the Bonneville Dam, the investigators recommended discontinuing their use (Stansell et al. 2010).

The pinnipeds' reactions to the ADDs employed at Bonneville Dam illustrates that the environmental context plays a significant role on whether or not pinnipeds react to continuous noise. The noise from ADDs was well above both the documented pinniped hearing thresholds and the established threshold of potentially disturbing continuous sound. While the ADDs have been effectively used as a pinniped deterrent elsewhere, the acoustic deterrent was not enough to dissuade the animals from the abundant foraging opportunity at Bonneville Dam.

The results of the ADDs employed at Bonneville Dam strongly suggest that sea lions can habituate to high levels of continuous sound. Sound from vibratory pile driving is conservatively estimated to be 181 dB_{RMS} (170 dB_{RMS} could be more typical). The ADDs used at Bonneville Dam emitted sound at 205 decibels at the source (not specified as dB_{RMS}, decibels sound exposure level (dB_{SEL}) or decibels peak. However, since the ADDs emit continuous sound, dB_{RMS} should be a comparable metric). A modeled comparison of these sound levels determined that sound from vibratory pile driving is expected to be of comparable loudness to that emitted by the ADDs at Bonneville Dam. Other characteristics including frequencies could be different, but the ADDs targeted the most sensitive frequencies for pinnipeds and were still not effective deterrents at the Bonneville Dam.

California sea lions, Steller sea lions, and harbor seals would pass through the study area during the period proposed for vibratory pile driving with increasing numbers toward the end of the vibratory pile in-water work window. Individuals that occur within 5.4 miles (28,512 feet) of vibratory pile driving would experience elevated sound levels. As discussed above, based on Southall et al. (2007), pinnipeds do not typically elicit strong behavioral responses to continuous sound between 90 and 140 dB_{RMS}. While not included in the detailed behavioral analysis, Southall et al. (2007) also discuss a number of studies that suggest a high tolerance of and/or limited behavioral changes by pinnipeds to sounds from underwater drilling, ADDs, and other continuous sources in the field. Stansell et al. (2012) observed that Steller sea lions did not avoid areas ensonified by ADDs and were observed foraging within 20 feet of the ADDs. Those ADDs emitted sound at levels comparable to what is expected during vibratory pile driving, and were frequency-specific to target peak sensitivity for pinniped hearing. Taken together, these findings suggest that a strong behavioral response such as absolute avoidance of the entire area of elevated sound is unlikely during vibratory pile driving, even with the relatively long time-period (September 1 through February 28) and daily duration proposed over the two in-water construction seasons. Even if an individual were to initially avoid the area of elevated sound it would be expected to eventually move through the study area, either once acclimated to the sound or once pile driving has ceased. Vibratory pile driving is not expected to affect the ability

of, or the likelihood for, individual California sea lions, Steller sea lions, or harbor seals to transit through the study area or to eventually reach other upstream areas and the Bonneville Dam.

Underwater Noise Impacts on Diving Birds

Potential underwater noise impacts on diving birds in the Columbia River could occur during in-water installation of the trestle and dock piles, specifically impact pile driving, which would generate the loudest and most intense underwater noise during construction. Although hearing range and sensitivity has been measured in many terrestrial birds, little is known of diving bird hearing; most published literature on bird hearing focuses on terrestrial birds and their ability to hear in air (U.S. Navy 2014). There is little published literature on hearing abilities of birds underwater, and the manner in which birds could use sound underwater is unclear (Dooling and Therrien 2012 in U.S. Navy 2014). In fact, there are no measurements of underwater hearing ability in any diving birds (Therrien et al. 2011 in U.S. Navy 2014). Diving birds may not hear as well underwater, compared to other (nonavian) terrestrial species, based on adaptations to protect their ears from pressure changes (Dooling and Therrien 2012 in U.S. Navy 2014).

USFWS has provided information on underwater noise impact thresholds for impact pile driving for the federally listed marbled murrelet. While marbled murrelets would not be found in the study area, the underwater noise thresholds provide some guidance on potential underwater noise impacts that could be useful for other diving birds that could be in the study area. USFWS recognizes a behavioral threshold of 150 dB_{RMS}, an injury auditory threshold of 202 dB_{SEL}, and a nonauditory injury (i.e., barotrauma) threshold of 208 dB_{SEL}; underwater noise below 150 dB_{SEL} does not cause injury (Washington State Department of Transportation 2015). WSDOT has summarized underwater sound levels from impact pile driving (single strike) in Washington State for various types and sizes of piles. For a single strike of a 36-inch-diameter steel pile (similar to what is proposed for the project area), sound levels are estimated to be 201 dB_{RMS} and 186 dB_{SEL} 10 meters from the pile (Washington State Department of Transportation 2015). For all pile types and sizes that WSDOT summarizes, the sound equivalent level is always less than the root mean square.

Knowing that the use of bubble curtains for pile driving at the project area would reduce underwater noise levels to 190 dB_{RMS} at a 45-foot radius from each pile during a strike (Figure 11) and based on WSDOT's summary of underwater noise levels for impact pile driving, a marbled murrelet would need to be within 45 feet of the pile during an impact strike to experience the injury thresholds of 202 dB_{SEL} or 208 dB_{SEL}. Given the small area where these noise levels would be reached and the presence of construction equipment, vessels, and human activities during pile driving, it is likely a diving bird would avoid the area and not be close enough to a pile to be exposed to the injury thresholds established for the marbled murrelet. However, it is possible that diving birds could experience the behavioral threshold of 150 dB_{RMS}. The level B harassment (160 dB_{RMS}) distance for impact pile driving with use of a bubble curtain is 4,459 feet (Figure 12), and the distance to 150 dB_{RMS} would be slightly beyond this distance.

Figure 11. Level A Harassment Area for Impact Pile Driving for the On-Site Alternative

