MILLENNIUM **Bulk Terminals—Longview**

EIS Environmental Impact Statement

State Environmental Policy Act
Final Environmental Impact Statement

Volume I: Final Environmental Impact Statement

April 28, 2017

Printed on Recycled Paper

COWLITZ COUNTY WASHINGTON

DEPARTMENT OF ECOLOGY State of Washington

Cowlitz County
207 4th Avenue North
Kelso, WA 98626

Washington State Department of Ecology
300 Desmond Drive SE
Lacey, WA 98503

April 28, 2017

Dear Interested Parties, Jurisdictions, and Agencies:

Cowlitz County and the Washington State Department of Ecology (the co-lead agencies) are pleased to present the Final Environmental Impact Statement (Final EIS) for the proposed Millennium Bulk Terminals—Longview project. Millennium Bulk Terminals—Longview, LLC (the Applicant) is proposing to construct and operate a coal export terminal (Proposed Action) in Cowlitz County, Washington, along the Columbia River.

Under the Proposed Action, the Applicant would develop the coal export terminal on 190 acres (the project area) primarily within an existing 540-acre site that is currently leased by the Applicant. The coal 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. Coal would be unloaded from rail cars, stockpiled, and loaded by conveyor onto ocean-going vessels for export using two new docks located in the Columbia River. Once construction is complete, the Proposed Action could have a maximum annual throughput capacity of up to 44 million metric tons of coal per year.

The Final EIS has been prepared in accordance with the Washington State Environmental Policy Act (SEPA) and Cowlitz County Code. The purpose of the Final EIS is to evaluate the potential environmental impacts of constructing and operating the Proposed Action.

During the EIS scoping phase, the co-lead agencies identified areas of concern associated with the Proposed Action that were subsequently addressed in the Draft EIS. The co-lead agencies published the Draft EIS for review and comment on April 29, 2016. Comments on the Draft EIS were received April 29 through June 13, 2016. All comments received during the comment period were reviewed, compiled, and considered in the development of the Final EIS. The Final EIS reflects revisions and additional information in response to comments received on the Draft EIS. Responses to all comments on the Draft EIS are presented in the Final EIS.

The Final EIS evaluates the potential impacts from construction and operation of the Proposed Action, including potential impacts related to the rail and vessel transport of coal to and from the proposed export terminal. The Final EIS also evaluates the contribution of the Proposed Action to cumulative environmental impacts. In addition to the Proposed Action, the Final EIS evaluates a no-action alternative.

The following resource areas were evaluated in the Final EIS.

Built Environment

- Land and Shoreline Use
- Social and Community Resources
- Aesthetics, Light, and Glare
- Cultural Resources
- Tribal Resources
- Hazardous Materials

Natural Environment

- Geology and Soils
- Surface Water and Floodplains
- Wetlands
- Groundwater
- Water Quality
- Vegetation
- Fish
- Wildlife
- Energy and Natural Resources

Operations

- Rail Transportation
- Rail Safety
- Vehicle Transportation
- Vessel Transportation
- Noise and Vibration
- Air Quality
- Coal Dust
- Greenhouse Gas Emissions and Climate Change

The Final EIS identifies proposed mitigation measures to address potentially significant adverse environmental impacts of the Proposed Action. In some cases, implementation of proposed mitigation measures would reduce but not completely eliminate the significant adverse impacts. These impacts are identified in the Final EIS as unavoidable and significant adverse environmental impacts. Potential unavoidable and significant adverse environmental impacts are identified for the following resource areas: social and community resources; cultural resources; tribal resources; rail transportation; rail safety; vehicle transportation; vessel transportation; noise and vibration; and air quality.

The Final EIS will be used by Cowlitz County, Washington State Department of Ecology, and other agencies to inform decision-making regarding permits for the Proposed Action. SEPA (WAC 197-11-460) requires agencies shall take no actions for 7 days after Final EIS issuance. All local, state, regional, and federal permits must be issued before the Proposed Action can begin. Construction of the Proposed Action could begin in 2018.

Questions about this Final EIS may be directed to:

Elaine Placido, DPA
Director, Building and Planning
Cowlitz County
207 4th Avenue North
Kelso, WA 98626
(360) 577-3052 (Ext. 6662)
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Sally Toteff
Director, Southwest Regional Office
Washington State Department of Ecology
300 Desmond Drive SE
Lacey, WA 98503
(360) 407-6307
sally.toteff@ecy.wa.gov

Thank you for your interest in the Millennium Bulk Terminals—Longview project environmental review process.

Sincerely,

Elaine Placido, Building and Planning Director, Cowlitz County

Date: 28 April 2017 Signature: ______________________

Sally Toteff, Southwest and Olympic Regional Director, Washington State Department of Ecology

Date: 28 April 2017 Signature: ______________________

Fact Sheet

Project Title

Millennium Bulk Terminals—Longview

Proposed Action and Alternatives

Millennium Bulk Terminals—Longview, LLC (Applicant) is proposing to construct and operate a coal export terminal (Proposed Action) in Cowlitz County, Washington, along the Columbia River. The coal export terminal would receive coal from the Powder River Basin in Montana and Wyoming, and the Uinta Basin in Utah and Colorado via rail. The coal would be unloaded and stockpiled in the project area and then loaded onto vessels for transport to Asian markets via the Columbia River and Pacific Ocean.

Proposed Action

Under the Proposed Action, the Applicant would develop the coal export terminal on 190 acres (project area) primarily within an existing 540-acre site that is currently leased by the Applicant (Applicant's leased area). The project area is adjacent to the Columbia River in unincorporated Cowlitz County, Washington, near Longview, Washington. The Applicant currently operates and would continue to operate a bulk product terminal within the Applicant's leased area.

BNSF Railway Company (BNSF) or Union Pacific Railroad (UP) trains would transport coal in unit trains (rail cars that carry the same commodity) on BNSF main line routes in Washington State, and the BNSF Spur and Reynolds Lead in Cowlitz County to the project area. Coal would be unloaded from rail cars, stockpiled, and loaded by conveyor onto ocean-going vessels for export at two new docks (Docks 2 and 3) located in the Columbia River.

Once construction is complete, the Proposed Action could have a maximum annual throughput capacity of up to 44 million metric tons of coal per year. The coal export terminal would consist of one operating rail track, eight rail tracks for storing up to eight unit trains, rail car unloading facilities, a stockpile area for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks 2 and 3), and shiploading 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), and vessels would access the project area via the Columbia River. The Reynolds Lead and BNSF Spur—both jointly owned by BNSF and UP, and operated by Longview Switching Company (LVSW)—provide rail access to the project area from a point on the BNSF main line (Longview Junction) located to the east in Kelso, Washington. Coal export terminal operations would occur 24 hours per day, 7 days per week. The coal export terminal would be designed for a minimum 30-year period of operation.

At full terminal operations, the Proposed Action would bring approximately 8 loaded unit trains each day carrying coal to the project area, send out approximately 8 empty unit trains each day from the project area, and load an average of 70 vessels per month or 840 vessels per year, which would equal 1,680 vessel transits in the Columbia River annually.

No-Action Alternative

The Applicant plans to continue operating its existing bulk product terminal located adjacent to the project area. 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 the existing dock. The Applicant plans to expand operations at the existing bulk product terminal, which could include increased storage and upland transfer of bulk products using new and existing buildings. The Applicant would likely need to undertake demolition, construction, and other related activities to develop expanded bulk product terminal facilities.

If the coal export terminal is not constructed, the Applicant would likely propose expansion of the bulk product terminal onto areas that would have been subject to construction and operation of the proposed coal export terminal. Additional bulk product transfer activities could involve products such as a calcined pet coke, coal tar pitch, cement, fly ash, and sand or gravel. The Applicant has stated this new development or operations would be designed so that they would not require a shoreline or U.S. Army Corps of Engineers permit. Any new operations would be evaluated under applicable regulations, including the State Environmental Policy Act (SEPA). Upland areas of the project area are zoned Heavy Industrial and it is assumed future proposed industrial uses in these upland areas could be permitted. Any new construction would be limited to uses allowed under existing Cowlitz County development regulations.

Location

The location for the Proposed Action is a 190-acre site (project area) located at 4029 Industrial Way (State Route 432) in unincorporated Cowlitz County. The project area is the location of the former Reynolds Metals Company facility.

Proposed Date of Implementation

Construction could begin in 2018. The Proposed Action is expected to be fully operational at maximum capacity (44 million metric tons of coal per year) by 2028.

Proponent

Millennium Bulk Terminals—Longview, LLC

Co-Lead Agencies

Cowlitz County (SEPA nominal lead agency)
Washington State Department of Ecology

Responsible Officials

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Required Permits, Plans, and Approvals

The following permits, plans, and approvals would be required for the Proposed Action.

Local

- Cowlitz County Department of Building and Planning—Shoreline Substantial Development Permit
- Cowlitz County Department of Building and Planning—Shoreline Conditional Use Permit
- Cowlitz County Department of Building and Planning—Critical Areas Permit
- Cowlitz County Department of Building and Planning—Floodplain Permit
- Cowlitz County Department of Building and Planning—Building and Site Development Permits
- Three Rivers Regional Wastewater Authority—Wastewater Discharge Permit
- City of Longview—Utility Service Permit
- Southwest Clean Air Agency—Notice of Construction

State

- Washington State Department of Ecology—Clean Water Act Section 401 Water Quality Certification
- Washington State Department of Ecology—National Pollutant Discharge Elimination System Construction Stormwater Permit
- Washington State Department of Ecology—National Pollutant Discharge Elimination System Industrial Stormwater Permit
- Washington State Department of Ecology—Water Rights Permit
- Washington State Department of Ecology—Shoreline Conditional Use Permit
- Washington Department of Fish and Wildlife—Hydraulic Project Approval
- Washington State Department of Natural Resources—Site Use Authorization or Flow Lane Disposal Authorization
- Washington State Department of Natural Resources—Aquatic Lands Lease[1]

Federal

- U.S. Army Corps of Engineers—Clean Water Act Section 404 Permit
- U.S. Army Corps of Engineers—Rivers and Harbors Act Section 10 Permit
- U.S. Army Corps of Engineers—Rivers and Harbors Act Section 14 (Section 408) Permit
- U.S. Army Corps of Engineers—Section 106 of the National Historic Preservation Act compliance
- U.S. Fish and Wildlife Service and National Marine Fisheries Service—Endangered Species Act Consultation
- National Marine Fisheries Service—Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996, Section 305 Consultation
- National Marine Fisheries Service—Marine Mammal Protection Act

Environmental Impact Statement Authors and Principal Contributors

This document has been prepared under the direction of the co-lead agencies. Key authors and principal contributors to the analyses are listed below. The co-lead agencies determined the significance of potential adverse impacts of the Proposed Action, proposed mitigation measures, and determined the unavoidable and significant adverse impacts of the Proposed Action.

[1] The project area landowner (Northwest Alloys) holds a 30-year aquatic lands lease (20-B09222) with the Washington State Department of Natural Resources (WDNR). According to WDNR, under the terms of the lease, Northwest Alloys must obtain WDNR's written consent prior to construction of improvements.

Author	Topic(s)
ICF 710 Second Avenue, Suite 550 Seattle, WA 98104 (206) 801-2800	Environmental impact statement lead for the following topics under the direction of the co-lead agencies: air quality; climate change; coal dust; cumulative impacts; cultural resources; energy and natural resources; fish; geology and soils; greenhouse gas emissions; groundwater; hazardous materials; public involvement; rail safety; sulfur dioxide and mercury emissions; social and community resources; surface water and floodplains; tribal resources; vegetation; vehicle transportation; vessel transportation; water quality; wetlands; and wildlife
BergerABAM 210 East 13th Street, Suite 300 Vancouver, WA (360) 823-6100	Aesthetics, light, and glare; land and shoreline use; public involvement; social and community resources
Confluence Environmental Company 146 N Canal Street, Suite 111 Seattle, WA 98103 (206) 397-3741	Vegetation
DKS Associates 720 SW Washington Street, Suite 500 Portland, OR 97205 (503) 243-3500	Vehicle transportation
DNV GL 1400 Ravello Drive Katy, TX 77449 (281) 396-1000	Vessel transportation
Hellerworx 4803 Falstone Avenue Chevy Chase, MD 20815 (301) 654-1980	Rail transportation
Rodino 113 Calle Conejo Bayview, TX 78566 (956) 233-9931	Vessel transportation
VTD Rail Consulting 6707 230th Street SW Mountlake Terrace, WA 98043 (425) 345-6637	Rail transportation
Wilson Ihrig & Associates 6601 Shellmound Street, Suite 400 Emeryville, CA 94608 (510) 658-6719	Noise and vibration

Date of Draft Environmental Impact Statement Issuance

April 29, 2016

Date Draft Environmental Impact Statement Comments Were Due

June 13, 2016

Dates and Locations of Draft Environmental Impact Statement Public Hearings

May 24, 2016, 1:00 to 4:00 p.m. and 5:00 to 9:00 p.m.
Cowlitz County Regional Conference Center
1900 7th Avenue
Longview, WA 98632

May 26, 2016, 1:00 to 4:00 p.m. and 5:00 to 9:00 p.m.
Spokane Convention Center
334 W Spokane Falls Boulevard
Spokane, WA 99201

June 2, 2016, 1:00 to 4:00 p.m. and 5:00 to 9:00 p.m.
TRAC Center
6600 Burden Boulevard
Pasco, WA 99301

Date of Final Environmental Impact Statement Issuance

April 28, 2017

Final Environmental Impact Statement Availability

This Final EIS is posted on the EIS website at http://www.millenniumbulkeiswa.gov/. To obtain a printed copy or DVD of this Final EIS (for the cost of production), follow the instructions provided at http://www.ecy.wa.gov/services/disclosure/disclose.html. DVDs are also available at the Cowlitz County Administration Building, Department of Building and Planning.