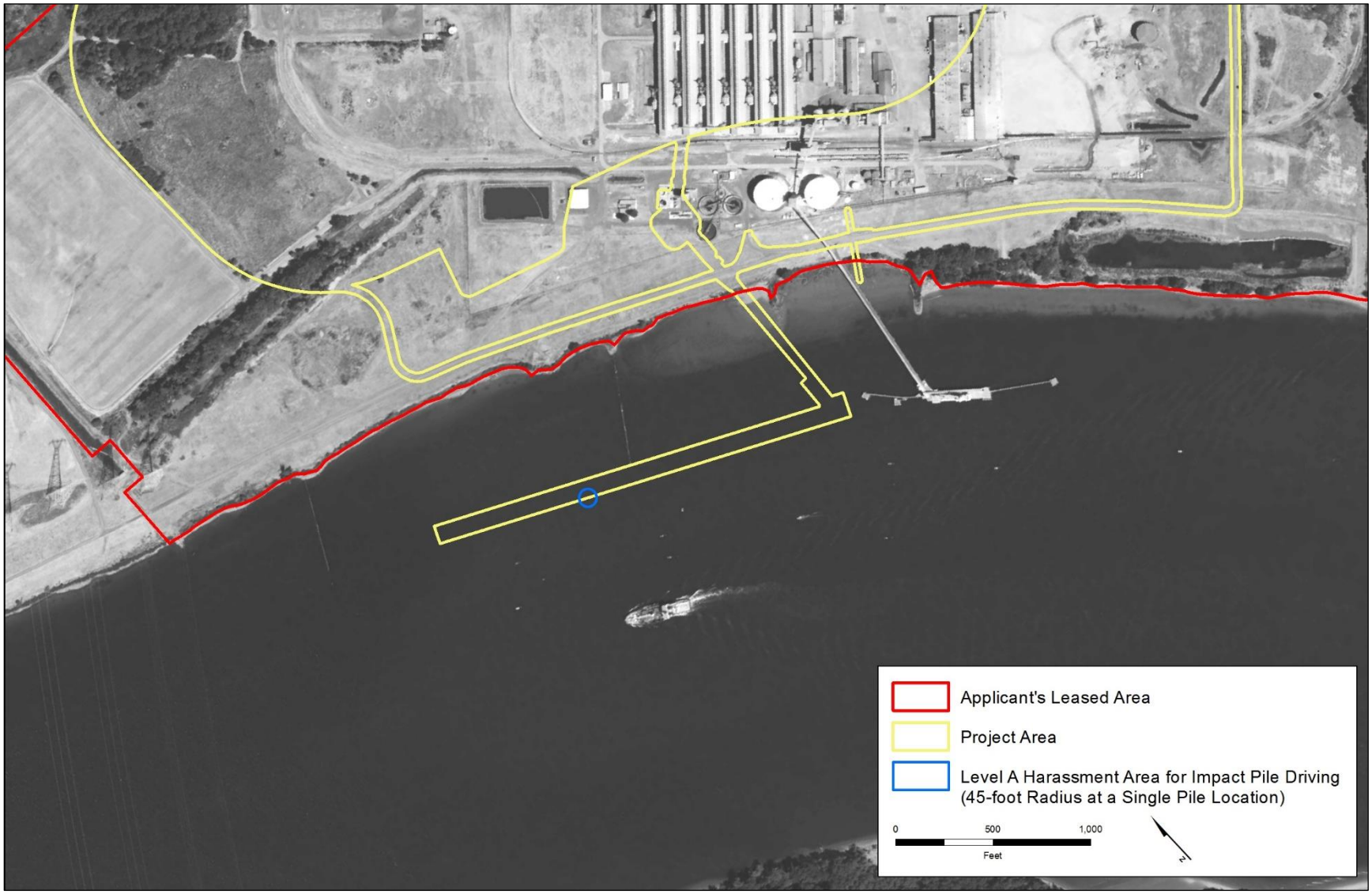
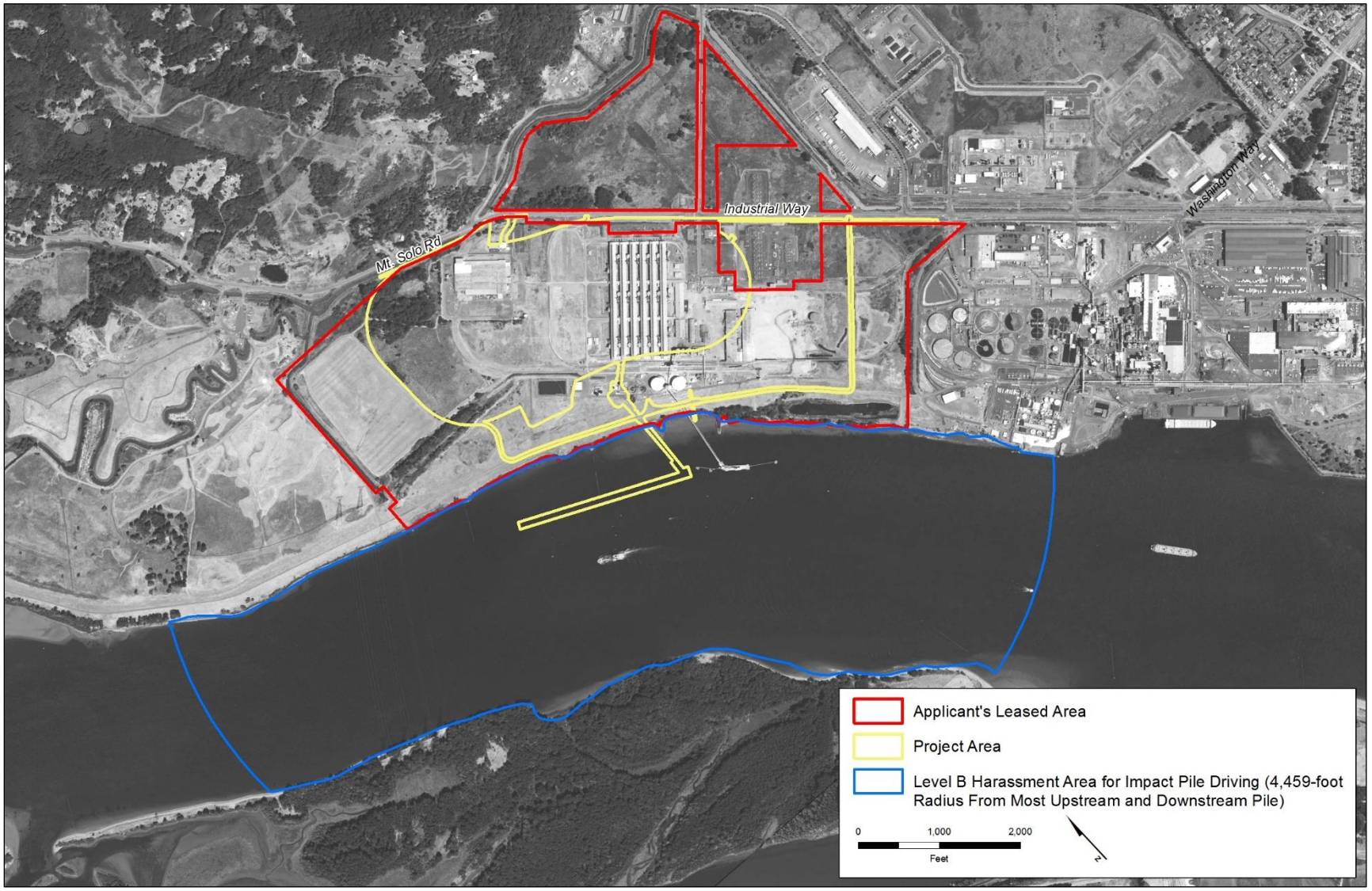


Figure 12. Level B Harassment Area for Impact Pile Driving for the On-Site Alternative



The reaction of a diving bird exposed to underwater noise levels above 150 dB_{RMS} (but below 202 dB_{SEL}) could range from mild disturbance to escape behavior, which would displace individuals. Displacement and disruption of behavior could interrupt feeding and diving, and reduce productivity and survival of individuals, as the individual would likely expend more energy relocating to a new area. However, impact pile-driving noise impacts would be temporary, occurring over 2 in-water work windows. It is not anticipated that underwater impact pile-driving noise would affect the overall fitness of diving bird populations.

Result in Spills and Leaks

During all construction related activities there is the potential risk of temporary water quality impacts resulting from the release of hazardous materials such as fuels, lubricants, hydraulic fluids, or other construction-related chemicals. These materials could enter surface waters of the Columbia River or drainage ditches located near the project area. Such spills could affect aquatic habitat or wildlife, including pinnipeds, waterfowl, or terrestrial wildlife, resulting in toxic acute or subacute impacts that could affect the respiration, growth, and reproduction of these species. Over-water and in-water work increases this risk as well as the potential for construction debris or materials to enter the Columbia River. The potential for these types of impacts would be avoided or greatly reduced given protective measures to guard against these risks, including: construction best management practices, avoidance and minimization measures, adhereance to the in-water work windows (to be identified in permits that may be issued), and regulatory requirements. The NEPA Water Quality Technical Report (ICF International 2016d) includes a detailed discussion on the potential impacts on water quality associated with the On-Site Alternative.

3.1.2 Construction: Indirect Impacts

Construction of the On-Site Alternative would not result in indirect impacts on wildlife or wildlife habitat because construction of the export terminal would be limited to the project area.

3.1.3 Operations: Direct Impacts

Operation of the proposed export terminal at the On-Site Alternative location would result in the following direct impacts.

Affect Wildlife as a Result of Noise

Operations of the On-Site Alternative could result in increased noise from movement of trains, transfer of coal from train to stockpile areas to vessels, and general industrial operations, which could affect wildlife in a manner similar to that described for construction noise. Increased operations noises could affect wildlife by causing disturbance or avoidance behaviors. Wildlife present in the area are likely habituated to noise levels associated with industrial and developed areas, and operations noises associated with the On-Site Alternative are anticipated to be comparable to existing noises associated with the ongoing industrial operations in the study area. Given that the species present in the study area are likely habituated to elevated noise levels associated with industrial areas and are generally mobile and avoid disturbing noise levels and human activities that are beyond those they are habituated to, it is anticipated that

operations noise associated with the On-Site Alternative would not have a measurable impact on wildlife within the terrestrial study area.

Result in Spills and Leaks

Routine operations could result in spills or leaks at the project area from vehicles, trains, or equipment that could affect water quality and the condition of aquatic habitat in the Columbia River and drainage ditches located in the project area. Potential impacts on wildlife and wildlife habitat are similar to those described for construction leaks and spills. Personnel training, oil discharge prevention briefings, and implementation of prevention and control measures, as required under the Spill Prevention, Control and Countermeasure Regulation (40 CFR 112) would guard against these risks, greatly reducing the likelihood of accidental spills. Further information is contained in the NEPA Water Quality Technical Report (ICF International 2016d) and NEPA Hazardous Materials Technical Report (ICF International 2016e).

Affect Wildlife from a Spill of Coal

Direct impacts on the natural environment from a coal spill during operation of the On-Site Alternative could occur. Direct impacts resulting from a spill during coal handling at the proposed terminal would likely be minor because the amount of coal that could be spilled would be relatively small. Also, there would be no impacts to wildlife or wildlife habitat in the project area due to the absence of terrestrial and aquatic environments in the project area and the contained nature and features of the proposed terminal (e.g., fully enclosed belt conveyors, transfer towers, and shiploaders). Potential physical and chemical effects of a coal release on the aquatic and terrestrial environments adjacent to the export terminal are described below.

Coal spilled into the Columbia River could have physical effects on aquatic wildlife and their habitats, including abrasion, smothering, diminished photosynthesis, altered sediment texture and stability, reduced availability of light, temporary loss of habitat, and diminished respiration and feeding for aquatic organisms. The magnitude of these potential impacts would depend on the amount and size of coal particles suspended in the water, duration of coal exposure, and existing water clarity (Ahrens and Morrisey 2005). Therefore, the circumstances of a coal spill, the conditions of a particular aquatic environment (e.g., pond, stream, wetland), and the physical effects on aquatic organisms and habitat from a coal spill would vary. Similarly, cleanup of coal released into the aquatic environment could result in temporary impacts on habitat, such as smothering, altering sediment composition, temporary loss of habitat, and diminished respiration and feeding for aquatic organisms.

The recovery time required for aquatic resources would depend on the amount of coal spill and the extent and duration of cleanup efforts, as well as the environment in which the incident occurred. It is unlikely that coal handling in the upland portions of the coal export terminal would result in a spill of coal that would affect the Columbia River because the rail loop and stockpile areas would be contained. Other areas adjacent to the export terminal are separated from the Columbia River by an existing levee. Coal could be spilled during shiploading operations because of human error or equipment malfunction. However, such a spill would likely result in a limited release of coal into the environment due to safeguards to prevent such operational errors. These measures include start-up alarms and dock containment measures (containment gutters placed beneath the docks to capture water and other materials that could fall onto and through the dock surface).

The chemical effects on aquatic organisms and habitats would depend on the circumstances of a coal spill and the conditions of a particular aquatic environment (e.g., stream, lake, wetland). Some research suggests that physical effects are likely to be more harmful than the chemical effects (Ahrens and Morrisey 2005).

A recent coal train derailment and coal spill in Burnaby, British Columbia, in 2014, and subsequent cleanup and monitoring efforts provide some insight into the potential impacts of coal spilled in the aquatic environment. Findings from spill response and cleanup found there were potentially minor impacts in the coal spill study area, and that these impacts were restricted to a localized area (Borealis Environmental Consulting 2015).

3.1.4 Operations: Indirect Impacts

Impacts indirectly associated with proposed operations of the proposed export terminal at the On-Site Alternative location could occur as a result of project related vessel traffic in the Columbia River within the indirect study area. These impacts include vessel strikes and underwater vessel noise impacts on pinnipeds. Periodic maintenance dredging could result in removal of habitat and associated impacts on pinnipeds and aquatic invertebrates as well as noise impacts on birds. Coal dust could indirectly affect terrestrial and aquatic wildlife. The potential risk of a vessel related spill is discussed in the NEPA Vessel Transportation Technical Report (ICF International 2016g) Operations of the On-Site Alternative would result in the following indirect impacts.

Potential Vessel Strike Impacts on Pinnipeds

Increased vessel traffic related to operations of the proposed export terminal would increase the risk of vessel collisions with pinnipeds in the indirect study area. Most available research and literature on marine mammal vessel strikes is associated with vessel-whale collisions at sea. Compared to pinnipeds, whales are typically much larger, slower-moving, and therefore, are assumed more vulnerable to vessel strikes. Vessel strikes on marine mammals are usually described as massive blunt force trauma (Geraci and Lounsbury 1993 in Horning and Mellish 2009), but are considered extremely rare for pinnipeds (Andersen et al. 2007 in Horning and Mellish 2009). The blunt force trauma that results from a marine mammal collision with a vessel can result in death or injury. Blunt force trauma to marine mammals can include, but are not limited to, bone fractures, organ damage, and internal hemorrhages (National Oceanic Atmospheric Administration 2008). There are cases in which small marine mammals survive strikes but sustain injuries and disfigurement to dorsal fins and other body parts (National Oceanic and Atmospheric Administration 2008); in Sarasota Bay, Wells and Scott (1997) (in National Oceanic Atmospheric Administration 2008) documented four cases of vessel strikes on bottlenose dolphins in which all four animals survived the strike.

Laist et al. (2001) examined collisions between vessels and whales by examining historical records and computerized stranding databases for evidence of vessel strikes, and concluded that larger vessels and higher vessel speeds can increase the risk of collisions. Even though pinnipeds are generally smaller and more agile than whales, it is reasonable to assume that vessel size and speed would also be a factor in the risk of collisions with pinnipeds. Laist et al. (2001) found that the most lethal and serious injuries to whales are caused by vessels 262 feet or longer, and by vessels traveling above 14 knots (16 miles per hour). Vessels accessing the project area would likely be larger than 262 feet, but typical transit speeds would be much less than 14 knots in the study area. Vessel speeds in the Columbia River are typically 12 knots,

slowing to about 8 knots when passing moored vessels (ICF International 2016g). In the indirect study area around the project area, the speed would likely be even slower as there would likely be a "no wake zone" around the vessel mooring area.

In summary, the potential for a pinniped strike with a vessel in the indirect study area would depend on many factors, including time of year, vessel type, vessel size, pinniped species, vessel location, vessel speed, and location of animal relative to vessel. The behavior of a pinniped in the path of an approaching vessel in the study area is uncertain, but it is likely that an individual would have the ability to swim away from an approaching vessel. In addition, pinnipeds in the lower Columbia River are likely habituated to existing Columbia River vessel traffic (estimated to be 3,185 vessels per year between 2021 and 2023), and vessel speed would be less than 14 knots. Therefore, the potential risk for a vessel collision with a pinniped would be low.

Potential Underwater Vessel Noise Impacts on Pinnipeds

Increased vessel traffic related to operation of the On-Site Alternative contributes to underwater noise generated by existing ship traffic in the Columbia River. Ships generate noise primarily by propeller cavitation, propulsion machinery, hydraulic flow over the hull, and flexing of the hull (Marine Mammal Commission 2007). Studies in the Salish Sea have shown that the greater the ship size, the greater the underwater source level due to propeller cavitation[6]; however, tug vessels exhibit greater source noise levels underwater while performing activities such as berthing or accelerating a ship (Hemmera Envirochem Inc., SMRU Canada Ltd., and JASCO Applied Sciences (Canada) Ltd., 2014) . While this information is from studies in the Salish Sea, noise levels from vessels would be similar in the Columbia River. Depending on the type of noise and ambient noise conditions, underwater noise generated by vessels could affect marine mammals because they rely on sound as a means of communication, for finding food and mates, and for detecting predators. Increasing background noise levels could decrease communication ranges and modify behavior as well as induce stress responses (Wright 2008).

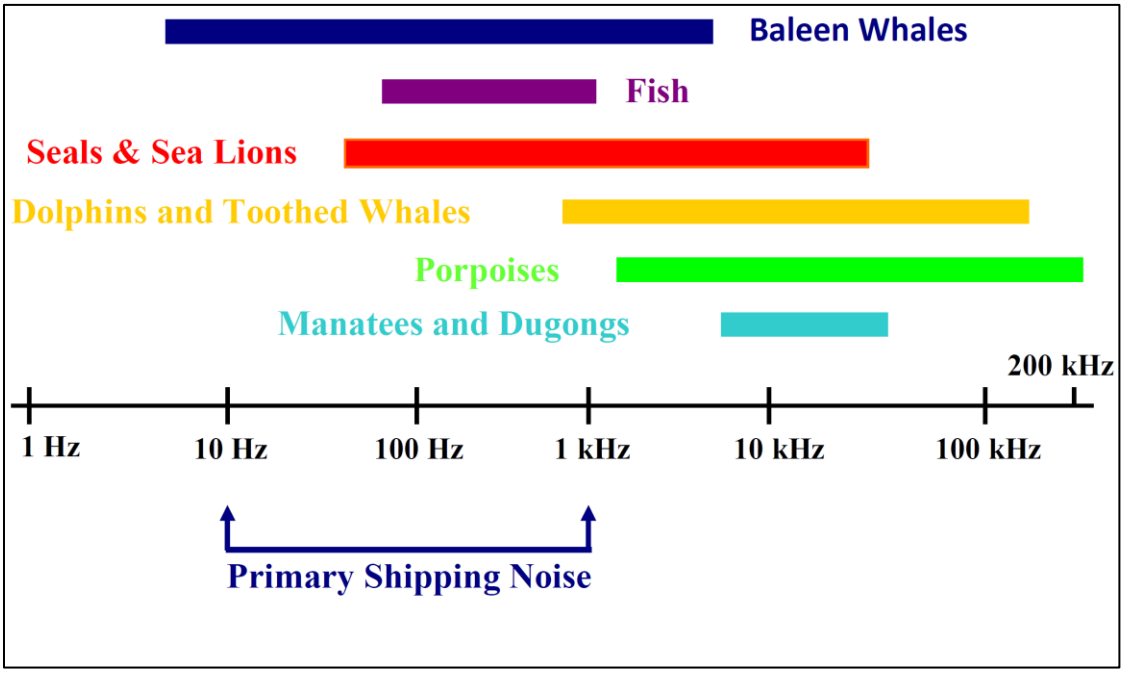
Operations of the project area at full build-out would result in approximately 840 additional vessels per year within the lower Columbia River compared to approximately 3,099 vessels that are estimated would transit the Lower Columbia River annually in 2028 (approximate timeframe for full build-out). With the project, total vessels per year would be approximately 3,939 (3,099 + 840). The 840 On-Site Alternative-related vessels represents approximately 21% of the expected total vessel traffic volume in the Lower Columbia River per year. See the NEPA Vessel Transportation Technical Report for additional information on vessel traffic resulting from the On-Site Alternative (ICF International 2016g).