The document is also available as a reference at the following locations:

Cowlitz County Administration Building—Department of Building and Planning
207 4th Avenue North
Kelso, WA 98626

Washington State Department of Ecology
300 Desmond Drive SE
Lacey, WA 98503

Longview Public Library
1600 Louisiana Street
Longview, WA 98632

Castle Rock Library
137 Cowlitz Street West
Castle Rock, WA 98611

Kelso Public Library
Three Rivers Mall
351 Three Rivers Drive, Suite 1263
Kelso, WA 98626

Kalama Public Library
312 N 1st Street
Kalama, WA 98625

Woodland Community Library
770 Park Street
Woodland, WA 98674

Mid-Columbia Libraries—Pasco Branch
1320 West Hopkins Street
Pasco, WA 99301

Spokane Public Library—Downtown
906 West Main Avenue
Spokane, WA 99201

Rainier Public Library
106 West B Street
Rainier, OR 97048

Next Actions

The Final EIS provides information for public, state, and local agencies to support decision-making regarding permits for the Proposed Action. These agencies include Cowlitz County, City of Longview, Southwest Clean Air Agency, Three Rivers Regional Wastewater Authority, Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, and Ecology. Local, regional, and state agencies will conduct their respective reviews as defined by adopted local, regional, and state rules. All primary local, regional, state, and federal permits must be issued before the Proposed Action may begin. The National Environmental Policy Act Final EIS, expected to be published in 2017, will also inform local, state, and federal permit decisions.

Previous Environmental Documents

Prior environmental review was conducted for the Millennium Bulk Terminals—Longview project, including the following documents.

- SEPA Checklist with attachments, October 6, 2010
- Joint Aquatic Resources Permit Application, February 22, 2012
- Shoreline Substantial Development and Conditional Use Permit Application, February 22, 2012

Prior environmental review was also conducted for the existing bulk product terminal operations, including the following documents.

- Air Discharge Permit/Nonroad Engine Preliminary Permit Application, October 22, 2014
- Air Discharge Permit/Nonroad Engine Permit Technical Support Document, October 22, 2014

When appropriate, prior environmental documents were considered in the preparation of this EIS.

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Tables

Figures

Acronyms and Abbreviations

°F	degrees Fahrenheit
μg/m3	micrograms per cubic meter
AADT	annual average daily traffic
ABS	Automated Block Signals
ACM	active channel margin
ACS	American Community Survey
ADT	annual daily traffic
ALCOA	Aluminum Company of America
AMR	American Medical Response
Applicant	Millennium Bulk Terminals—Longview
Applicant's leased area	540-acre site currently leased by the Applicant
ARAR	applicable or relevant and appropriate requirement
ASIL	acceptable source impact level
Bar Pilots	Columbia River Bar Pilots
BiOp	biological opinion
BMP	Black Mud Pond
BNSF	BNSF Railway Company
BPA	Bonneville Power Administration
Cadna/A®	Computer-Aided Noise Abatement
CCA	copper chromate arsenic
CCC	Cowlitz County Code
CDID	Consolidated Diking Improvement District
CEQ	Council on Environmental Quality
census	U.S. Census Bureau
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CMIP5	Fifth Coupled Model Intercomparison Project
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
co-lead agencies	Cowlitz County and Washington State Department of Ecology
COLRIP	Columbia River Pilots
Corps	U.S. Army Corps of Engineers
County	Cowlitz County government
CPAH	carcinogenic polycyclic aromatic hydrocarbon
CRD	Columbia River Datum
CREOFS	Columbia River Estuary Operational Forecast System
CRITFC	Columbia River Inter-Tribal Fish Commission
CSZ	Cascadia Subduction Zone
CTC	Centralized Traffic Control

DAHP	Department of Archaeology and Historic Preservation
dB	decibel
dBA	A-weighted decibels
DDT	dichlorodiphenyltrichloroethane
DPS	distinct population segment
Draft EIS	Draft Environmental Impact Statement
DWZ	deep water zone
Ecology	Washington State Department of Ecology
EFH	essential fish habitat
EIS	environmental impact statement
EMS	emergency medical services
EMT	emergency medical technicians
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FAST	Fixing America’s Surface Transportation
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
Final EIS	Final Environmental Impact Statement
FIRM	Flood Insurance Rate Map
FNU	formazin nephelometric unit
FR	*Federal Register*
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
g	gravity
g/m^2/month	grams per square meter per month
g/m^2/year	grams per square meter per year
GCTM	global chemical transport model
GHG	greenhouse gas
GIS	geographic information system
GMA	Growth Management Act
gpm	gallons per minute
HAP	hazardous air pollutant
HGM	hydrogeomorphic
IBC	International Building Code
JARPA	Joint Aquatic Resources Permit Application
Ldn	day-night sound level
Leq(h)	hourly sound-level equivalent
LMC	Longview Municipal Code
LNG	liquefied natural gas
LVSW	Longview Switching Company
MCL	maximum contaminant level
mg/km^2-yr	milligrams per square kilometer per year
MM	mitigation measure
MMT/year	million metric tons per year

MOU	Memorandum of Understanding
mph	miles per hour
MT/year	metric tons per year
MTCA	Model Toxics Control Act
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NFA	no further action
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
ng/m^3	nanogrms per cubic meter
NMFS	National Marine Fisheries Service
NO_2	nitrogen oxides
NOAA	National Oceanic and Atmospheric Administration
NORPAC	North Pacific Paper Corporation
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTU	nephelometric turbidity units
O_3	ozone
OFW	Oregon Department of Fish and Wildlife
OHW	ordinary high water
OHWM	ordinary high water mark
Oregon DEQ	Oregon Department of Environmental Quality
PAH	polycyclic aromatic hydrocarbon
PBDE	polybrominated diphenyl ether
PCB	polychlorinated biphenyl
PDMEX	Merchants Exchange of Portland, Oregon
PHS	priority habitat and species
PEM	palustrine emergent
PFO	palustrine forested
pg/m^3	picograms per cubic meter
PHS	Priority Habitat and Species
PM2.5	particulate matter with a diameter of 2.5 micrometers or less
PM10	particulate matter with a diameter of 10 micrometers or less
ppb	parts per billion
ppm	parts per million
Proposed Action	construction and operation of a coal export terminal
project area	190-acre site
PSS	palustrine scrub-shrub
PTC	Positive Train Control
PUD	Public Utilities District
RI/FS	Remedial Investigation/Feasibility Study
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Reynolds facility	former Reynolds Metals Company facility

RI/FS	remedial investigation and feasibility study
SEPA	State Environmental Policy Act
SMA	Shoreline Management Act
SMP	shoreline management master program
SO_2	sulfur dioxide
SPL	spent potliner
SR	State Route
SWCAA	Southwest Clean Air Agency
SWMP	stormwater management plan
SWPPP	stormwater pollution prevention plan
SWZ	shallow water zone
TESC	temporary erosion and sediment control
TMDL	total maximum daily load
TPH	total petroleum hydrocarbons
TWC	Track Warrant Control
U.S. DOE	U.S. Department of Energy
UP	Union Pacific Railroad
US 30	U.S. Route 30
USC	United States Code
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
v.	*versus*
VdB	velocity decibels
VEAT	Vessel Entries And Transits
VOC	volatile organic compound
WA HSL	Washington Hazardous Sites List
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WRIA	Water Resources Inventory Area
WSDOT	Washington State Department of Transportation
WUTC	Washington Utilities and Transportation Commission

S.1 Introduction

Millennium Bulk Terminals—Longview, LLC (Applicant) is proposing to construct and operate a coal export terminal (Proposed Action) on a 190-acre site (project area) in Cowlitz County, Washington, along the Columbia River. The project area is located primarily within a 540-acre site currently leased by the Applicant (referred to as the Applicant's leased area).

The proposed coal export terminal would receive coal from the Powder River Basin in Montana and Wyoming and Uinta Basin in Utah and Colorado via rail. The coal would be unloaded and stockpiled in the project area and then loaded onto vessels for transport to Asian markets via the Columbia River and Pacific Ocean.

The Proposed Action would be constructed in two stages with a maximum throughput of 44 million metric tons of coal per year. The coal export terminal would consist of one operating rail track, eight rail tracks for storing rail cars, rail car unloading facilities, a stockyard for coal storage, and conveyor and reclaiming facilities. The terminal would include two new docks (Docks 2 and 3) in the Columbia River, and shiploading facilities on the two docks. Dredging would be required to provide access to and from the Columbia River navigation channel (navigation channel) and for berthing at Docks 2 and 3. A detailed description of proposed facilities and operations, as well as the existing facilities and operations in the project area is provided in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

This *Summary* chapter provides an overview of key elements of this Final Environmental Impact Statement (Final EIS) in the following sections.

- **Section S.2, Environmental Review Process.** This section presents an overview of the environmental review process, including public involvement, and agency and tribal coordination.
- **Section S.3, Applicant's Project Objectives.** This section provides the Applicant's project objectives for the Proposed Action.
- **Section S.4, Alternatives.** This section provides an overview of the two alternatives evaluated in this Final EIS: the Proposed Action and No-Action Alternative.
- **Section S.5, Significant Areas of Concern.** This section summarizes the significant areas of concern identified in comments during the EIS scoping process for the Proposed Action.
- **Section S.6, Potential Environmental Impacts and Proposed Mitigation Measures.** This section summarizes the environmental impacts that would likely result from construction and operation of the Proposed Action, and proposed measures that have been identified to mitigate those impacts. This section also summarizes the resource areas with potential cumulative impacts. A table of potential impacts and proposed mitigation measures is provided at the end of this *Summary* chapter.
- **Section S.7, Unavoidable and Significant Adverse Environmental Impacts.** If proposed mitigation measures were implemented, they would reduce but not completely eliminate significant adverse impacts resulting from construction and operation of the Proposed Action.

This section summarizes the unavoidable and significant adverse environmental impacts of the Proposed Action that could remain.

- **Section S.8, Required Permits, Plans, and Approvals.** This section lists the permits, plans, and approvals that would be required for the Proposed Action.
- **Section S.9, Next Steps.** This section describes the next steps in the environmental review process.

Detailed technical information is provided in Chapters 1 through 8 of this Final EIS (Volume I), the EIS appendices (Volume II), and technical reports (Volume III). Volume IV presents responses to comments on the Draft EIS.

S.2 Environmental Review Process

This EIS was prepared for the Proposed Action as required by the Washington State Environmental Policy Act (SEPA) (Chapter 43.21C of the Revised Code of Washington [RCW]), the SEPA Rules (Chapter 197-11 of the Washington Administrative Code [WAC]), and Cowlitz County Code (Chapter 19.11). The Proposed Action triggers SEPA review because it would require permits from state and local agencies. Other local, state, and federal agencies responsible for permits for the Proposed Action will use this Final EIS along with other information to support permitting decisions. The permits, plans, and approvals that would be required for the Proposed Action are listed in Section S.8, *Required Permits, Plans, and Approvals*, of this of this *Summary* chapter. The Proposed Action is also being reviewed under the National Environmental Policy Act (NEPA), for which the U.S. Army Corps of Engineers (Corps), the NEPA lead agency, prepared a separate Draft EIS pursuant to NEPA. The Corps published the NEPA Draft EIS on September 30, 2016.

SEPA requires state and local agencies in Washington State to identify and consider the environmental impacts that could result from governmental decisions including issuing permits for private proposals, such as the Proposed Action. Under SEPA, an EIS is necessary if a proposed action is likely to result in significant adverse environmental impacts. The purpose of an EIS is to provide the public and agencies with information about the effects of a proposed action and inform local and state agency permitting decisions. An EIS is not a decision to approve or deny a proposal.

The co-lead agencies responsible for this EIS under SEPA are Cowlitz County and the Washington State Department of Ecology (Ecology). Cowlitz County is the designated nominal lead agency for SEPA environmental review since the Proposed Action would occur within unincorporated Cowlitz County. As SEPA co-lead agencies, Cowlitz County and Ecology issued a Determination of Significance and Request for Comments on the Scope of the EIS for the Proposed Action on August 9, 2013, and a revised Determination of Significance on September 9, 2013. This document determined the Proposed Action is likely to result in significant adverse impacts on the environment, pursuant to SEPA (RCW 43.21C.080), and an EIS under SEPA is required.

Separate and parallel to the environmental review process is the development of a Health Impact Assessment (HIA) for the Proposed Action. Information about the Health Impact Assessment is not provided in this Final EIS.

S.2.1 Public Involvement, Agency Coordination, and Tribal Coordination

The first step in the SEPA EIS process is called *scoping*. The co-lead agencies invited local agencies, state agencies, federal agencies, tribes, organizations, and members of the public to comment on the scope of the EIS during a 95-day scoping period. The scoping period began on August 16, 2013, and closed November 18, 2013. Approximately 217,500 comments were received. The co-lead agencies established the scope of the Draft EIS based, in part, on comments received during the scoping period and identified elements of the environment that should be addressed in the Draft EIS. The co-lead agencies coordinated with applicable state and local agencies with technical expertise or jurisdiction during the development of the Draft EIS.

Publication of the Draft EIS on April 29, 2016, triggered a second round of public outreach and involvement, including notification to interested parties about the document's availability and public hearings to solicit input on the Draft EIS. During the 45-day Draft EIS public comment period (April 29 through June 13, 2016), the co-lead agencies provided multiple opportunities to comment on the Draft EIS. The co-lead agencies invited members of the public, government agencies, tribes, and organizations to provide comments by mail, online, and in person at three public hearings held on the following days.

- May 24, 2016, 1:00 to 4:00 p.m. and 5:00 to 9:00 p.m., at the Cowlitz County Regional Conference Center, 1900 7th Avenue, Longview, WA 98632
- May 26, 2016, 1:00 to 4:00 p.m. and 5:00 to 9:00 p.m., at the Spokane Convention Center 334 W Spokane Falls Boulevard, Spokane, WA 99201
- June 2, 2016, 1:00 to 4:00 p.m. and 5:00 to 9:00 p.m., at the TRAC Center, 6600 Burden Boulevard, Pasco, WA 99301

Approximately 267,000 comment submissions were received during the 45-day Draft EIS public comment period. Of these submissions, approximately 263,000 were from mass-mailing form letter or petition campaigns and approximately 4,000 were unique submissions (i.e., not a form letter or petition). All comments submitted during the Draft EIS public comment period were reviewed and considered in the development of this Final EIS. Volume IV, *Responses to Comments on the Draft Environmental Impact Statement*, of this Final EIS presents responses to comments on the Draft EIS. Copies of all public comments received on the Draft EIS are included in an appendix to this volume.

S.3 Applicant's Project Objectives

As part of the SEPA process, the Applicant provided the co-lead agencies with its project objectives, summarized as follows.

- **Enable western U.S. coal to compete in the Pacific international coal supply market.** The Applicant states the Proposed Action would enable western U.S. coal to compete in the Pacific international coal supply market by providing a facility designed to transport western U.S. coal efficiently from rail to ocean-going vessels. The Applicant states further development of western U.S. coalfields and the growth of Asian market demand for U.S. coal is expected to continue, and existing West Coast terminals are unavailable to support this need. According to the Applicant, to derive benefit from economies of scale, implementation of the Proposed Action would provide a coal export terminal sufficient in throughput to give U.S. coal producers the opportunity to expand their share of the international coal market.

- **Diversify Washington State's trade-based economy.** The Applicant states the Proposed Action would support the diversification of Washington State's trade-based economy by providing a new bulk commodity export terminal to accommodate the anticipated growth in demand for exporting U.S. coal. According to the Applicant, implementation of the Proposed Action would help support the state's diverse economy, which is essential for maintaining economic sustainability.
- **Reduce local unemployment.** The Applicant states the Proposed Action would help reduce unemployment in Cowlitz County by creating employment opportunities in the Longview area. The new employment opportunities would also generate needed tax revenues for local economies.

S.4 Alternatives

This section provides an overview of two alternatives: the Proposed Action and No-Action Alternative. Analysis of off-site alternatives is not required under SEPA for a private proposal.

S.4.1 Proposed Action

The Proposed Action would construct and operate a coal export terminal in Cowlitz County, Washington, along the Columbia River (Figure S-1). The coal export terminal would receive coal from the Powder River Basin in Montana and Wyoming and Uinta Basin in Utah and Colorado by rail. The coal would be unloaded and stockpiled in the project area and then loaded by conveyor to ocean-going vessels for transport to Asian markets via the Columbia River and Pacific Ocean. The Proposed Action would have a maximum annual throughput capacity of up to 44 million metric tons of coal per year at full export terminal operations.

The location for the Proposed Action is adjacent to the Columbia River in unincorporated Cowlitz County, Washington, near Longview, Washington. Under the Proposed Action, the Applicant would develop the terminal on 190 acres (project area) primarily within an existing 540-acre site that is leased by the Applicant (Applicant's leased area). The Applicant currently operates and would continue to operate approximately 350 acres of the leased area as a bulk product terminal.

BNSF Railway Company (BNSF) or Union Pacific Railroad (UP) trains would transport coal in unit trains (rail cars that carry the same commodity) to Washington State. Trains would then travel on BNSF main line routes in Washington State and the BNSF Spur and Reynolds Lead in Cowlitz County. Coal would be unloaded from rail cars, stockpiled, and loaded by conveyor onto ocean-going vessels at the two proposed docks (Docks 2 and 3) on the Columbia River.

Figure S-2 shows the expected rail routes for Proposed Action-related trains. Figure S-3 shows the expected route for Proposed Action-related vessels.

Figure S-1. Proposed Action

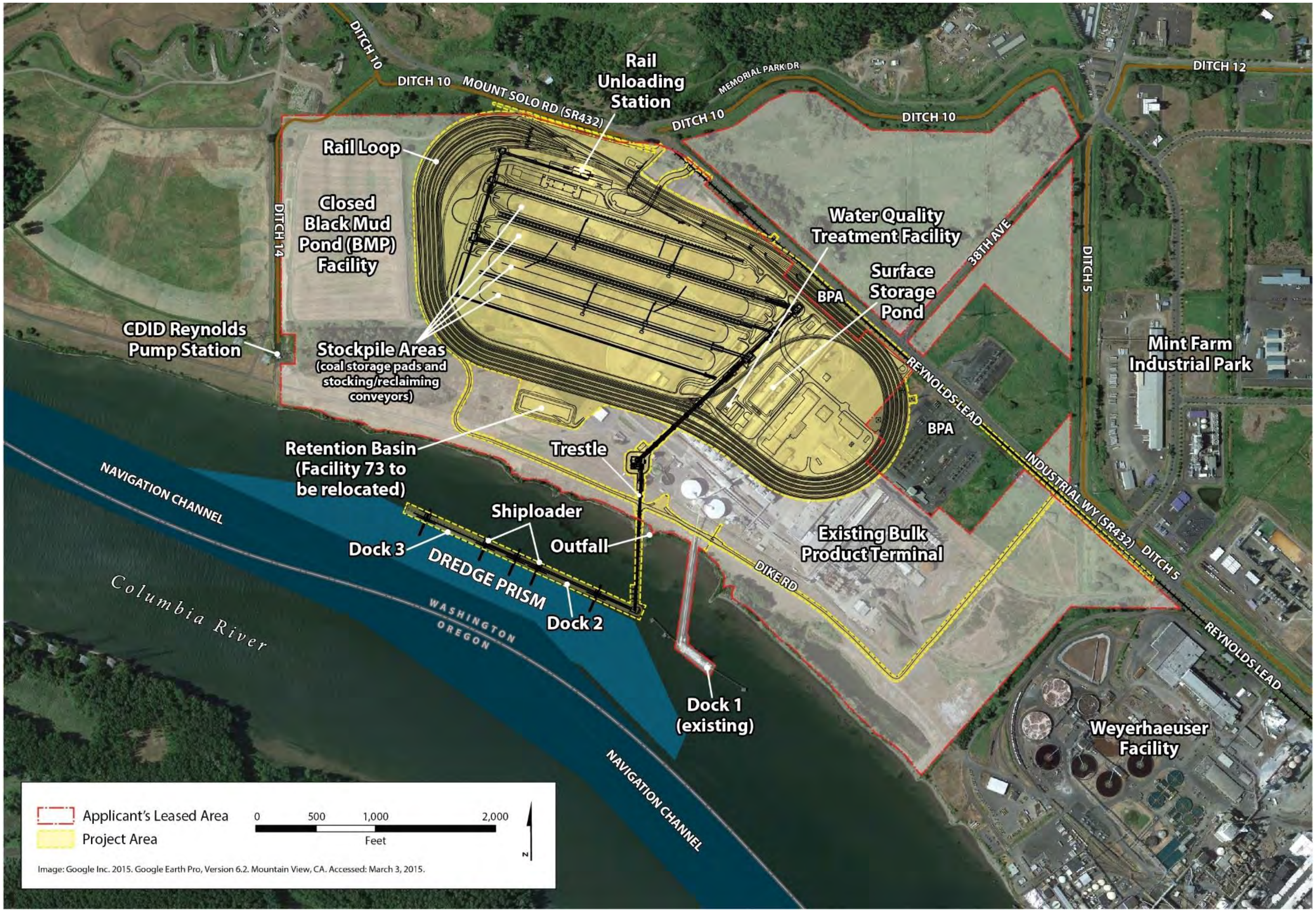


Figure S-2. Expected Rail Routes for Proposed Action-Related Trains

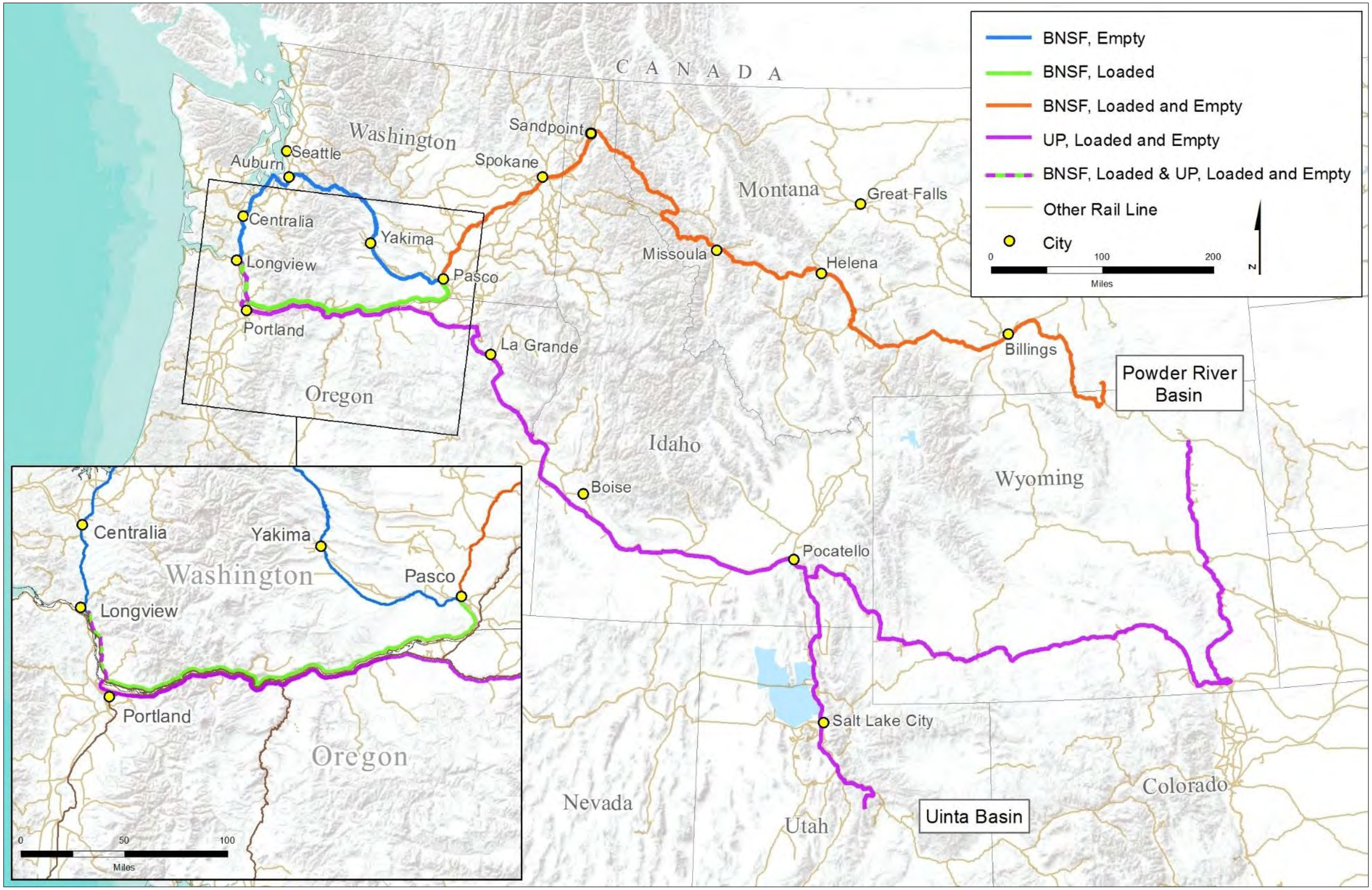
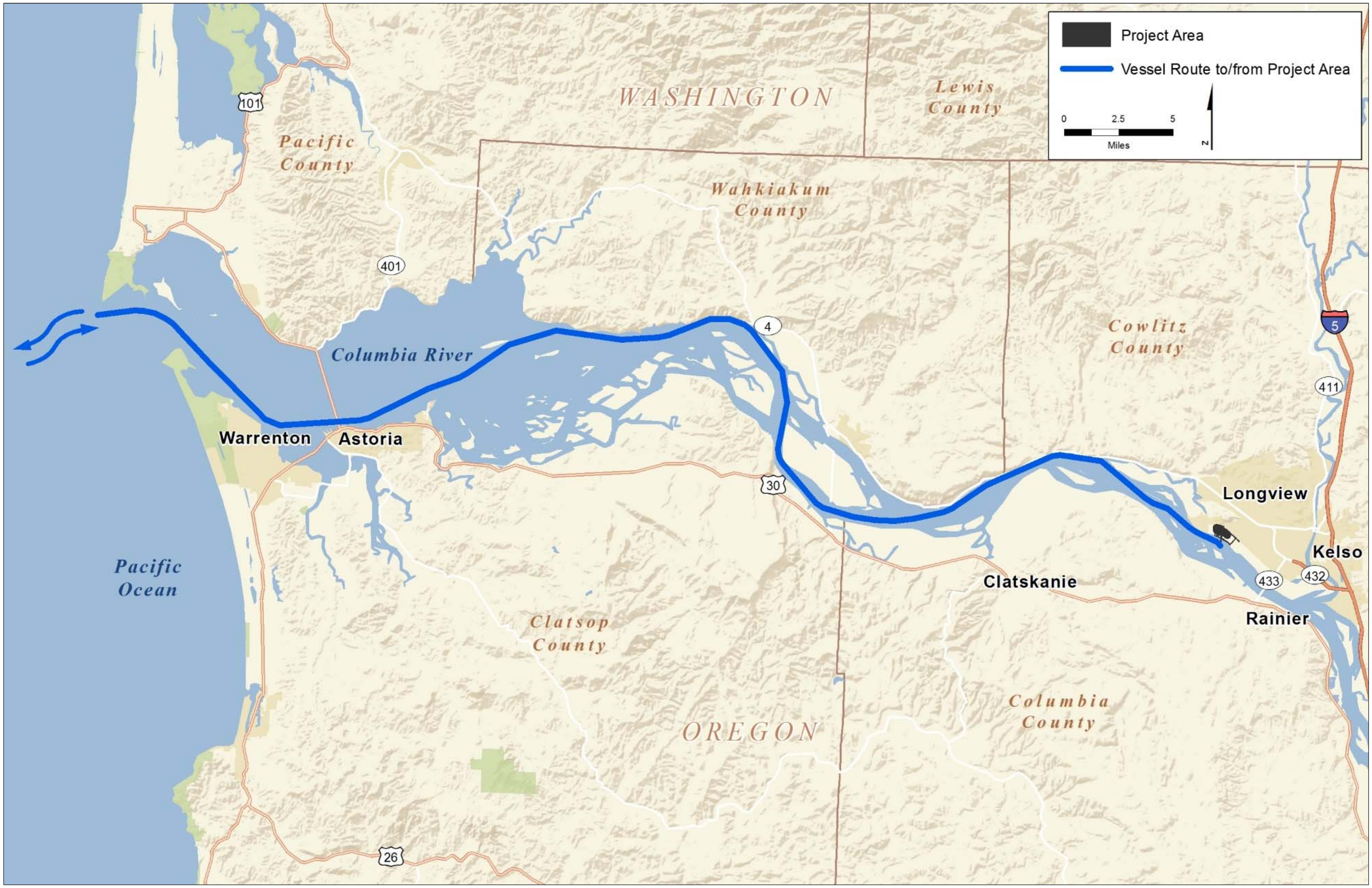


Figure S-3. Columbia River Vessel Route for Proposed Action-Related Vessels



Construction of the Proposed Action would involve clearing, grading, and constructing rail and coal-handling facilities. These facilities would include one operating rail track and eight loop tracks to provide staging for arriving and departing trains. Coal would be moved on the facility using a tandem rotary dumper, conveyors, stackers, and reclaimers. The stockpile area would be located within the rail loop and consist of four discrete stockpile pads. Each pad would require ground improvements, which would entail preloading[1] of each stockpile pad.