Underwater noise frequencies associated with shipping vessels typically range between 10 Hertz (Hz) and 1kHz (Wright 2008) (Chart 1), but most ships produce noise primarily in the low frequency range (up to 100 Hz) (Marine Mammal Commission 2007). Additionally, tugboats, the vessels that would be used to assist vessels in docking and departing the project area, typically produce less near-surface sounds than other vessels. This is not because they are quieter but because the propellers of a typical tugboat are recessed to protect the propeller from damage in

[6] As propellers move through water, low-pressure areas are formed as the water accelerates around and moved past the propellers. The faster the propeller moves, the lower the pressure around it can become. As it reaches vapor pressure, the water vaporizes and forms small bubbles. This is cavitation. When the bubbles collapse, they typically cause very strong local shock waves in the water, which may be audible and may even damage the propellers.

case of grounding. With the propeller in this position, the sound rays from the propellers are blocked by the hull. Thus, the propeller noise cannot be heard ahead of the tug (University of Rhode Island 2015).

Chart 1. Frequency Relationship between Marine Animals Sounds and Sounds from Shipping



Source: Wright 2008.

As shown in Chart 1, several groups of marine animals hear sound within and outside of the primary shipping noise frequency range. Sea lions have been shown to be sensitive to a fairly wide range of mid frequencies (approximately 1 to 30 kHz) while seals are generally capable of hearing across a wider range of low to mid sound frequencies (approximately 0.2 to 50 kHz) (National Oceanic and Atmospheric Administration 2005). Steller sea lion hearing sensitivity peaks between 1 kHz and 16 kHz for males and 16 kHz and 25 kHz for females (Kastelein et al. 2005 in Grette Associates 2014a); California sea lion hearing sensitivity peaks between 1 kHz and 28 kHz with a peak at 16 kHz (Schusterman et al. 1972 in Grette Associates 2014a); harbor seal hearing sensitivity peaks between approximately 10 kHz and 40 kHz (Mohl 1968 in Richardson et al. 1995 in Grette Associates 2014a). Comparing these pinnipeds' hearing frequency ranges with the shipping noise frequency range, underwater noise generated by ships in the study area would generally be outside of the peak sensitive hearing frequencies for Steller sea lion, California sea lion, and harbor seal; and potentially outside the full range of their sensitive hearing frequencies given that most ships produce noise primarily in the low frequency range (up to 100 Hz). In addition, pinnipeds that migrate through the study area would likely be habituated to ship noise because ship traffic on the Lower Columbia River is relatively frequent; between 2021 and 2023, it is estimated that a total of 3,185 vessels (this includes the estimated 840 vessels accessing the project area annually) would transit the Lower Columbia River annually (ICF International 2016g). Marine mammals have adapted to varying levels of natural sound, and the adaptive mechanisms could allow them to function normally in the presence of many anthropogenic sounds. The unknown variable is when introduced sounds

could exceed the adaptive capacity of marine mammals and thus pose a threat to individual animals or their populations (Marine Mammal Commission 2007).

In the event a pinniped were in the study area during the transit of a ship to or from the project area and if the underwater noise frequency of a particular ship were within the frequency range in which the pinniped is sensitive, there could be potential affects to the individual. Research has suggested that the primary auditory effect of vessel noise on marine animals is the masking of biologically significant sounds (National Oceanic and Atmospheric Administration 2005), which can affect communications between individuals. Complex behavioral responses to the same noise source can range from mild to severe and can vary among species and individuals, making it challenging to broadly characterize impacts of shipping noise on marine mammal species (Ellison et al. 2012 in Joint Working Group on Vessel Strikes and Acoustic Impacts 2012). The effects of underwater noise exposure on marine organisms have been generally characterized by the following range of physical and behavioral responses (Richardson et al. 1995 in Bureau of Ocean Energy Management 2012), although it would not be anticipated that ship noise would cause all of these responses given the low frequency of underwater ship noise and the higher frequencies that Steller sea lion, California sea lion, and harbor seal are most sensitive. Additionally, it would be difficult to measure the effect that could be caused by the increase in vessel traffic associated with the project, as compared to the overall vessel traffic that would occur in the Columbia River.

- **Behavioral reactions.** Range from brief startle responses to changes or interruptions in feeding, diving, or respiratory patterns, to cessation of vocalizations, to temporary or permanent displacement from habitat.
- **Masking.** Reduction in ability to detect communication or other relevant sound signals due to elevated levels of background noise.
- **Temporary threshold shift.** Temporary, recoverable reduction in hearing sensitivity caused by exposure to sound.
- **Permanent threshold shift.** Permanent, irreversible reduction in hearing sensitivity due to damage or injury to ear structures caused by prolonged exposure to sound or temporary exposure to very intense sound.
- **Nonauditory physiological effects.** Effects of sound exposure on tissues in nonauditory systems either through direct exposure or because of changes in behavior (e.g., resonance of respiratory cavities or growth of gas bubbles in body fluids).

The effects of increased vessel noise associated with project related vessels on pinnipeds in the study area would depend on many factors, including vessel size and type, existing vessel traffic in Columbia River, ambient underwater noise, time of year, species of pinniped, vessel location, and location of animal relative to vessel and the intervening environment. Given that the peak hearing sensitivity frequencies of Steller sea lion, California sea lion, and harbor seal are generally outside of the noise frequencies generated by vessels and because these species would likely be habituated to existing Columbia River vessel generated noise levels, it is likely that any response to project related vessel noise would be relatively minimal, and could in fact be indistinguishable from the response of pinnipeds to Columbia River vessel traffic in general.

Remove Habitat during Maintenance Dredging

Maintenance dredging would likely be required on a multiyear basis or following extreme flow conditions; however it could be needed as frequently as every year to maintain required depths at Docks 2 and 3 and to access the navigation channel, especially in the years following the initial dredging work (WorleyParsons 2012). Other neighboring berths typically do maintenance dredging on an annual basis.

Sediment accretion in the proposed dredge prism would most likely occur because of bedload transport due to river currents, and local scour and sediment redistribution resulting from propeller wash. Hydrodynamic modeling and sediment transport analysis was conducted for the proposed Docks 2 and 3 berthing/navigation basin. Sedimentation is complex in a newly dredged basin. Specific morphologic data is unavailable for the proposed new dredging basin; therefore the rate of accretion can only be estimated roughly. Based on current accretion estimates, rough estimates for annual accretion height is approximately 0.16 feet (0.07 to 0.26 feet range) and annual accretion volume is approximately 11,675 yd^3 (4,670 to 23,350 y^3 range). Maintenance dredging would likely be required on a multiyear basis or following occasions with extreme flow events. Small scale maintenance dredging could be needed more frequently, especially in the early years following the initial dredging work when higher than normal accretion is more likely (WorleyParsons 2012).

Impacts on pinnipeds and benthic organisms would be similar to those described for initial dredging associated with construction activities (Section 3.1.1.1, *Construction: Direct Impacts*) but maintenance dredging would likely remove a smaller amount of material, resulting in some mortality of invertebrate organisms and temporary disruption of benthic productivity. Habitat within the proposed dredge prism is in deep water where benthic productivity is expected to be low compared to shallow water habitats (McCabe et al. 1997). As mentioned in Section 3.1.1.1, *Construction: Direct Impacts*, benthic organisms typically recolonize disturbed areas in 30 to 45 days following disturbance. Thus, should dredging occur annually, it would not prevent recolonization of the benthic habitat.

Maintenance related dredging activities could affect pinnipeds in a similar manner as was described for initial dredging associated with construction activities in Section 3.1.1.1, *Construction: Direct Impacts*. Pinnipeds could be affected by colliding with dredging vessels, increased turbidity, and noise associated with dredging activities (Todd et al. 2014). Collisions between dredging vessels and pinnipeds are possible but unlikely to occur given the slow speeds of dredging vessels (Todd et al. 2014). Turbidity is unlikely to cause substantial impacts on pinnipeds since they often inhabit naturally turbid or dark environments and are likely to use other senses in addition to their vision to locate potential hazards and prey (Todd et al. 2014). Noise could cause masking and behavioral changes in pinnipeds but is unlikely to cause auditory damage (Central Dredging Association 2011; Dickerson et al. 2001; Todd et al. 2014).

Noise Impacts from Maintenance Dredging

Potential noise impacts from maintenance dredging would be similar to those described for dredging in Section 3.1.1.1, *Construction: Direct Impacts*.

Produce Coal Dust

Coal particles would be generated during operation of the proposed export terminal as coal is unloaded from trains, stored in large stockpiles, and then loaded onto vessels.

The potential extent and deposition rate of coal dust particles less than 75 microns was modeled as part of the air quality analysis. See the NEPA Air Quality Technical Report for additional details (ICF International 2016f). Based on the models, the highest rate of coal dust deposition would be expected in the immediate area surrounding the export terminal, but smaller particles would also be expected to deposit in a zone extending around and downwind of the export terminal. Deposition rates could range from 1.45 grams per square meter per year (g/m^2/year) adjacent to the export terminal, gradually declining to less than 0.01 g/m^2/year approximately 2.41 miles from the export terminal. Refer to the SEPA Coal Technical Report (ICF International 2016h). Thresholds for possible effects of coal dust on wildlife have not been established. However, as described in Section 6.7, *Coal Dust*, the benchmark used for the analysis of potential negative impacts to people was 2.0 g/m^2/month. Coal dust deposition in the indirect study area from the proposed terminal would be below this benchmark. See Section 6.7, *Coal Dust*, for more information.

Based on the models, the zone of deposition would extend primarily northwest of the project area for the On-Site Alternative and over the Columbia River, encompassing the project area for the Off-Site Alternative and forested hills at the northern extent of the project area for the Off-Site Alternative, riparian habitat along the shoreline, and extending across the Columbia River to Lord and Walker islands. Deposition rates of less than 0.1 g/m^2/year are projected to occur over the forested habitats of Lord Island in the study area (Figure 4), with declining concentrations across the island and to the south and west toward Walker Island.

Although concerns regarding coal dust are commonly expressed relative to air quality and human health concerns, there is a paucity of peer-reviewed scientific literature examining the potential effects of coal dust on wildlife, in particular, on terrestrial wildlife. More research has been conducted on potential effects of coal dust on aquatic organisms. Potential physical effects of coal dust have been well documented; however, documentation on potential toxic effects on aquatic organisms is lacking.

Ahrens and Morrisey (2005) conducted a literature review on the biological effects of unburnt coal in the marine environment. The following discussion is distilled from that review. Coal particles could affect aquatic wildlife in a manner comparable to any form of suspended particulates. Impacts could include tissue abrasion, smothering, obstruction or damage to feeding or respiratory organs, and effects resulting from reduced light. Another manner in which coal could affect aquatic wildlife is through coal leachates. Unburnt coal can be a source of acidity, salinity, trace metals, hydrocarbons, chemical oxygen demand, and potentially macronutrients if they leach from the coal matrix into aquatic habitats. Toxic constituents of coal include PAHs and trace metals, which are present in coal in variable amounts and combinations dependent on the type of coal. The coal type, along with mineral impurities in the coal and environmental conditions determine whether these compounds can be leached from the coal. Some PAHs are known to be toxic to aquatic animals and humans.

Metals and PAHs could also leach from coal to the pore water of sediments and be ingested by benthic-feeding organisms, providing a mechanism for subsequent ingestion by other organisms throughout the food chain. However, the low aqueous extractability and bioavailability of the

contaminants minimizes the potentially toxic effects. The coal anticipated to be exported from the export terminal is alkaline and low in sulfur and trace metals. The conditions to produce concentrations in pore waters are not present in a dynamic riverine environment. This would further support the view of Ahrens and Morrisey (2005) that the bioavailability of such toxins would likely be low.

In summary, fugitive coal dust from operation of the On-Site Alternative is not expected to increase suspended solids in the Columbia River to the point that there would be a demonstrable effect on aquatic wildlife and fish distribution, abundance, or survival. Additionally, the potential risk for exposure to toxic chemicals contained in coal (e.g., PAHs and trace metals) would be relatively low as these chemicals tend to be bound in the matrix structure and not quickly or easily leached. Particles would likely be transported downstream and either carried out to sea or distributed over a sufficiently broad area as not to be problematic. Coal dust accumulation within the area is expected to be below the trigger level for sensitive areas, as indicated in the SEPA Coal Technical Report (ICF International 2016h). Sensitive areas, as defined by New Zealand Trigger Levels referenced in the NEPA Coal Technical Report typically include areas with significant residential development. Over the long term, coal dust could accumulate in the terrestrial study area; however, predicting the extent to which wind and rain would further disperse coal dust and to what extent coal dust could affect wildlife species and their habitats over the life of the On-Site Alternative is unknown. Refer to the NEPA Vegetation Technical Report for information related to coal dust impacts on vegetation (ICF International 2016c).

3.2 Off-Site Alternative

Potential impacts on wildlife from the proposed export terminal at the Off-Site Alternative location are described below.

3.2.1 Construction: Direct Impacts

Construction of the terminal would affect both terrestrial habitats as well as aquatic habitats in the Columbia River. The types of construction impacts would be similar to those described for the On-Site Alternative. Potential impacts in terrestrial habitat due to construction include removal of habitat, wildlife disturbance and possibly mortality, and construction related noise and visual impacts. Potential impacts in aquatic habitat from construction would include removal or alteration of habitat, animal disturbance and possibly mortality, underwater noise, and potential leaks or spills.

Construction of the Off-Site Alternative would result in the following direct impacts.

3.2.1.1 Terrestrial Habitat and Wildlife Impacts

Permanently Remove Habitat and Cause Associated Wildlife Mortality

Construction of the Off-Site Alternative would destroy all wildlife habitat within the limits of construction.

A total of 216.36 acres of terrestrial habitat (aquatic habitat is discussed in the *Aquatic Habitat and Wildlife Impacts* section, below) would be permanently removed during construction by grading and clearing (Table 8 and Figure 13). The majority of impacts at the project area would occur in upland (155.46 acres) and wetland (51.28 acres) habitats, which would affect nearly six times as much upland habitat (compared to 26.26 acres for the project area for the On-Site Alternative) and twice as much wetland habitat (compared to 24.10 acres for the project area for the On-Site Alternative). Less than 5% of impacts at the project area (9.62 acres) would occur on developed lands, compared to more than 75% at the project area for the On-Site Alternative (151.14 acres) which is predominantly developed.

Although the majority of the habitats at the project area are vegetated, habitats at the site have been degraded by past disturbances related to agriculture and recreational activities, including a motocross track that consisted of several winding dirt tracks, dirt roads, and a drag strip. Wildlife currently inhabiting and using the project area would be displaced to habitats outside of the site and mortality of some individuals could occur. Highly mobile wildlife species, such as larger mammals and birds, would be expected to leave the vicinity of the project area for the On-Site Alternative during construction activities. Some mortality of individuals could occur in less mobile species, such as burrowing mammals, reptiles, and amphibians that could occur in suitable habitats on the project area. Typically, these species reproduce rapidly and any losses due to mortality of individuals would not be expected to affect the viability or fitness of the species' population overall.

Table 8. Permanent Direct Impacts by Terrestrial Habitat Type within the Project Area—Off-Site Alternative

Habitat Type	Direct Impact Area (acres)
Developed	9.62
Upland	155.46
Wetland	51.28
Open Water	8.61
Total	**224.97**

Affect Wildlife Habitat

Potential temporary impacts on wildlife habitat resulting from construction activities would be the same or similar to those described for the On-Site Alternative in Section 3.1.1.1, *Construction: Direct Impacts*.