The Proposed Action would also require constructing a trestle and two docks, Docks 2 and 3, with one shiploader on each dock. Dredging of the Columbia River would be required to provide access to and from the Columbia River navigation channel and for berthing at Docks 2 and 3.

Vehicles would access the project area from Industrial Way, and vessels would access the project area via the Columbia River and berth at Dock 2 or 3. The Reynolds Lead and BNSF Spur—both owned by BNSF and operated by the Longview Switching Company (LVSW)—provide rail access to the project area from a point on the BNSF main line (Longview Junction) located to the east in Kelso, Washington. Operations of the Proposed Action would occur 24 hours per day, 7 days per week, and the terminal would be designed for a minimum 30-year period of operation.

The Applicant anticipates construction to begin in 2018 and be completed by 2024. Construction and operations would consist of two stages. Stage 1 would include two sub-stages: Stage 1a for start-up operations and Stage 1b for increased operations. Stage 2 would involve construction and operations for full build-out. For the purpose of the EIS analysis, the Proposed Action is assumed fully operational at maximum capacity by 2028. At full terminal operations, the Proposed Action would bring approximately 8 loaded unit trains each day carrying coal to the project area, send out approximately 8 empty unit trains each day from the project area, and load an average of 70 vessels per month or 840 vessels per year, which would equate to 1,680 vessel transits in the Columbia River annually.

The project area would be located within the Applicant's leased area. Portions of the Applicant's leased area are subject to ongoing hazardous materials cleanup activities resulting from contamination by the former aluminum smelting and casting uses. Ecology is overseeing work being done by the Applicant and Northwest Alloys/Alcoa to investigate and clean up the Applicant's leased area under Washington State's Model Toxics Control Act. Cleanup efforts are in progress and are separate from the EIS process. The Applicant's leased area is currently used as a bulk product terminal that includes both marine and upland facilities. Current operations of the bulk product terminal, allowed under current permits and zoning, include storing and transporting alumina and up to 150,000 metric tons per year of coal.

S.4.2 No-Action Alternative

SEPA Rules (WAC197-11) require an EIS to evaluate a no-action alternative. By evaluating a no-action alternative, decision-makers and the public can meaningfully compare the impacts of a proposed action with a no-action alternative. Under the No-Action Alternative evaluated in this EIS, the Applicant would not construct the Proposed Action as described in Section S.4.1, *Proposed Action*. In 2014, the Applicant described its planned operations and expansion and potential future

[1] Preloading is the consolidation or compression of soils to support coal stockpiles and associated infrastructure and prevent excessive future settlement.

operations to evaluate under the No-Action Alternative. The analysis of the No-Action Alternative looks at how the site could develop in the future if the coal export terminal were not built.

The Applicant plans to continue current activities under existing permits at the existing bulk product terminal adjacent to the project area and increase commodities storage regardless of whether the Proposed Action in the 190-acre project area is built. Current operations include storing and transporting alumina and up to 150,000 metric tons per year of coal. The importing of alumina would continue using Dock 1. Expanded operations could increase upland storage and transfer of bulk products. The Applicant would likely undertake demolition, construction, and other related activities to develop expanded bulk product terminal facilities adjacent to the project area. Maintenance of the bulk product terminal would continue, including maintenance dredging for the existing dock (Dock 1). Cleanup activities from past industrial uses would also continue.

The Applicant would expand its existing bulk product terminal business onto areas that would have been subject to construction and operation of the proposed coal export terminal. A future expansion scenario under the No-Action Alternative would involve handling bulk materials already permitted for offloading at Dock 1, including pet coke, coal tar pitch, cement, fly ash, sand, and gravel. The Applicant has stated that new development or operations would not require a Corps or shoreline permit. Any new construction would be limited to uses allowed under existing Cowlitz County development regulations. 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 the No-Action Alternative evaluation in this EIS.

S.5 Significant Areas of Concern

The co-lead agencies received over 217,500 comments on the Proposed Action during the scoping period and approximately 267,000 comment submissions during the 45-day Draft EIS public comment period. Many of these comments expressed concerns about the Proposed Action.

The most commonly expressed concerns centered on climate change and potential air quality impacts. Climate change concerns included impacts as a result of combustion of fossil fuels at coal power plants overseas and greenhouse gas emissions from the transportation of coal under the Proposed Action. Climate change concerns also focused on natural environment effects, including increasing temperatures, changes to ecosystem health, causing extreme weather conditions, and the view that the Proposed Action could conflict with or contradict public interest and/or government regulatory actions aimed to reduce greenhouse gas emissions. Concerns were also raised about air quality and the effects of coal dust deposition related to the Proposed Action.

Commenters expressed concern for aquatic resources and the potential for damage to aquatic ecosystems and fishing areas on the Columbia River. Vessel traffic concerns focused on the increased potential for incidents or vessel collisions and the risk of fuel and cargo spills into the Columbia River, as well as the potential for increased vessel traffic congestion. Water quality and surface water concerns centered on the potential for coal dust emitted from trains and vessels during transportation to be deposited on water bodies, and potential coal spills at the project area, along the rail routes, and along the vessel route.

Concerns were also raised about the potential for the Proposed Action to affect human health due to coal dust and diesel emissions. Commenters also expressed concern about rail transportation, including the scope of the analysis, potential delay at at-grade crossings, vehicle and pedestrian safety, and the potential infrastructure improvements that would be necessary to accommodate the Proposed Action. Additional concerns were raised about the potential for the Proposed Action to affect public services and utilities, socioeconomic conditions, noise, and vibration. Commenters recommended a Health Impact Assessment be conducted concurrently with the environmental review process. Further concerns were tied to the cumulative impacts[2] of the Proposed Action with other reasonably foreseeable actions, including coal export terminal proposals in the Pacific Northwest and British Columbia, Canada.

S.6 Potential Environmental Impacts and Proposed Mitigation Measures

This section summarizes the environmental impacts that would likely result from construction and operation of the Proposed Action and proposed measures that have been identified to mitigate those impacts. Mitigation measures must be reasonable and capable of being accomplished. This section also summarizes the resource areas with potential cumulative impacts.

S.6.1 Environmental Resource Areas, Study Areas, and Types of Impacts Analyzed

This Final EIS studies potential impacts on 23 environmental resource areas. These environmental resource areas are divided into three categories: Built Environment, Natural Environment, and Operations, corresponding with Chapters 3, 4, and 5, respectively, of this Final EIS. Table S-1 lists the environmental resource areas by category.

Table S-1. Environmental Resource Areas

Built Environment	Natural Environment	Operations
Land and Shoreline Use	Geology and Soils	Rail Transportation
Social and Community Resources	Surface Water and Floodplains	Rail Safety
Aesthetics, Light, and Glare	Wetlands	Vehicle Transportation
Cultural Resources	Groundwater	Vessel Transportation
Tribal Resources	Water Quality	Noise and Vibration
Hazardous Materials	Vegetation	Air Quality
	Fish	Coal Dust
	Wildlife	Greenhouse Gas Emissions and Climate Change
	Energy and Natural Resources	

Section S.6.2, *Summary of Impacts and Proposed Mitigation Measures*, summarizes the potential impacts associated with construction and operation of the Proposed Action for each of the 23 environmental resource areas. Table S-2 at the end of this *Summary* chapter illustrates proposed mitigation measures identified by the co-lead agencies. Following the overview of impacts on

[2] Cumulative impacts are impacts that would result from the incremental addition of the Proposed Action to impacts from past, present, and reasonably foreseeable future actions.

environmental resource areas, there is a description of cumulative impacts that would result from the Proposed Action combined with other past, present, and reasonably foreseeable actions.

Each environmental resource area has a specific study area described in each section. The areas vary because physical characteristics or regulations may differ pertaining to the respective environmental resource areas.

The Final EIS considers impacts from construction and operation of the Proposed Action. Construction impacts would include temporary impacts from construction activity, or permanent impacts that result from changes to the project area due to construction of the coal export terminal. This includes vehicle and rail traffic associated with construction activities. Operation impacts would result from rail unloading, coal storage, machinery operations, equipment, vessel loading, and Proposed Action-related rail, vehicle, and vessel traffic.

Proposed Action-related rail and vessel trips would result in indirect environmental impacts along the transportation corridors. All vessel trips for the Proposed Action would travel along the Columbia River between the project area and the Pacific Ocean (Figure S-3). The rail corridors that would be affected by the Proposed Action would vary depending on the source of the coal. However, all rail trips for the Proposed Action would occur on the Reynolds Lead, BNSF Spur, and the BNSF main line in Cowlitz County. Representative BNSF and UP rail routes in and outside of Washington State were also identified (Figure S-2).

S.6.2 Summary of Impacts and Proposed Mitigation Measures

This section summarizes the impacts on the built environment, natural environment, and operations resource areas.

S.6.2.1 Built Environment

This section summarizes the impacts on the built environment resources: land and shoreline use; social and community resources; aesthetics, light, and glare; cultural resources; tribal resources; and hazardous materials.

Land and Shoreline Use

The assessment of land and shoreline use addresses potential impacts on land use, shoreline use, parks and recreation, and agricultural land.

The study area for direct impacts on land and shoreline use is the project area and the area within 500 feet of the project area; the indirect impacts study area is the Longview-Kelso urban area and nearby unincorporated areas of Cowlitz County. The study area for impacts on parks and recreation facilities is the area within 0.5 mile of the project area. The study area for impacts on agricultural land is the project area (direct impacts) and the area within 500 feet of the project area (indirect impacts).

Construction

Construction of the Proposed Action would not result in direct or indirect impacts on land and shoreline use.

Operations

The Proposed Action would introduce a new industrial land use to the project area. The Proposed Action would not change the land use of the project area substantially and the project area would remain generally compatible with other land uses in the study area. The Proposed Action would be compatible with land use conditions in the indirect impacts study area. The Proposed Action would not result in significant land use impacts on parks and recreation facilities or agricultural land uses.

Proposed Action-related rail traffic would not affect land use because existing land uses currently coexist with rail traffic. The Proposed Action would increase commercial vessel traffic along the Columbia River. However, the Columbia River is currently used for marine transportation and the additional vessel traffic would be consistent with this ongoing use.

Operation of the Proposed Action would be consistent with the comprehensive plan designation, zoning ordinance, critical areas ordinance, and shoreline master program for the project area. The Applicant would be required to obtain the appropriate land use, shoreline, and critical areas permits from Cowlitz County and Ecology to ensure compliance and consistency with the applicable land use and shoreline management programs.

Social and Community Resources

The assessment of social and community resources addresses potential impacts on social and community cohesion, public services, and utilities. Potential impacts on minority and low-income populations are also evaluated. The study areas for each element are as follows.

- **Social and Community Cohesion and Public Services:** The project area, within 0.5 mile of the project area, and the area within 0.5 mile of the affected rail lines (Reynolds Lead, BNSF Spur, and BNSF main line) in Cowlitz County.
- **Utilities:** The project area and the area within 0.5 mile of the project area.
- **Minority and Low-Income Populations:** The area within 1 mile of the project area and 0.5 mile of the affected rail lines in Cowlitz County.

Social and Community Cohesion and Public Services

Construction

Construction of the Proposed Action would have negligible impacts on social and community cohesion and access to public services.

Operations

Proposed Action-related trains could affect access to community resources and public services during peak travel times because of increasing wait times at at-grade crossings along the Reynolds Lead, BNSF Spur, and BNSF main rail line. Proposed Action-related trains could also cause pedestrian and bicyclist delay at at-grade crossings.

The Proposed Action would place new demands on Cowlitz Fire & Rescue protection services. Required fire and life safety systems would be installed in the project area and the Applicant would maintain a surface water storage pond with a reserve capacity for fire suppression.

Proposed Action-related trains would increase noise from rail traffic in Archie Anderson Park, along the Highlands Trail, and in Gerhart Gardens Park. Proposed Action-related trains would be required to sound their horns for public safety at at-grade crossings per federal regulations. Implementation of the proposed mitigation measure (Table S-2) to support the implementation of and fund a Quiet Zone[3] along the Reynolds Lead would reduce noise impacts at Archie Anderson Park and along the Highlands Trail.

Utilities

Construction

Construction activity would generate a modest demand for potable water that would be partially offset by the reduction in water demand from the existing use in the project area. Construction of the Proposed Action is not anticipated to result in significant impacts on water and sewer service.

Construction of the Proposed Action would affect two Bonneville Power Administration (BPA)-owned parcels in the project area. The Applicant would coordinate with BPA on potential impacts on BPA infrastructure. Significant adverse impacts on BPA operations are not anticipated.

Operations

Operation of the Proposed Action would create new sanitary sewage flows and new water demand. New sanitary sewer flows from the Proposed Action would be small and would be offset by the reduction in flows from the existing uses in the project area. Industrial process wastewater would be treated in the on-site water treatment facility, used on site, and would not add new demands to public sewer and wastewater utilities.

The Proposed Action would use potable municipal water supplies for domestic uses such as drinking, sinks, and toilets. The Proposed Action would not use potable water supplies for industrial needs and would not place new demands on the Longview water supply.

If the Applicant obtains an easement from BPA, the coal export terminal would be partially located on the two BPA-owned parcels in the project area. Significant adverse impacts on BPA operations are not anticipated.

Minority and Low-Income Populations

Construction

Construction activities would not have disproportionately high and adverse effects on minority and low-income populations.