Figure 13. Existing Land and Vegetation Cover Types Affected during Construction Off-Site Alternative

Displace and Cause Mortality of Wildlife

Construction of the Off-Site Alternative would be limited to the project area. If wildlife species were present on the project area during construction activities, there could be an increased risk of disturbance or direct mortality. Wildlife present at the project area during construction could be directly injured or killed during a collision with construction vehicles or equipment, or by placement of construction materials on the ground. This impact is unlikely because wildlife species in the study area are already habituated to the nearby industrial noise and individual animals are generally mobile and would be able to flee the construction area in advance of construction equipment operating at the project area. Suitable, similar habitats exist north and east of the site and wildlife are likely to relocate to these other adjacent areas. In addition, some of the project area is currently developed (approximately 10 acres) with an agricultural building (likely a pole barn) and some areas of dirt road and thus does not provide suitable habitat for most wildlife species. It would be anticipated that wildlife would not be present in those areas that do not provide suitable habitat; and most areas of the project area that are vegetated are of lower habitat quality due to the overall historic disturbance. Further, the risk of this impact would be temporary and would last only the duration of construction (i.e., up to 6 years). Given the general lack of high quality suitable habitat, the ability of wildlife to relocate away from construction areas, and the short-term use of construction equipment; the potential risk of construction equipment collisions with wildlife would be minimal and would not be expected to adversely affect species populations or fitness.

Result in Noise and Visual Impacts on Wildlife

Potential impacts on wildlife resulting from construction noise and visual inputs associated with construction equipment, materials and infrastructure would be the same or similar to those described for the On-Site Alternative.

Result in Spills and Leaks

Potential impacts on wildlife and habitat resulting from construction spills and leaks would be similar to those described for the On-Site Alternative.

3.2.1.2 Aquatic Habitat and Wildlife Impacts

Remove or Alter Habitat and Cause Animal Disturbance and Mortality

A total of 597 36-inch-diameter steel piles would be installed in the river for the trestle and docks, removing an area equivalent to 0.10 acre of benthic habitat. Approximately 94% of this habitat (3,980 square feet) is located in deep water (Grette Associates 2014o). Benthic, epibenthic, and infaunal organisms within the pile footprint at the time of pile driving would likely perish.

Dredging would permanently alter a 15-acre area of deepwater habitat (below -20 feet CRD) by removing approximately 50,000 cubic yards of benthic sediment to achieve a depth of -43 feet CRD, with a two-foot overdredge allowance (Grette Associates 2014o). The amount of deepening required to reach target depth would be 3 feet or less, as the proposed dredge prism (Figure 3) is at or below -42 feet CRD (Grette Associates 2014o). Required sediment removal at the project area would be ten times less than would be needed at the project area for the On-Site

Alternative, which would involve the removal of approximately 500,000 cubic yards or sediment over an area more than three times larger (48 acres at the project area for the On-Site Alternative). As with the On-Site Alternative, dredged materials would be expected to be disposed of within the flow lane, adjacent to the navigation channel, to support the downstream sediment transport system (Grette Associates 2014i, m, o). This area would be located within an area of approximately 80 to 110 acres between approximately RMs 60-66 (Figure 2).

Potential impacts on wildlife and habitat from dredging activities would be similar in nature to those described for the On-Site Alternative, although the magnitude would be much less for the Off-Site Alternative. The On-Site Alternative would dredge an area approximately 48 acres in size and remove and dispose of approximately 500,000 cubic yards of material. The Off-Site Alternative would dredge an area approximately 15 acres in size (approximately 1/3 the area) and remove and dispose of approximately 50,000 cubic yards of material (approximately 1/10 the volume). The majority of benthic, epibenthic, and infaunal organisms are nonmotile or slow-moving and occur relatively close to the substrate surface and would become entrained during dredging. Because the benthic organisms generally occur near the interface between the water and substrate, the area of impact best represents the magnitude of the potential impact to benthic organisms, which for the Off-Site Alternative would be approximately 1/3 less than the potential magnitude of impact associated with the On-Site Alternative. Benthic organisms often serve as prey for larger animal species. All of the habitat within the proposed dredge prism is in deep water where benthic productivity is expected to be low relative to shallower habitat. Deepwater channels are subjected to higher water velocities which periodically scour bottom sediments, limiting the standing crop of invertebrates and the buildup of detritus and fine materials which support these invertebrates (McCabe et al. 1997). Dredging activities are not typically associated with long-term reductions in the availability of prey resources and impacts on benthic productivity are expected to be temporary. Disturbed habitats are expected to return to reference conditions with rapid recolonization by benthic organisms (McCabe et al. 1996).

Dredging activities could affect pinnipeds. In *A review of Impacts of Marine Dredging Activities on Marine Mammals*, Todd et al. (2014) states that potential direct impacts on marine mammals include collisions, turbidity, and noise. Collisions between dredging vessels and pinnipeds are possible but unlikely to occur given the slow speeds of dredging vessels. Information on turbidity is limited, however existing research indicates that dredge related turbidity is not likely to cause substantial impacts on pinnipeds since they often inhabit naturally turbid or dark environments and are likely to use senses in addition to their vision (Todd et al. 2014). Noise could cause masking and behavioral changes but is unlikely to cause auditory damage to pinnipeds (Todd et al. 2014). Dredging would be conducted using a clamshell or hydraulic dredger (Grette Associates 2014o). Sound pressure levels (SPLs) can vary widely, based on dredger type, operations stage, or environmental conditions (Todd et al. 2014). Operations stage is an important component of noise levels produced by a clamshell (grab) dredger. Dickerson et al. (2001) measured the entire dredge process at increasing distances from the dredge operation. The loudest measurement, 124 dB_{RMS} was recorded at a distance of 518 feet from the dredge operation. This measurement is consistent with SPLs that could result in behavioral changes in pinnipeds but would not be likely to cause auditory damage. Hydraulic dredges typically produce higher SPLs than clamshell dredges but these SPLs are unlikely to reach levels that could cause auditory damage (Central Dredging Association 2011; Todd et al. 2014). Further discussion on underwater noise follows (*Underwater Construction Noise Impacts on Pinnipeds*).

Construction would result in the loss of approximately 8.61 acres of aquatic habitat (i.e., ditches) that meander through the project area. These open water areas support amphibians and are used by small mammals and birds. Mammals and birds are highly mobile species and would be expected to leave the vicinity during construction. Some mortality of amphibians and less mobile species would likely occur.

Result in Underwater Noise Impacts on Pinnipeds and Diving Birds

Potential impacts on pinnipeds and diving birds resulting from underwater construction noise would be the same or similar to those described for the On-Site Alternative (Section 3.1.1.1, *Construction: Direct Impacts*).

Result in Spills and Leaks

Potential impacts on habitat and wildlife resulting from construction related spills and leaks would be the same or similar to those described for the On-Site Alternative (Section 3.1.1.1, *Construction: Direct Impacts*).

3.2.2 Construction: Indirect Impacts

Construction of the Off-Site Alternative would not result in indirect impacts on wildlife or wildlife habitat because construction of the export terminal would be limited to the project area.

3.2.3 Operations: Direct Impacts

Operation of the Off-Site Alternative would result in similar types of direct impacts as those described for the On-Site Alternative (Section 3.1.1.2, *Operations: Direct Impacts*).

3.2.4 Operations: Indirect Impacts

Operation of the Off-Site Alternative would result in similar types of indirect impacts as those described for the On-site Alternative (Section 3.1.1.3, *Operations: Indirect Impacts*).

However, deposition rates could range from 1.83 grams per square meter per year (g/m^2/year) adjacent to the project area, gradually declining to 0.01 g/m^2/year approximately 2.98 miles from the project area. Based on the models, the zone of deposition would extend primarily northwest of the project area and over the Columbia River. Deposition rates of less than 0.1 g/m^2/year are projected to occur over the forested habitats of Lord Island within the study area, with declining concentrations across the island and to the south and west toward Walker Island.

3.3 No-Action Alternative

Under the No- Action Alternative, the Applicant would not construct the proposed export terminal. Current operations would continue, and the existing bulk product terminal site could be expanded. However, any expansion would only include activities that would not require a permit from the U.S. Army Corps of Engineers or a shoreline permit; thus, no impacts on aquatic habitats would occur as a result of an expansion occurred under the No Action Alternative. New construction, demolition, or related activities to expand the bulk terminal could occur on previously developed upland portions

of the On-Site Alternative. This could affect upland areas and terrestrial habitats that provide suitable wildlife habitat. The specific extent cannot be determined, as the specific build-out is undefined for the No-Action Alternative.