Operations

Proposed Action-related trains would be required to sound their horns for public safety at at-grade crossings, and noise levels would exceed applicable criteria at noise-sensitive receptors near four public at-grade crossings on the Reynolds Lead (3rd Avenue, California Way, Oregon Way, and Industrial Way). Because there are minority and low-income populations adjacent to the Reynolds

[3] A Quiet Zone is a public at-grade crossing(s) where additional safety precautions have been constructed, reducing the federal requirement for trains to sound their horns when approaching the crossing(s). A Quiet Zone is subject to Federal Railroad Administration approval.

Lead rail line in Cowlitz County, the Proposed Action would have a disproportionately high and adverse effect on minority and low-income populations if no measures were implemented to mitigate this noise impact. Implementation of the proposed mitigation measure (Table S-2) to support the creation of a Quiet Zone along the Reynolds Lead would remove the disproportionately high and adverse noise effect on minority and low-income populations. If the Federal Railroad Administration does not approve a Quiet Zone, the impacts would be unavoidable and significant, as described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*.

With the current track infrastructure on the Reynolds Lead, a Proposed Action-related train traveling during the peak traffic hour would result in a vehicle delay impact at four public at-grade crossings on the Reynolds Lead (Industrial Way, Oregon Way, California Way, and 3rd Avenue) in minority and low-income areas in 2028. These vehicle delay impacts would have a disproportionately high and adverse effect on minority and low-income populations. If no improvements are made to reduce vehicle delay at these crossings, this disproportionately high and adverse effect on minority and low-income populations would be unavoidable and significant, as described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*.

Based on the inhalation-only health risk assessment, diesel particulate matter emissions primarily from Proposed Action-related train locomotives traveling along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County would result in areas of increased cancer risk. The maximum modeled cancer risk increase in the City of Longview would be 50 cancers per million in the Highlands neighborhood, a low-income and minority community. This impact would constitute a disproportionately high and adverse effect on minority and low-income populations and would be unavoidable and significant, as described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*.

Aesthetics, Light, and Glare

The study area for aesthetics, light, and glare is the area within a 3-mile radius of the project area. This study area encompasses ground-based locations from which the activities and structures on the project area could be observed in detail.

Construction

Construction of the Proposed Action would change the visual features of the project area. Construction activities in the project area would be visible to residents, workers, commuters, recreationalists, and boat operators, but these activities would be temporary and consistent with the general industrial context of the surrounding area. More distant viewers would not likely perceive noticeable changes during construction. Construction of the Proposed Action would result in a low level of impact on aesthetics and visual quality.

Operations

Operation of the Proposed Action would introduce new visual features and new sources of light and glare from the project area. The visual features of the Proposed Action would be consistent with the existing industrial aesthetics of the project area and the surrounding area. The Proposed Action would result in no visual impacts or low visual impacts, except for the view from Dibblee Beach. At the Dibblee Beach viewpoint, the Proposed Action would be visible to recreational users on the beach and in the Columbia River, and new sources of light would be visible and reflected in the waters of the Columbia River. Therefore, the Proposed Action would result in a moderate level of impact from the Dibblee Beach viewpoint. Implementation of proposed mitigation (Table S-2) to modify lighting and appearance of facility surface to minimize visual impacts would reduce impacts on viewers at this viewpoint.

Cultural Resources

The study area for cultural resources consists of the project area, the areas of the Columbia River that would be directly affected by overwater structures and dredging, and surrounding areas that would be affected by construction of the Proposed Action. The study area also includes vantage points on the Oregon side of the Columbia River along U.S. Route 30 (US 30) to account for potential visual effects.

The cultural resources analyses and findings are based on research prepared by the Applicant pursuant to Section 106 of the National Historic Preservation Act. The Corps is carrying out the Section 106 review concurrent with the NEPA process.

No precontact archaeological resources have been identified in the study area through previous and current archaeological surveys and geotechnical monitoring conducted for the Proposed Action. The historic resources survey identified four built environment resources in the study area. These resources are the Reynolds Metals Reduction Plant Historic District, the Consolidated Diking Improvement District (CDID) #1 levee, the BPA Longview Substation, and the Reynolds Federal Credit Union. Of these resources, the Reynolds Metals Reduction Plant Historic District, CDID #1 levee, and BPA Longview Substation have been determined eligible for listing on the National Register of Historic Places. The Lewis and Clark National Historic Trail, which is a nationally significant trail that traverses the study area, was also considered. Outside the study area, the nearest recorded historic property is the J.D. Tennant House, or Rutherglen Mansion, which is listed in the National Register of Historic Places and located approximately 0.5 mile north of the study area at the base of Mount Solo. No other culturally significant properties were identified in the study area.

Construction

Construction of the Proposed Action would demolish 30 of the 39 identified resources in the study area that contribute to the historical significance of the Reynolds Metals Reduction Plant Historic District. The Proposed Action would adversely affect cultural resources associated with the Reynolds Metals Reduction Plant Historic District through the demolition of buildings and structures that contribute to the Reynolds Metals Reduction Plant Historic District. The anticipated adverse impacts on these resources would diminish the integrity of design, setting, materials, workmanship, feeling, and association that make the historic district eligible for listing in the National Register of Historic Places. If the Proposed Action is constructed, the Reynolds Metals Reduction Plant Historic District would no longer be eligible for listing in the National Register of Historic Places. Demolition of the Reynolds Metals Reduction Plant Historic District would be an unavoidable and significant adverse environmental impact, as described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*. A Memorandum of Agreement is currently being negotiated between the Corps, Cowlitz County, Washington State Department of Archaeology and Historic Preservation (DAHP), City of Longview, BPA, National Park Service, potentially affected Native American tribes, and the Applicant. If it is successful, the Memorandum of Agreement could resolve this impact in compliance with Section 106 of the National Historic Preservation Act.

The demolition of buildings and structures associated with the former Reynolds facility would diminish the integrity of setting and association of the CDID #1 levee and the BPA Longview Substation. The CDID #1 levee and BPA Longview Substation would remain individually eligible for listing in the National Register of Historic Places. Construction of the Proposed Action would not adversely affect the J.D. Tennant House.

Preparation of an Inadvertent Discovery Plan and implementation of proposed mitigation (Table S-2) to monitor ground-disturbing activities would address potential construction impacts on unidentified archaeological resources.

Operations

Routine operations and maintenance of the Proposed Action are not expected to affect cultural resources in the study area. Remaining portions of the Reynolds Metals Reduction Plant Historic District would no longer be eligible for listing in the National Register of Historic Places, due to a loss of integrity caused by the removal. The CDID #1 levee and BPA Longview Substation would remain individually eligible for listing in the National Register of Historic Places.

Portions of the Lewis and Clark National Historic Trail are located in in the study area. However, these portions of the trail do not retain historic integrity; the features present during the Lewis and Clark expedition have been significantly modified by existing industrial development.

Archaeological resources in the project area discovered during construction could be vulnerable to inadvertent disturbance during routine operations and maintenance. If previously undocumented archaeological resources are encountered in the project area during routine operations, they would be addressed through implementation of an Inadvertent Discovery Plan.

Tribal Resources

The study area for impacts on tribal resources consists of tribal resources in and near the project area that could be affected by construction and operation of the Proposed Action. The study area also includes tribal resources and access to those resources that could be affected during rail transport along the expected rail routes for Proposed Action-related trains in Washington State. The study area for vessel transport is the route for Proposed Action-related vessels in the Columbia River from the project area to 3 nautical miles offshore, as well as the Columbia River upriver to McNary Dam, including the tribal commercial, subsistence, and ceremonial fishing zone on the Columbia River known as Zone 6.

Construction

Construction activities of the Proposed Action could cause physical or behavioral responses in fish and would affect aquatic habitat. These impacts could reduce the number of fish surviving to adulthood and returning to areas upriver of Bonneville Dam, thereby affecting the number of fish available for harvest by the tribes. Implementation of proposed mitigation measures to reduce the Proposed Action's potential impacts on fish (Table S-2) could reduce potential impacts on tribal resources.

Operations

Proposed Action-related trains would travel along the BNSF main line adjacent to the Columbia River and could result in increased at-grade crossing delays to tribal fishers' access to traditional fishing sites compared to conditions under the No-Action Alternative. Specifically, Proposed Action-related trains could affect access via designated roads to the managed tribal fishing sites on the Washington side of the Columbia River. Tribal fishers also access the river at multiple unmapped locations using unimproved, at-grade crossings. Proposed Action-related trains also could delay tribal fishers' access to these unmapped traditional fishing locations.

Operation of the Proposed Action could cause physical or behavioral responses in fish and affect aquatic habitat. These impacts could reduce the number of fish surviving to adulthood and returning to areas east of Bonneville Dam, thereby affecting the number of fish available for harvest by the tribes.

Coal dust particles could enter the aquatic environment through movement of coal into and around the project area during terminal operations and during rail transport, but would not be expected to affect behavior or survival of fish significantly.

Impacts on tribal resources are further described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*.

Hazardous Materials

The study area for evaluating hazardous materials is the area within 1 mile of the project area, and the area within 1 mile of the project area. The study area includes the former Reynolds facility and the existing bulk terminal operations located on the Applicant's leased area. Cleanup of contamination from operations of the former Reynolds facility is presently occurring as required by state cleanup laws and is separate from the EIS process.

Construction

The Applicant would be required to obtain a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit. Construction of the Proposed Action could encounter or expose hazardous materials in the project area. Construction of the Proposed Action would occur in areas separate from where cleanup actions are being done as part of the Cleanup Action Plan, with the exception of two small areas. In these areas, construction and remediation activities would be coordinated to avoid and minimize potential exposure of hazardous materials to construction workers and the surrounding environment. Cleanup actions are expected to remove or isolate hazardous materials and ensure that remaining hazardous materials are below thresholds established by federal, state, and local regulations.

Demolition of existing structures could expose possible lead- and asbestos-containing materials, chemically treated wood, and polychlorinated biphenyls (PCBs). Releases of these materials could migrate to the air, soil, surface water, or groundwater and affect the health and safety of construction personnel and others. Lead- and asbestos-containing material, treated wood debris, and caulking waste (containing PCBs) would be managed properly and recycled or disposed of at approved off-site facilities, thereby minimizing potential impacts on human health and the environment.

The transport, use, storage, and disposal of hazardous materials during construction would comply with applicable federal, state, and local regulations. In addition, the Applicant would be required to follow local and state construction and demolition standards, including best management practices. These actions would minimize the potential for a spill, release, or explosion, and would ensure a timely cleanup response. The Applicant would also be required to comply with water pollution laws to avoid or minimize pollutants entering surface waters and groundwater by obtaining and complying with the NPDES Construction Stormwater Permit.

Impacts, such as a release associated with the routine transport, use, storage, and disposal of hazardous materials (e.g., fuels, solvents) during construction, could occur; however, all construction activities would be required to comply with applicable federal, state, and local regulations. In addition, the Applicant would be required to comply with local and state construction and demolition standards, including best management practices that would minimize the potential for a spill, and ensure a timely cleanup response.

Operations

The Applicant would be required to obtain a NPDES Industrial Stormwater Permit. Operations would occur concurrently with, but would be independent of, environmental cleanup and monitoring as required in the Cleanup Action Plan for the former Reynolds facility. The Applicant would conduct cleanup activities in accordance with applicable regulations and coordinated with operations to avoid contact and exposure to personnel and the environment.

Operation of the Proposed Action could introduce new sources of hazardous materials, such as fuel, oil, grease, lubricants, hydraulic fluids, solvents, and acids. Because these substances would be used and stored in small quantities, spills would be expected to be small and rapidly cleaned up and reported, as required by federal, state, and local laws. The Applicant would include design features that would avoid and minimize the potential release of hazardous materials during operations.

During operations, the transport, use, storage, and disposal of hazardous materials by the Applicant would be required to comply with applicable federal, state, and local regulations. The Applicant would also be required to comply with water pollution laws to avoid or minimize pollutants entering surface waters and groundwater by obtaining and complying with the NPDES Industrial Stormwater Permit.

The maximum amount of hazardous materials would be a 5,000-gallon locomotive fuel tank. There is the potential for impacts related to the release of hazardous materials during rail operations. Day-to-day rail operations could increase the potential for hazardous materials (e.g., fuel, oil, grease) to be released through leaks and spills from the locomotives and rail cars along the rail line. Fuel spills could occur if any of the trains or rail cars collide or derail. If a release of hazardous materials in the project area were to result from a collision or derailment, emergency response and cleanup measures would be implemented as required by the federal and state law, including Washington State regulations under RCW 90.56.

S.6.2.2 Natural Environment

This section summarizes the impacts on the natural environment resources: geology and soils; surface water and floodplains; wetlands; groundwater; water quality; vegetation; fish; wildlife; and energy and natural resources.

Geology and Soils

The study area for impacts on geology and soils is the project area and the broader geologic environment in the surrounding area that could influence the project area. These broader geologic influences include earthquakes (seismicity) and their associated impacts (ground shaking), as well as tsunamis (large earthquake-generated waves that can affect coastal zones and could travel some distance up large rivers) or landslides that might reach the project area.

Construction

Construction of the Proposed Action would involve ground-disturbing activities such as grading, railroad and road construction, and excavating for foundations, which could increase soil erosion in the project area. The on-site erosion hazard is relatively low due to the flat condition of the site. Bare soils could be exposed during construction, resulting in the potential for soil erosion from rainfall or wind. Implementation of best management practices would be expected to reduce the potential for erosion.

Underlying soils at the project area could affect Proposed Action-related structures and infrastructure through corrosion or settlement. Impacts related to corrosion could be avoided through standard engineering and construction methods. Potential impacts associated with compaction and settlement of underlying sediments in the coal stockpile areas are addressed in the project design through preloading, which involves installing wick-drains to expel the water and compacting the soils beneath the stockpile areas prior to operations to improve its load-bearing capacity and consolidate the soils to avoid further settlement during operations.

Operations

Operation of the Proposed Action could expose people and structures to potential impacts involving catastrophic events such as strong seismic ground shaking, seismic-related ground failure (liquefaction), and landslides. The Proposed Action would be required to comply with applicable building codes. A geotechnical report would also be prepared as part of the Proposed Action to inform project design and construction techniques that could reduce potential risks associated with ground shaking and liquefaction. Additionally, preloading the stockpile areas would reduce the susceptibility of the soils to liquefaction and would reduce the potential for damage to proposed structures that occur in the immediate vicinity of the preloading area. Other geologic hazards, such as landslides are not anticipated to affect the Proposed Action.

Surface Water and Floodplains

The study area for impacts on surface water encompasses the project area and the CDID #1 drainage ditches adjacent to the project area and the Columbia River downriver 1 mile from the project area. The study area for impacts on floodplains is the project area and the surrounding 500-year floodplain on the north side of the Columbia River near the project area.

Construction

Construction of the Proposed Action could affect surface water in the study area by altering drainage patterns from heavy equipment/staging areas, construction of Docks 2 and 3 and removal of existing pile dikes in the Columbia River, and water used for construction. Construction activities could redirect drainage and increase erosion, which could introduce sediment to the surrounding drainage system. This could result in the need for additional channel maintenance; however, this is unlikely because the Applicant would be required to comply with erosion and sediment control best management practices and the requirements of an NPDES Construction Stormwater Permit. The NPDES Construction Stormwater Permit would outline best management practices that must be implemented to avoid and minimize potential impacts on surface waters during construction.

The project area is protected by levees and does not currently function as a floodplain in its ability to retain or absorb floodwaters. Thus, activities that occur landward of the levee would not modify conditions in the Columbia River and would not decrease the ability of the Columbia River to retain floodwaters within the floodplain.

Water would be supplied by either rainfall runoff collected and/or on-site groundwater wells and would be used for dust suppression, washdown water, and fire-protection systems. Water would be collected, treated, and either stored in a detention pond to be constructed on site or discharged to the Columbia River through an existing stormwater outfall (Outfall 002A). Discharge would be regulated under the NPDES Construction Stormwater Permit. The Proposed Action would not withdraw water from the Columbia River or other surface waters in the study area to meet construction water demands. Thus, no significant impacts on surface water and floodplains are anticipated during construction of the Proposed Action.

Operations

Operations would use water in ways very similar to construction, including dust suppression (i.e., coal dust), washdown water, and fire-protection systems. Impacts on surface water and floodplains resulting from operation of the Proposed Action would be considered low. Water use to meet water demands for operation of the Proposed Action would be supplied by rainfall runoff that would be collected, treated, and stored on site, and from existing on-site groundwater wells. If stormwater is collected and used for industrial beneficial use (such as dust control), a Water Rights Permit would be required in accordance with Chapter 90.03 RCW 90.03. Excess water not needed for operations would be treated and discharged to the Columbia River through Outfall 002A, in compliance with conditions the NPDES Industrial Stormwater Permit. No withdrawal of water from the Columbia River or other surface waters in the study area would occur.

Water from the stockpile areas, rail loop, office areas, docks, and other developed areas in the project area would be collected, treated, and either stored for reuse or discharged to the Columbia River, in accordance with the new NPDES Industrial Stormwater Permit. Also, construction of the Proposed Action would modify existing drainage, such that during operations less stormwater would be discharged to CDID #1 (estimated to be 26.3 million gallons/year compared to 88 million gallons/year currently). This change could have a beneficial indirect impact on the ditches by reducing the risk of flooding during significant rain events.

Operations would include modifications to the existing stormwater management system to accommodate the Proposed Action and address anticipated operational needs. Compliance with the conditions likely to be outlined in the required permits would reduce impacts on surface water and floodplains. No significant adverse impacts on surface water and floodplains related to operational water needs or use are anticipated.

Wetlands

The study area for impacts on wetlands is the project area and the immediate vicinity, where wetlands might be affected by the construction and operation of the Proposed Action.

Construction

Construction of the Proposed Action would result in 24.10 acres of permanent wetland loss. Loss of wetlands would result from placing fill material to construct the rail loops and facilities associated with the transfer and stockpiling of coal. Compliance with applicable federal, state, and local permits to place fill in wetlands and implementation of proposed mitigation (Table S-2) would compensate for the loss of wetlands. Impacts during construction would also include filling 0.57 acre of a 3.40-acre wetland. Implementation of the proposed mitigation (Table S-2) to prepare a comprehensive wetland mitigation plan would offset the impact.

Impacts on wetland water quality would not be likely to occur, as runoff from the project area would be directed to on-site drainage systems and would be treated and reused on site, or discharged in accordance with a NPDES Construction Stormwater Permit that would be required during construction.

Operations

Vegetation for one wetland would likely be affected by coal dust deposition. Coal dust deposition on vegetation would depend on the dust load, climatic conditions, and physical characteristics of the vegetation. Potential impacts related to coal dust deposition would be reduced by project design measures, best management practices, and permit requirements to control dust emissions. Implementation of proposed coal dust mitigation (Table S-2) would further reduce impacts.

Groundwater

The groundwater study area is the project area and the Applicant's leased area.

Construction

Preloading would involve installing wick-drains to expel water and consolidate soils. Preloading could temporarily disrupt existing drainage and groundwater recharge patterns in the shallow aquifer within the study area. Changes to groundwater recharge patterns on the deep and shallow aquifers would not result in a significant impact. Groundwater required for dust suppression would represent approximately 6.5% of the original groundwater extraction rights[4], which would not have a significant impact on groundwater supply.

Construction of the Proposed Action could degrade groundwater quality. Leaks and spills during construction could introduce contaminants to groundwater. Implementation of proposed mitigation (Table S-2) to locate spill response kits in the project area could reduce impacts on groundwater. Stormwater generated during construction would be collected and treated in compliance with the required NPDES Construction Stormwater Permit prior to discharge and, thus, would not be expected to degrade water quality in the Columbia River, which is the source of shallow aquifer groundwater recharge.

Construction activities would not significantly affect the deep-water aquifer. Additionally, construction of the Proposed Action would not likely affect the wellfield at the Mint Farm Industrial Park, which pulls municipal water from the deep-water aquifer.

Operations

The Applicant would be required to obtain a NPDES Industrial Stormwater Permit and would develop a separate system of stormwater collection, treatment, and discharge regulated by the

[4] The EIS does not verify the amount of Northwest Alloys' water rights; verification will occur outside of the environmental review process.

separate permit. Operations under the separate permit would not be expected to change groundwater recharge patterns measurably. The total demand on groundwater supplies during operation would account for less than 10% of the maximum pumping limits allowed under the original water rights. Potential impacts on groundwater recharge or effects on groundwater supply during operations of the Proposed Action are not considered significant.

Runoff from the project area would be directed to on-site drainage systems and would be treated and either reused on site, or discharged to the Columbia River in accordance with the new NPDES Industrial Stormwater Permit. Stormwater reused on site would require a water right and would be brought to Washington State Class A Reclaimed Water standards. Additionally, the potential for infiltration of surface water containing coal dust would be relatively low based on the low recharge rates of the soil characteristics that exist in the study area. Thus, the potential for coal dust or constituents of coal to infiltrate and affect groundwater quality is relatively low. Operation of the Proposed Action would be unlikely to affect groundwater quality significantly.

Materials released onto the ground by a rail car collision or derailment could degrade groundwater quality. If a release of hazardous materials were to occur, the rail operator would implement emergency response and cleanup actions as required by federal and state law. A potential release of hazardous materials would not be expected to affect groundwater significantly. Operations would not likely affect the wellfield at the Mint Farm Industrial Park.

Water Quality

The study area for analysis of in-water construction and dredging impacts on water quality associated with suspended sediment and elevated turbidity is the project area and the area extending 300 feet from the project area into the Columbia River. The study area also incorporates potential in-river dredged material disposal sites and an area extending 300 feet downriver of each disposal site. The study area for impacts on water quality also incorporates the CDID #1 drainage ditches adjacent to the project area, the Columbia River downriver 1 mile from the project area, and 300 feet downriver from the potential dredged material disposal sites.

Construction

Construction activities would disturb soil, which could result in impacts on water quality. The Applicant would be required to obtain an NPDES Stormwater Construction Permit and to avoid and minimize impacts on water quality. Monitoring and reporting would be required and would document if short-term or long-term impacts were occurring.

Construction activities would require using materials and products that could introduce pollutants to surface waters, which could degrade water quality. Development and implementation of a site-specific construction Stormwater Pollution Prevention Plan that includes best management practices for material handling and construction waste management would reduce the potential for water quality impacts. Implementation of proposed mitigation (Table S-2) to locate spill response kits in the project area during construction could reduce potential impacts from hazardous materials or fuels on water quality.

Construction of the Proposed Action would require in-water work, including dredging, that would disturb sediment on the river bottom and temporarily increase turbidity. Additionally, a long-term increase in the exposure of creosote in the project area could occur from removing the existing pile dikes. The Applicant would be required to use standard best management practices for working in aquatic areas, and follow permit requirements that would help maintain acceptable water quality conditions during construction.

Demolition of the existing structures in the project area has the potential to affect water quality by disturbing soil or debris that could contain hazardous or toxic materials (i.e., asbestos, lead). This impact would be minimized by collecting and removing all concrete and other structural debris and collecting and treating all stormwater from the site prior to discharge to surface waters. The Applicant will be required to use best management practices in compliance with the NPDES Construction Stormwater Permit to reduce the potential for demolition-related pollutants to enter and contaminate surface waters. Overall, the demolition activities associated with the Proposed Action would not be expected to cause a measurable impact on water quality.

Steps to avoid and minimize potential impacts on water quality from in-water and over-water work would be addressed in the Water Quality Monitoring and Protection Plan to be prepared by the Applicant. The Applicant would develop a Dredge Material Management Plan for approval by state and federal agencies to avoid and minimize impacts on water quality. The Applicant would be required to follow the approved plan and permits to ensure that potential impacts are temporary and localized in nature. No significant long-term changes in the baseline conditions in the study area would be expected to persist.

Operations

Operations and maintenance of the Proposed Action have the potential to introduce contaminants in the study area that could affect water quality. The Applicant would be required to obtain an NPDES Industrial Stormwater Permit to prevent contaminants from being discharged into surface waters during operations. Coal dust and coal dust constituents would be associated with transport, stockpiling, transfer, loading, and unloading of coal. The Applicant would be required to follow dust control requirements in the Notice of Construction. Dust-control measures would be designed into facility operations such as water sprayers, enclosed conveyor belts, enclosed rail unloading building, enclosed loading spouts, and dust suppression system for coal stockpiles. The coal dust analysis estimated the amount of coal dust that could be deposited around the project area, rail lines in Washington State, and concentrations of particles that would occur. Coal dust is not anticipated to have a significant impact on water quality.

A spill or release of potential contaminants required for the operation and maintenance of heavy equipment and machinery (e.g., diesel fuel, oils) could affect water quality if they were either released directly into surface waters or transported and discharged to surface or groundwater. During operations and maintenance, relatively small quantities (less than 50 gallons) of this amount would be handled. Potential releases could be limited in their extent and duration with rapid and appropriate spill response and cleanup. Substances such as oil, grease, coal dust, and other chemicals could contaminate stormwater. Additionally, locomotives (with fuel capacity of approximately 5,000 gallons) and fuel trucks (with fuel capacity of up to approximately 4,000 gallons) could release fuel during operations. The Applicant would be required to manage stormwater in accordance with the requirements of an NPDES Industrial Stormwater Permit and to avoid and minimize impacts on water quality.

Implementation of the proposed mitigation (Table S-2) to locate spill response kits in the project area, develop and implement a coal spill containment and cleanup plan, and monitor and reduce coal dust emissions could reduce impacts on water quality.

Impacts on water quality from vessel and rail transport outside the project area could occur. Potential increases in turbidity from vessel propeller wash would be temporary and localized and would not be expected to be measurable beyond the study area. Discharges of ballast water from vessels would be regulated at the state and federal level, and discharge of ballast water by vessels calling at the coal export terminal would be required to implement a U.S. Coast Guard ballast water management method and meet ballast discharge standards. The potential for impacts on water quality from ballast water would not be significant.

Day-to-day rail operations could release contaminants to water resources immediately adjacent to the rail line, resulting in the potential for water quality impairment. Fuel or hazardous materials spills from a vessel incident or a collision or derailment of a train would have impacts on water quality. Oil spills from a vessel or train could have significant potential impacts on water quality. The magnitude of the potential impact would depend on the location of the spill, the volume of the spill, and weather and tidal conditions. If a release of fuel or hazardous materials were to occur, rail and vessel operators would be required to follow federal and state emergency response and cleanup actions.

Coal could enter water as either coal dust or as the result of a coal spill. The potential risk for exposure to toxic chemicals contained in coal would be relatively low as these chemicals tend to be bound in the matrix structure and not quickly or easily leached. Coal dust particles would likely be transported downriver by river flow and either carried out to sea or distributed over a sufficiently broad area that a measurable increase in concentrations of toxic chemicals in the Columbia River would be unlikely. Potential impacts related to coal dust deposition would be reduced by the use of surfactants and load profiling for Proposed Action-related trains. Coal spilled into the water could occur in Washington State along the rail routes. Cleanup efforts would be implemented quickly and it would be expected that the majority of the spilled coal would be recovered.

Vegetation

The study area for direct impacts on vegetation is the project area plus additional elements (e.g., access roads, docks, and rail line). The study area for indirect impacts related to coal dust deposition consists of the area within 1 mile of the project area. The study area related to vessel transport includes the lower Columbia River from the project area to the mouth of the Columbia River. The indirect impacts study area related to rail traffic includes the expected rail routes for Proposed Action-related trains in Washington State.

Construction

Clearing and grading during construction would permanently remove approximately 26 acres of upland forest (including a small area of riparian zone), scrub-shrub, and herbaceous vegetation; approximately 24 acres of wetland vegetation; and approximately 151 acres of previously developed industrial area. The previously developed areas are devoid of vegetation because of existing structures, or there are areas of disturbed vegetation around existing structures. These areas generally do not support native plant species or provide suitable habitat for animals. Although no special-status plant species have been recorded in the project area, special-status plant species have the potential to occur based on the presence of potentially suitable habitat. Proposed mitigation is to conduct a special-status plant survey prior to construction (Table S-2). Permanent removal of vegetation during construction could be mitigated through implementation of a County-approved revegetation plan consistent with the Cowlitz County Critical Areas Ordinance 19.15.170 (Table S-2).

Construction and staging activities along the edges of the project area could temporarily disturb adjacent vegetation. To ensure disturbed native vegetation is restored after construction, mitigation is proposed to replant disturbed areas with suitable native vegetation (Table S-2).