It is assumed that growth in the region would likely continue, which would allow continued operation of the export terminal and the adjacent bulk terminal site within the 20-year analysis period (2018–2038). Cleanup activities, relative to past industrial uses, would continue to occur. This could affect developed areas and associated disturbed upland habitats. Vessel traffic volumes are expected to continue and any aquatic wildlife disturbance or injury associated with vessel movements would continue at levels similar to current conditions; however, no additional measurable impact on aquatic wildlife or their habitat would be expected to occur under the No-Action Alternative because no in-water work would occur.

Chapter 4
Required Permits

The following permits would be required in relation to wildlife.

4.1 On-Site Alternative

The On-Site Alternative would require the following permits related to wildlife.

- **Endangered Species Act Consultation—U.S. Fish and Wildlife Service and National Marine Fisheries Service.** Constructing and operating the proposed export terminal at the On-Site Alternative location would result in impacts on wildlife species listed (or eligible for listing) under the ESA or designated critical habitat. In accordance with Section 7(a)(2) of the ESA, as amended, any action that requires federal authorization or funding, or is carried out by a federal agency must undergo consultation with the USFWS and/or NMFS to ensure the action is not likely to jeopardize the continued existence of any listed threatened or endangered animal species or result in the destruction or adverse modification of designated critical habitat. Since the proposed project could affect listed species, a Section 7 consultation with NMFS and USFWS is required under the ESA. A biological assessment (BA) would be prepared and submitted to the federal lead for consultation with NMFS and USFWS. NMFS and USFWS would issue biological opinions containing their conclusions on the effects of the On-Site Alternative on ESA-listed species and critical habitats.
- **Clean Water Act Authorization, Section 404—U.S. Army Corps of Engineers.** Construction and operation of the terminal would result in discharges of dredged and fill material into waters of the United States, including wetlands. Department of the Army authorization from the U.S. Army Corps of Engineers would be required.
- **Marine Mammal Protection Act—National Marine Fisheries Service.** The On-Site Alternative would involve pile-driving, which could result in harassment, or "take," of marine mammals protected under the Marine Mammal Protection Act (MMPA) of 1972, as amended. Under the MMPA, the NMFS would have to issue authorization for incidental "take" of marine mammals. Take is defined under the MMPA as "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal."
- **Local Critical Areas and Construction Permits—Cowlitz County.** The On-Site Alternative would also require local permits for clearing and grading of the site and for impacts on regulated critical areas. Chapter 19.15 of the Cowlitz County Code regulates activities within and adjacent to critical areas and in so doing regulates vegetation occurring in wetlands and their buffers, fish and wildlife habitat conservation areas (including streams and their buffers), frequently flooded areas, and geological hazard areas. Cowlitz County would require an application for Planning Clearance, a Fill and Grade Permit, and would review the proposed project for consistency with the County's critical areas ordinance.
- **Shoreline Substantial Development and Conditional Use Permits—Cowlitz County**. Cowlitz County administers the Shoreline Management Act through its Shoreline Management Master Program. The project area would have elements and impacts within jurisdiction of the Act

(Washington Administrative Code (CCC 19.20) and would, thus, require a Shoreline Substantial Development and Conditional Use permit from Cowlitz County and Ecology

- **Hydraulic Project Approval—Washington Department of Fish and Wildlife.** The On-Site Alternative would require a hydraulic project approval from WDFW because it will change the natural flow or bed of the Columbia River.
- **Clean Water Act, Section 401 Water Quality Certification—Washington State Department of Ecology.** Because the export terminal would require authorization under Section 404 of the Clean Water Act, the regulated discharges would require a Clean Water Act, Section 401 water quality certification. This certification is administered by Ecology. The dredged materials management plan requires site-specific sediment sampling to characterize sediments and determination of suitability of dredged material for disposal.

The following measures were identified by the Applicant as measures that would be implemented during construction and/or operations. These measures are assumed conditions or requirements of permits that would be issued for the On-Site Alternative or Off-Site Alternative. These measures were considered when evaluated the potential impacts.

- The Applicant will use flow-lane disposal (initial and maintenance dredging) to keep dredged materials in aquatic areas, thus maintaining sediment transport processes and aquatic habitats in the Lower Columbia River.
- While the Applicant will plan construction for an 8- to 10-hour day, 5 days per week. On occasion, dredging could occur 7 days per week to complete work within specific fish windows.
- The Applicant will limit the impact of turbidity to a defined mixing zone and would otherwise comply with WAC 173-201A.
- The Applicant will not stockpile dredged material on the river bottom surface.
- The Applicant will contain all dredged material in a barge prior to flow-lane disposal; dredged material would not be stockpiled on the riverbed.
- During hydraulic dredging, the Applicant will not operate the hydraulic pumps unless the dredge intake is within 3 feet of the bottom.
- The Applicant will remove any floating oil, sheen, or debris within the work area as necessary to prevent loss of materials from the site. The contractor will be responsible for retrieval of any floating oil, sheen, or debris from the work area and any damages resulting from the loss.
- For material being transported to flow-lane disposal sites, the Applicant will remove all debris (larger than 2 feet in any dimension) from the dredged sediment prior to disposal. Similar-sized debris floating in the dredging or disposal area will also be removed.
- The Applicant will use mixing zones established in the water quality certification for flow-lane disposal associated with the Corps' Channel Deepening Project (150 feet radially and 900 feet downstream from the point of disposal location).
- The Applicant will comply with BMPs and operations requirements for flow-lane disposal, as determined by the Corps.
- The Applicant will dispose materials to the flow lane using a bottom-dump barge or hopper dredge. These systems release material below the surface, minimizing surface turbidity.

- The Applicant will limit all construction activities to daylight hours to ensure that construction noise levels would be controlled and within local and state noise limits.
- The Applicant will install and maintain a noise monitoring station at an appropriate location on or near the site boundary to create 24-hour per day noise record during construction. The measurements would be recorded and monitored on a real time basis, and the contractor would take actions to halt or alter construction activities that exceed noise levels.
- To reduce the sound along the rail line, the Applicant will work with the Longview Switching Company to convert both the Oregon Way and Industrial Way crossings to quiet crossings and would fund such improvements to the rail line as necessary to achieve this mitigation.
- The Applicant will plan construction for an 8- to 10-hour day, 5 days per week. On occasion, it could be necessary to work 6 or 7 days per week depending on the nature of the task. For example, dredging could occur 7 days per week to complete work within specific fish windows.
- The Applicant will use activity-specific work windows designed to minimize specific impact mechanisms that could affect individual species (or populations within those species) of concern. These proposed work windows would protect species of concern while providing feasible construction periods for the in-water portion of construction over a 2-year schedule.
- The Applicant will comply with timing restrictions specifying that in-water construction must occur when species of concern (i.e., salmonids, eulachon, and green sturgeon) are absent or present in very low numbers in the adjacent waterbody. All timing restrictions established by WDFW, the Corps, NMFS, or USFWS would be strictly observed.
- The Applicant will conduct impact pile driving using a confined bubble curtain or similar sound attenuation system capable of achieving approximately 9 decibels of sound attenuation.
- Where possible, the Applicant will keep extraction equipment out of the water to avoid "pinching" pile below the water line in order to minimize creosote release during extraction.
- During pile removal and pile driving, the Applicant will place a containment boom around the perimeter of the work area to capture wood debris and other materials released into the waters because of construction activities. The Applicant will collect all accumulated debris and dispose of it upland at an approved disposal site. The contractor will deploy absorbent pads should any sheen be observed.
- The Applicant will provide a containment basin on the work surface on the barge deck or pier for piles and any sediment removed during pulling. The Applicant will dispose of any sediment collected in the containment basin at an appropriate upland facility, as with all components of the basin (e.g., straw bales, geotextile fabric) and all pile removed.
- Upon removal from substrate, the Applicant will move the pile expeditiously from the water into the containment basin. The contractor will not shake, hose, strip, or scrape the pile, nor leave it hanging to drip or any other action intended to clean or remove adhering material from the pile.
- The Applicant will dispose of all piles removed at an appropriate upland facility.
- The Applicant will prepare a mitigation plan in coordination with the Corps, Ecology, and Cowlitz County to address impacts on wetlands and aquatic habitats. Mitigation actions could be implemented at one or several locations to ensure that a wide range of ecological functions is provided to offset identified, unavoidable impacts of the On-Site Alternative. The mitigation

actions could include Applicant-sponsored mitigation actions or use of credits from existing or proposed mitigation banks

4.2 Off-Site Alternative

The Off -Site Alternative would require the same permits related to wildlife as described for the On-Site Alternative.