Operations

Impacts on vegetation during operations would include the possible colonization by noxious weeds, spills of coal or other materials associated with vessel loading and transport activities, and altering vegetation as part of maintenance activities. Implementation of proposed mitigation measures (Table S-2) could avoid and minimize the invasion and colonization of noxious weeds. Best management practices, prevention, and control measures would also reduce potential vegetation impacts.

Operations in the project area and when transporting coal by rail could generate coal particles and fugitive coal dust, which could be deposited on vegetation, soils, and sediments. The impacts of coal dust on vegetation would vary depending on dust load, climatic conditions, and the physical characteristics of the vegetation. Fugitive emissions of coal dust in the project area would be reduced by using the equipment and system operations that are part of the Proposed Action. Examples include the use of enclosed conveyors, transfer points, and transfer chutes and systems including a washdown water collection and containment system, a dry fog system, and water spray systems to minimize impacts. Potential impacts related to coal dust deposition from Proposed Action-related trains would be reduced using surfactants and load profiling. Implementation of proposed coal dust mitigation (Table S-2) would further reduce impacts related to coal dust from the project area and during rail transport. Coal transported by vessel would be in enclosed cargo holds and coal dust would not likely result in significant deposition on vegetation along the vessel route in the Columbia River.

Impacts from operations could include vessel wake impacts on vegetation along the lower Columbia River. The magnitude of potential impacts would depend on vessel characteristics (i.e., vessel design, hull shape, vessel weight and speed, angle of travel relative to the shoreline, proximity to the shoreline), currents and waves, tidal stage, water depth, and shoreline characteristics (i.e., slope of the shoreline, shoreline vegetation, soil erodibility).

Fish

The direct impacts study area includes the main channel of the Columbia River 3.92 miles upriver and downriver of the project area. The study area for indirect impacts on fish related to vessel traffic extends downriver from the project area to the mouth of the Columbia River. The study area for indirect impacts related to rail traffic includes the rail routes along the Columbia River for Proposed Action-related trains.

Construction

Construction activities including installing and removing piles and the dredging and disposal of dredged materials could temporarily affect fish due to increased turbidity. While not anticipated to cause physical damage, increased turbidity could result in behavioral responses in fish.

Installing steel piles with vibratory and impact type pile drivers would generate underwater noise that could result in physical and behavioral impacts on fish. Noise attenuation and fish movement models predicted that underwater noise thresholds would be exceeded, resulting in potential injury or behavior impacts on fish. Proposed mitigation measures to reduce the noise level during in-water pile-driving activities such as the use of a confined bubble curtain or similar noise attenuation (Table S-2) would minimize impacts on fish.

Construction activities could result in temporary water quality impacts from the release of hazardous materials (e.g., fuels and lubricants) that could affect aquatic habitat or fish near the discharge point. It is assumed that a spill would be less than 50 gallons because limited quantities of potentially hazardous materials would be stored and used during construction. Implementation of proposed mitigation (Table S-2) would minimize impacts on fish.

Operations

Impacts on fish could increase during operations from the new overwater structures and increase in vessel transits. Overwater structures would increase shading to the aquatic environment, which could result in direct impacts on fish including changes to primary productivity, behavior, predation, and migration. Design features and best management practices would be implemented to minimize shading, which would reduce impacts on fish.

Proposed Action-related vessel transits could increase the risk of impacts on fish from vessel noise. Vessel noise would be sufficient to affect fish behavior but unlikely to injure fish.

Operations activities could result in temporary water quality impacts from a release of hazardous materials (fuels and lubricants) that could affect aquatic habitat or fish near the discharge point. Overall, it is assumed that a spill would be less than 50 gallons because limited quantities of potentially hazardous materials would be stored and used near water. Implementation of proposed mitigation (Table S-2) to place spill kits throughout the project area could minimize impacts on fish.

Increases in vessel traffic could increase the risk of fish stranding from vessel wakes. In 2028, the Proposed Action would represent an approximate 27% increase over projected baseline vessel traffic in the lower Columbia River. This level of increase could result in an increased risk of fish stranding.

Coal dust and fugitive coal particles could be generated during operations in the project area and rail transport that could affect fish through physical or toxicological means. Coal particles could affect fish in a manner comparable to any form of suspended particulates, such as tissue abrasion, smothering, obstruction or damage to feeding or respiratory organs, and other effects resulting from reduced quantity or quality of light. Another potential manner in which coal could affect aquatic fish is through coal leachates. Unburnt coal can be a source of acidity, salinity, trace metals, hydrocarbons, and potentially macronutrients if they leach from the coal matrix into aquatic habitats. However, the contaminants tend to be bound to the matrix of the coal and are not readily leached when exposed to water. The contaminants would be in a form not easily absorbed by aquatic organisms and the impacts are not likely to be significant. Fugitive coal dust and potential coal spills are not expected to affect fish significantly because the potential risk for exposure to toxic chemicals contained in coal would be relatively low. (Estimated coal dust deposition at and beyond the project area boundary would range from 1.99 grams per square meter per year at the northwest boundary of the project area to 0.01 gram per square meter pear year approximately 2.4 miles from the project area.) Potential impacts related to coal dust deposition would be reduced by project design measures, best management practices, and permit requirements to control dust emissions, and by the use of surfactants and load profiling for Proposed Action-related trains. Implementation of proposed coal dust mitigation (Table S-2) would further reduce impacts related to coal dust from the project area and during rail transport.

Wildlife

The study area for direct impacts on terrestrial species and habitats includes the project area plus an area up to 0.5 mile beyond the project area. The study area for indirect impacts on terrestrial species related to rail transport consists of the expected rail routes for Proposed Action-related trains in Washington State. The direct impact study area for aquatic species and habitats includes the main channel of the Columbia River approximately 5.1 miles upriver and 2.1 miles downriver from the proposed docks and the various surface and stormwater ditches, ponds, and wetlands found throughout the project area. The study area for indirect impacts on aquatic species related to vessel transport consists of the Columbia River downstream from the project area to the mouth of the river.

Construction

Approximately 151.1 acres of the project area consist of previously developed and disturbed land that generally does not support wildlife. Clearing and grading to construct the export terminal would permanently remove approximately 26.2 acres of terrestrial forested habitat and 24.1 acres of wetland habitat. The removal of this suitable wildlife habitat would affect wildlife. Construction activities would also result in the permanent loss of approximately 5.1 acres of aquatic habitat in the project area (excluding the area affected by the docks and dredging in the Columbia River).

Temporary impacts on terrestrial wildlife habitat could occur through soil disturbance, stockpiling, and erosion, causing an increase in total suspended sediments in the Columbia River and freshwater ditches on and adjacent to the project area. These types of impacts could be avoided or greatly reduced with the implementation of construction-related best management practices, avoidance and minimization measures, and compliance with permit requirements, such as those associated with the required 401 Water Quality Certification and Hydraulic Project Approval.

Construction activities that could affect wildlife include installing steel piles and dredging activities. Installation of steel piles would generate underwater noise during pile driving that could exceed the harassment thresholds (behavioral response) on wildlife. Pile installation and the applicable work windows would be provisioned in the Section 404 permit and the Hydraulic Project Approval issued by the U.S. Army Corps of Engineers and Washington Department of Fish and Wildlife, respectively. Underwater noise impacts could be reduced with the proposed mitigation measure to implement a bubble curtain, or other similar measure to attenuate noise levels during impact pile driving. Dredging would permanently alter approximately 48 acres of deep-water habitat by removing 500,000 cubic yards of benthic sediment, which could affect wildlife and benthic organisms in the study area. Implementing proposed mitigation to monitor wildlife for distress during pile-driving and dredging activities (Table S-2), implementing construction best management practices, and complying with permit conditions would minimize dredging impacts.

Construction activities could result in temporary water quality impacts from the release of hazardous materials (e.g., fuels and lubricants) that could affect aquatic and terrestrial wildlife. The potential for impacts would be avoided or reduced through protective measures, including construction best management practices, avoidance and minimization measures, in-water work restrictions, and compliance with regulatory and permit requirements. However, a spill may have impacts on wildlife based on the location, weather conditions, and type and amount of material.

Operations

Routine operations of the Proposed Action could result in spills or leaks of hazardous materials from vehicles, trains, or equipment. Contaminants could affect terrestrial habitat and water quality, thus, degrading aquatic habitat in the Columbia River and drainage ditches in the aquatic study area. Training, oil discharge prevention briefings, and regulatory compliance, among other measures could reduce these risks and the potential for impacts.

Operations of the Proposed Action could result in increased terrestrial noise that has the potential to affect wildlife by causing disturbance or avoidance behavior. However, noise generated by the Proposed Action would be similar to the existing, adjacent land uses and would not likely have a significant impact on wildlife species in the terrestrial study area. Increased rail traffic could result in an increased number of wildlife strikes by trains.

Maintenance dredging could result in impacts on benthic organisms and wildlife similar to the initial construction-related dredging activities. Impacts would be minimized through implementation of construction best management practices, compliance with permit requirements, and proposed mitigation to monitor wildlife during dredging activities (Table S-2).

Impacts on wildlife due to increased potential vessel strikes and underwater noise from additional vessel traffic for the Proposed Action would not be significant. Regarding vessel strikes, while the behavior of a pinniped (such as a seal) in the path of an approaching vessel in the study area is uncertain, it is likely that a pinniped would have the ability to avoid and swim away from the vessel. Additionally, pinniped vessel strikes are rare, pinnipeds in the Columbia River would likely be habituated to existing Columbia River vessel traffic, and vessel speed would be less than 14 knots. Therefore, the potential risk for a vessel collision with a pinniped in the study area would not be considered significant. Similarly, it is expected that Proposed Action-related vessel underwater noise impacts on pinnipeds would not be significant because peak hearing frequencies of pinnipeds in the study area are generally outside of the noise frequencies generated by vessels, and these species are habituated to existing Columbia River noise levels.

Coal dust and fugitive coal particles could be generated during operations of the Proposed Action and rail transport that could affect wildlife through physical or toxicological means. Coal particles could affect aquatic wildlife in a manner comparable to any form of suspended particulates, such as tissue abrasion, smothering, obstruction or damage to feeding or respiratory organs, and other effects resulting from reduced quantity or quality of light. Another potential manner in which coal could affect aquatic wildlife is through coal leachates. Unburnt coal can be a source of acidity, salinity, trace metals, hydrocarbons, and potentially macronutrients if they leach from the coal matrix into aquatic habitats. However, the contaminants tend to be bound to the matrix of the coal and are not readily leached when exposed to water. The contaminants would be in a form not easily absorbed by aquatic organisms and the impacts are not likely to be significant. Potential impacts related to coal dust deposition would be reduced by project design measures, best management practices, and permit requirements to control dust emissions, and by the use of surfactants and load profiling for Proposed Action-related trains. Implementation of proposed coal dust mitigation (Table S-2) would further reduce impacts related to coal dust from the project area and during rail transport.

Energy and Natural Resources

The study area for impacts on energy and natural resources is the area within 0.25 mile of the project area. When assessing the availability of energy and natural resources, the analysis considers those resources that are available regionally, beyond the 0.25-mile study area.

Construction

Construction activities of the Proposed Action would require the consumption of energy and natural resources. Energy consumption would include the use of electricity, diesel fuel, gasoline, oil, and natural gas to provide lighting, power tools and equipment, and transport employees and materials to and from the project area. Construction would also consume natural resources including water, gravel, fill dirt, steel, and wood. The demand for construction-related energy and natural resource consumption would be minor compared to current demand, and could be met by existing local and regional supply.

Operations

Electricity, gasoline, oil, propane, and diesel fuel would be the primary energy types used in the project area during operations, and fuel consumption would increase due to increased train, vessel, and vehicle transits to and from the project area. The demand for energy would not be significant compared to current demand and is anticipated to be met by the existing local and regional supply.

Operation of the Proposed Action would consume natural resources including water, gravel, fill dirt, and wood. Water demand during operations would be met by the on-site water management system, designed to collect and treat runoff for reuse, as well as from existing groundwater wells. All of the stormwater would be processed through the water treatment facility prior to reuse. Groundwater would be sourced from existing production wells with approved water rights, and there would be no need for new wells. The demand for gravel, dirt, and wood during operation of the Proposed Action is anticipated to be met by existing local and regional supply considering the availability of these resources.

S.6.2.3 Operations

This section summarizes the impacts on operations resources: rail transportation; rail safety; vehicle transportation; vessel transportation; noise and vibration; air quality; coal dust; and greenhouse gas emissions and climate change.

Rail Transportation

The study area for impacts on rail transportation includes the rail routes expected to be used by Proposed Action-related trains between the project area and the Powder River Basin in Montana and Wyoming and the Uinta Basin in Utah and Colorado. The assessment of potential rail transportation impacts focuses on the Reynolds Lead and BNSF Spur and the BNSF main line in Cowlitz County. A qualitative assessment along the BNSF main line in Washington State and to and from the Powder River Basin and the Uinta Basin is also presented.

Construction

The Applicant would transport construction materials to the project area via rail or truck. The transport of construction materials by rail would add an average of 1.3 train trips per day in the peak construction year (2018) to the Reynolds Lead, BNSF Spur, and BNSF main line routes in Washington State. This increase in rail traffic would not exceed the capacity of the Reynolds Lead and BNSF Spur and would represent a low number of trains per day compared to projected rail traffic volumes on BNSF main line routes in Washington State.

Operations

At full operation, Proposed Action-related trains would add 8 loaded and 8 empty trains per day (16 total trains per day) on the Reynolds Lead, BNSF Spur, BNSF main line in Cowlitz County, BNSF main line routes in Washington State beyond Cowlitz County, and to BNSF and UP rail lines outside of Washington State as described below. Railroad companies are expected to make investments or operating changes to accommodate the growth in rail traffic, but it is unknown when those actions would be taken or permitted.