- Endangered Species Act Consultation
- Clean Water Act Authorization, Section 404
- Marine Mammal Protection Act
- Hydraulic Project Approval
- Clean Water Act, Section 401 Water Quality Certification
- **Local Critical Areas and Construction Permits—City of Longview.** In addition to the Cowlitz County permits, the Off-Site Alternative would require permits from the City of Longview. Chapter 17.10 of the City of Longview Municipal Code regulates activities within and adjacent to critical areas such as wetlands and their buffers, fish and wildlife habitat conservation areas (including streams and their buffers), frequently flooded areas, and geological hazard areas. The City of Longview would require Critical Areas and Floodplain permits, as well as a Building Permit for clearing, grading, and construction.
- **Shoreline Substantial Development—City of Longview**. A Shoreline Substantial Development permit from the City of Longview would also be required. The City of Longview administers the Shoreline Management Act through its Shoreline Management Master Program. The project area would have elements and impacts within jurisdiction of the act and would thus require a Shoreline Substantial Development permit from the City of Longview. The Off-Site Alternative would not require a Shoreline Substantial Development Permit or Conditional Use Permit from Cowlitz County.

Chapter 5
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Appendix A

Special-Status Wildlife Species in Cowlitz County

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Special-Status Wildlife Species in Cowlitz County

Table A-1. Special-Status Wildlife Species that Could Occur in Cowlitz County, Washington

Common Name	Scientific Name	Element of Concern	Potential for Occurrence in the study area	Potential for Habitat in the study area
Mammals				
Columbian black-tailed deer	*Odocoileus hemionus columbianus*	Individuals	Yes	Documented on the project site for the On-Site Alternative
Columbian white-tailed deer	*Odocoilieus virginianus leucurus*	Individuals	Yes	Documented on the project site for the On-Site Alternative[a]
Harbor seal (*Phoca vitulina*)	*Phoca vitulina*	Individuals	Yes	Present in Columbia River
California sea lion	*Zalophus californianus*	Individuals	Yes	Present in Columbia River
Stellar Sea lion	*Eumetopias jubatus*	Individuals	Yes	Present in Columbia River
Big brown bat	*Eptesicus fuscus*	Roosting concentrations	Unlikely	No suitable habitat identified
Myotis bats	*Myotis spp.*	Roosting concentrations	Unlikely	No suitable habitat identified
Pallid bat	*Antrozous pallidus*	Roosting concentrations	Unlikely	No suitable habitat identified
Townsends big-eared bat	*Corynorhinus townsendii*	Individuals	Unlikely	No suitable habitat identified
Fisher	*Martes pennant*	Individuals	No	No suitable habitat identified
Marten	*Martes Americana*	Individuals	No	No suitable habitat identified
Wolverine	*Gulo gulo*	Individuals	No	No suitable habitat identified
Elk	*Cervus elaphus*	Individuals	Unlikely	No suitable habitat identified
Birds				
Western grebe	*Aechmophorus occidentalis*	Individuals	Unlikely	Open water
Marbled murrelet	*Brachyramphus marmoratus*	Individuals	No	No suitable habitat identified
Yellow-billed cuckoo	*Coccyzus americanus*	Individuals	Unlikely, extremely rare	Very limited habitat

Common Name	Scientific Name	Element of Concern	Potential for Occurrence in the study area	Potential for Habitat in the study area
Streaked horned lark	*Eremophila alpestris strigata*	Individuals	Possibly	Not documented on project site for the On-Site Alternative; Other areas of potential habitat in study area not surveyed
Great-blue heron	*Ardea herodias*	Breeding Colony	No (Individuals documented on project site for the On-Site Alternative)	No breeding habitat documented in study area
Cavity nesting ducks	N/A	Breeding Areas	No	No breeding habitat documented in study area
Barrows Goldeneye	*Bucephala islandica*	Western Washington non-breeding concentrations	Unlikely	Open water
Common Goldeneye	*Bucephala clangula*	Western Washington non-breeding concentrations	Unlikely	Open water
Bufflehead	*Bucephala albeola*	Western Washington non-breeding concentrations	Unlikely	Open water
Harlequin duck	*Histrionicus histrionicus*	breeding areas and regular concentrations in salt water	No	No open salt water; no suitable breeding habitat identified
Tundra swan	*Cygnus columbianus*	regular concentrations	No	No suitable habitat identified
Trumpeter swan	*Cygnus buccinators*	Individuals	No	No suitable habitat identified
Waterfowl concentrations	N/A	significant breeding areas, regular winter concentrations	Unlikely	Suitable habitat not likely to support large concentrations
Bald eagle	*Haliaeetus leucocephalus*	breeding areas, communal roosts, regular concentrations	Possibly (Individuals documented flying over the project	No breeding habitat identified; forested wetland could provide roosting habitat.

Common Name	Scientific Name	Element of Concern	Potential for Occurrence in the study area	Potential for Habitat in the study area
			site for the On-Site Alternative)	
Golden eagle	*Aquila chrysaetos*	breeding and foraging areas	Unlikely	Not found in lowland industrial areas
Northern goshawk	*Accipiter gentilis*	breeding areas	No	No suitable habitat identified
Peregrine falcon	*Falco peregrinus*	breeding areas; regular occurrences	Possibly	Potential foraging habitat
Sooty grouse	*Dendragapus fuliginosus*	breeding areas; regular concentrations	No	No suitable habitat identified
Wild turkey	*Meleagris galiopavo*	Individuals	Unlikely	No suitable habitat identified
Sandhill Crane	*Grus Canadensis*	breeding areas, regular concentrations, migration staging areas	Unlikely	No suitable habitat for breeding or congregating.
Plovers	Charadridae	Western Washington non-breeding concentrations	Unlikely	Suitable habitat is limited
Waders/Sandpipers	Scolopacidae	Western Washington non-breeding concentrations	Unlikely	Suitable habitat is limited
Phalaropes	Phalaropodidae	Western Washington non-breeding concentrations	Unlikely	Suitable habitat is limited
Band-tailed pigeon	*Columba fasciata*	regular concentrations, occupied mineral sites	No	No known habitat on the project site for the On-Site Alternative
Spotted owl	*Strix occidentalis*	Individuals	No	No suitable habitat on the project site for the On-Site Alternative
Vaux's swift	*Chaetura vauxi*	breeding areas, communal roosts	Possibly	No large snags for breeding or roosting on the project site for the On-Site Alternative ; known

Common Name	Scientific Name	Element of Concern	Potential for Occurrence in the study area	Potential for Habitat in the study area
				sightings at Mint Farm Industrial Park[b]
Pileated woodpecker	*Dryocopus pileatus*	breeding areas	Unlikely (individuals possibly)	Breeding habitat component unlikely at the project site for the On-Site Alternative
Purple martin	*Progne subis*	breeding and feeding areas	Yes	Species presence documented on the project site for the On-Site Alternative[a]
Slender-billed white-breasted nuthatch	*Sitta carolinensus*	Individuals	Unlikely	Lack of mature deciduous forest on the project site for the On-Site Alternative
Amphibians				
Western toad	*Bufo boreas*	Individuals	Unlikely, recently extirpated from local range	Species is uncommon; No large natural ponds for breeding on the project site for the On-Site Alternative and unlikely in study area
Dunn's salamander	*Plethodon dunii*	Individuals	No	No suitable habitat on the project site for the On-Site Alternative and unlikely in study area
Van Dyke's salamander	*Plethodon vandykii*	Individuals	No	No suitable habitat on the project site for the On-Site Alternative and unlikely in study area
Cascade torrent salamander	*Rhyacotriton cascadae*	Individuals	No	No suitable habitat on the project site for the On-Site Alternative and unlikely in study area
Larch mountain salamander	*Plethodon larselli*	Individuals	No	No suitable habitat on the project site for the On-Site Alternative and unlikely in study area

Common Name	Scientific Name	Element of Concern	Potential for Occurrence in the study area	Potential for Habitat in the study area
Reptiles				
Western pond turtle	*Actinemys marmorata*	Individuals	No	No suitable habitat on the project site for the On-Site Alternative and unlikely in study area

[a] Grette Associates 2014
[b] Willapa Hills Audubon Society 2014

Grette Associates, LLC. 2014. Appendix F, Noxious weeds and sensitive plants, in Millennium Coal Export Terminal, Wetland and Stormwater Ditch Delineation Report – Parcel 619530400; prepared for Millennium Bulk Terminals—Longview, LLC. September 1, 2014. Pages 1 and 2.

Willapa Hills Audubon Society. 2014. *Cowlitz County Willapa Hills Audubon Society Annual Bird List 2014*. Available: http://willapahillsaudubon.org/WHAS_files/Birdlists/2014cowlitz_birdlist.pdf Accessed: November 21, 2014.