- **Reynolds Lead and BNSF Spur**. The Proposed Action would add 16 trains per day (8 loaded and 8 empty) on the Reynolds Lead and BNSF Spur. The Reynolds Lead and BNSF Spur would have the capacity to handle baseline rail traffic and Proposed Action-related trains.
- **Main line routes in Cowlitz County.** The Proposed Action would add 8 loaded and 8 empty trains per day on the BNSF main line in Cowlitz County. Proposed Action-related trains would contribute to this segment reaching capacity in 2028 if no capacity expansions or operating changes were made.
- **Main line routes beyond Cowlitz County.** Proposed Action-related trains would add 8 loaded and 8 empty trains per day to BNSF main line routes in Washington State beyond Cowlitz County. The projected 2028 volumes on the Idaho/Washington State Line–Spokane, Spokane–Pasco, and Pasco–Vancouver segments would exceed capacity without Proposed Action-related trains. Proposed Action-related trains would contribute to these segments reaching capacity in 2028 if no capacity expansions or operating changes were made.
- **Main line routes outside Washington State.** Proposed Action-related trains would add 8 loaded and 8 empty trains per day to existing rail traffic beyond Washington State. Proposed Action-related trains would contribute to some BNSF and UP segments exceeding capacity in 2028 if no capacity expansions or operating changes were made.

If improvements are not made, Proposed Action-related trains could result in an unavoidable and significant adverse impact on rail transportation as described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*.

Rail Safety

The study area for impacts on rail safety includes the expected rail routes of Proposed Action-related trains in Washington State. A train incident for this analysis is defined as involving one or more railroads that have sustained combined track, equipment, and/or structural damage in excess of the federal reporting threshold of $10,500.

Construction

The Proposed Action would require an average of 1.3 train trips per day during the peak year of construction (2018) if rail is used to transport construction materials, which would increase the predicted accident frequency on construction train routes.

Operations

Proposed Action-related trains during operations would increase the potential for train accidents by adding 8 loaded and 8 empty trains per day on rail routes in Cowlitz County and Washington State. The predicted accident frequency with Proposed Action-related trains would increase over baseline conditions in 2028 by approximately 22% in Cowlitz County and Washington State. Implementation of proposed mitigation (Table S-2) involving coordination with BNSF and UP about operations and capacity could reduce rail safety impacts. If rail safety improvements are not made, Proposed Action-related trains could result in an unavoidable and significant adverse impact on rail safety as described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*.

Vehicle Transportation

The study area for impacts on vehicle transportation consists of public and private at-grade crossings on the Reynolds Lead and BNSF Spur and all at-grade public crossings on the BNSF main line in Cowlitz County. A review of at-grade crossings of interest along the BNSF main line in Washington State beyond Cowlitz County is also considered.

Proposed Action-related trains would block crossings more frequently and contribute to vehicles being delayed at crossings. To determine potential vehicle transportation impacts during construction and operations, increases in the average vehicle delay at crossings on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County were evaluated during a 24-hour period (to represent an average delay) and during the afternoon peak traffic hour (to analyze the highest potential vehicle delay impact that could occur). Vehicle safety was also analyzed because Proposed Action-related trains would change vehicle safety conditions at at-grade crossings.

Construction

Construction materials would be transported to the project area by rail or truck. Construction vehicles would access the project area via an existing private driveway opposite 38th Avenue or a new driveway on Industrial Way. If construction materials were delivered by rail, the Proposed Action would add an average of 1.3 train trips per day during the peak construction year (2018), which would increase vehicle delay at the study crossings along the Reynolds Lead, BNSF Spur, and BNSF main line. If Proposed Action-related construction trains travel during the peak traffic hour, the Proposed Action would have a vehicle transportation impact at three crossings on the Reynolds Lead (project area access at 38th Avenue, California Way, and 3rd Avenue).

Increased vehicle delay could affect emergency services. In a 24-hour period, the Proposed Action would increase the probability of an emergency response vehicle being delayed at study crossings by 1%.

Operations

Proposed Action-related rail traffic would increase vehicle delay and change vehicle safety conditions at the rail crossings along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County, as described below.

Vehicle delay would increase for the average driver. Delays would be the highest during the peak traffic hour. If no improvements are made to the Reynolds Lead, the Proposed Action could result in a vehicle transportation impact at six crossings (four public crossings and two private crossings) during the peak traffic hour (project area access opposite 38th Avenue, Weyerhaeuser access opposite Washington Way, Industrial Way, Oregon Way, California Way, and 3rd Avenue). If improvements are made to the Reynolds Lead and BNSF Spur to increase train speed, the Proposed Action could result in a vehicle transportation impact at four crossings (two public crossings and two private crossings) during the peak traffic hour (project area access opposite 38th Avenue, Weyerhaeuser access opposite Washington Way, 3rd Avenue, and Dike Road). On the BNSF main line in Cowlitz County, the Proposed Action could result in a vehicle transportation impact at two crossings during the peak traffic hour (Mill Street and South River Road).

Proposed Action-related trains would also increase emergency vehicle delay at rail crossings. The total gate downtime would increase over 130 minutes a day at the at-grade crossings along the Reynolds Lead and BNSF Spur, and up to 20 minutes a day at the at-grade crossings along the BNSF main line in Cowlitz County. In a 24-hour period, trains for the Proposed Action would increase the probability of emergency response vehicles being delayed by 10% at crossings along the Reynolds Lead and BNSF Spur with current track infrastructure. For crossings along the BNSF main line in Cowlitz County the probability of delay would increase by 1%. The probability of delay would increase by 5% with planned track infrastructure on the Reynolds Lead and BNSF Spur. The potential impact from the increased delay would depend on the location of the incident, if emergency vehicles need to cross the rail line, and the availability of alternative routes.

An accident probability analysis was conducted for the rail crossings in Cowlitz County (Reynolds Lead, BNSF Spur, and BNSF main line) to determine the impact on vehicle safety with Proposed Action-related trains. The analysis concluded that while the predicted accident probability for all other study crossings would increase because the Proposed Action would increase rail traffic, the predicted accident probability at all study crossings would not result in a significant vehicle safety impact.

A review of at-grade rail crossings of interest identified by the Washington State Department of Transportation (WSDOT) on BNSF main line routes beyond Cowlitz County was also conducted. Vehicle delay at these crossings would increase because the Proposed Action would add 8 or 16 train trips daily to existing BNSF rail routes (depending on location). Because the frequency of train traffic on BNSF routes would increase with Proposed Action-related trains, the probability of an increase in emergency response time at all statewide study crossings would also increase because at-grade crossings would be blocked more frequently. While Proposed Action-related trains would increase the predicted accident probability at all statewide study crossings, the analysis found that none of these crossings would result in a significant vehicle safety impact.

Implementation of proposed mitigation (Table S-2) involving notifying local agencies about rail traffic operations on the Reynolds Lead and BNSF Spur could reduce impacts on vehicle transportation. If infrastructure improvements are not made, impacts on vehicle transportation would be unavoidable and significant as described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*.

Vessel Transportation

The study area for impacts related to vessel transportation includes the waters out to 3 nautical miles seaward of the mouth of the Columbia River, the Columbia River Bar, the Columbia River upriver to Vancouver, Washington, and the Willamette River upriver to the Port of Portland, Oregon.

Construction

In-water construction activities (dock construction, pile driving, dredging) would use barges near the proposed docks (Docks 2 and 3). If construction materials were delivered by barge, approximately 750 barge trips in the study area would be required during the peak construction year. While construction-related barge activity would increase vessel traffic in the Columbia River, impacts would be temporary and not significant as barges would operate mainly near the proposed docks and are not restricted to the navigation channel.

Operations

The terminal would load 840 vessels per year during operations, which equates to 1,680 vessel transits annually in the Columbia River. Increased vessel traffic could be managed within the existing infrastructure and systems for vessel management in the lower Columbia River and would not have a significant impact on the vessel transportation system.

An increase in vessels calling at the proposed docks could increase the risk of vessel-related emergencies, such as fire or vessel allision[5] at Docks 2 and 3. Vessels are required to have fire prevention and response features including fire equipment and automated fire suppression systems. Vessel design standards, fire equipment requirements, and crew training are required by federal law. A fire or allision while at the dock would not be likely to affect resources significantly other than the vessel itself.

Increased vessel traffic could increase the risk of vessel incidents such as allisions, collisions, groundings, and fire. Based on modeling conducted for the analysis, Proposed Action-related vessel traffic would increase the frequency of collisions, groundings, and fires by approximately 2.8 incidents per year. Not all incidents would be likely to result in notable damages.

The risk of an oil spill resulting from an incident such as a collision or grounding or during refueling at anchorages[6] in the study area would increase due to the increase in vessel traffic. Based on the incident modeling and the location of fuel tanks, the likelihood of oil spills from a vessel incident is relatively low. The risk of an oil spill during refueling would increase compared to the No-Action Alternative.

Implementation of the proposed mitigation measure (Table S-2) to attend at least one Lower Columbia River Harbor Safety Committee meeting per year could reduce impacts related to vessel transportation. If a vessel incident occurred, the impact could be significant as described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*.

Noise and Vibration

The study area for direct noise and vibration impacts is the area within 1 mile of the project area. The study area for indirect noise impacts includes the area within 1 mile of the Reynolds Lead and BNSF Spur, the rail routes in Washington State, and the lower Columbia River out 3 nautical miles from the mouth of the river.

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[5] An allision occurs when a vessel strikes a fixed structure, such as a dock or a vessel at berth.

[6] The Applicant has committed to not refuel vessels at the proposed docks (Docks 2 and 3).

Construction

Construction of the Proposed Action would result in a temporary increase in noise and vibration. Construction noise would primarily occur during daylight hours and would be generated primarily from construction equipment, such as pile-driving equipment, backhoes, cement mixers, and excavators. The greatest noise levels would result from pile driving. Implementation of the proposed mitigation measure (Table S-2) to monitor and control increased noise at the residence closest to the project area and taking action if a noise impact is detected could reduce construction noise. While construction of the Proposed Action would emit vibration from pile-driving, no adverse vibration impacts during construction are expected at the closest noise-sensitive receptors.

If rail is used for construction materials, an average of 1.3 train trips per day during the peak construction year (2018) would emit noise from operations and horn sounding. Construction-related vehicles would increase vehicle-related noise. These construction-related activities would increase noise levels but would not result in a substantial change to existing noise levels.

Operations

Noise levels from operations of the coal export terminal are projected to exceed the applicable standard for nighttime noise levels at one residence. Implementation of the proposed mitigation measure (Table S-2) to monitor increased noise at this residence and take action if noise levels exceed applicable standards for nighttime noise levels could reduce noise during operations.

Operation of the Proposed Action would increase rail traffic-related noise along the Reynolds Lead and BNSF Spur by 16 trains per day at full coal export terminal operations. Train engineers are required to sound locomotive horns in advance of at-grade crossings at all crossings on the Reynolds Lead and BNSF Spur for public safety. Train-related noise levels would increase from train operations and locomotive horn sounding. Noise modeling concluded the greatest noise impacts would occur near four public at-grade crossings on the Reynolds Lead (3rd Avenue, California Way, Oregon Way, and Industrial Way). The increase in average daily noise levels would exceed applicable noise criteria at noise-sensitive receptors. Approximately 229 residences would be exposed to moderate noise impacts and approximately 60 residences would be exposed to severe noise impacts. These impacts would be reduced near the Industrial Way and Oregon Way crossings if a grade-separated intersection is constructed at the Industrial Way/Oregon Way intersection as currently proposed through a separate action. This project is currently in environmental review and is not permitted.

A mitigation measure is proposed (Table S-2) for the Applicant to assist with the development of a Quiet Zone in coordination with the City of Longview, Cowlitz County, LVSW, and the affected community. Implementation of the Quiet Zone would eliminate noise impacts related to train horns. If the Quiet Zone is not implemented, the impacts would remain, and the Applicant would explore the feasibility of reducing rail-related noise by funding a sound-reduction study (Table S-2). If noise-reduction measures are not implemented, the impacts would be unavoidable and significant as described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*.

Proposed Action-related trains on BNSF main line routes in Washington State would travel at the same speeds as existing trains, and locomotives would sound horns for public safety consistent with existing practices. Therefore, noise levels associated with any individual train trip would not change substantially compared to existing conditions. Although Proposed Action-related trains would increase average daily noise levels along the BNSF main line routes in Washington State, the change would not typically be noticeable to the average person. Noise from Proposed Action-related vessel traffic at noise-sensitive receptors would be comparable to or less than existing noise levels, and would be unlikely to cause significant noise impacts at noise-sensitive receptors along the Columbia River.

There would be no significant impacts from vibration. The closest vibration-sensitive receptors would be too far way to be affected by vibration from operations of the coal export terminal, rail traffic on the Reynolds Lead and BNSF Spur, and vessel operations on the Columbia River.

Air Quality

The study area for direct impacts on air quality consists of the area in and near the project area that could be affected by construction and operation activities in the project area. The study area for indirect impacts on air quality comprises Cowlitz County. An assessment of air quality impacts in Washington State from Proposed Action-related trains and vessels is also included.

Construction

Sources of air pollutant emissions during construction include emissions from construction equipment operations, vehicle delays at grade crossings, construction worker vehicles, delivery trucks, river barges, and dust from earthwork activity. Maximum annual construction emissions estimates for the peak construction year would not cause National Ambient Air Quality Standards established by the U.S. Environmental Protection Agency to be exceeded. Although emissions of criteria air pollutants would occur, they would not be expected to cause a substantial change in air quality and are unlikely to affect sensitive receptors surrounding the project area significantly.

Operations

Sources of air emissions during operation of the Proposed Action would include emissions from coal handling and storage; maintenance, operation, and emergency equipment; employee commute vehicles; and Proposed Action-related trains and vessels. Rail and vessel transport would be the largest sources of emissions.

A computer modeling analysis was performed to assess emissions from operation of the Proposed Action and the impact on localized air quality. The analysis determined the estimated maximum concentrations for each criteria air pollutant in combination with background concentrations would not cause National Ambient Air Quality Standards to be exceeded.

Based on an inhalation-only health risk assessment, coal export terminal operations and Proposed Action-related trains would increase the cancer risk associated with diesel particulate matter emissions.[7] Diesel particulate matter emissions primarily from Proposed Action-related train locomotives traveling along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County would result in areas of increased cancer risk at or above 10 cancers per million. These impacts would be unavoidable and significant as described in Section S.7, *Unavoidable and Significant Adverse Environmental Impacts*.

Estimated countywide and statewide locomotive and vessel emissions estimates related to the Proposed Action were compared to 2011 countywide and statewide locomotive and commercial marine vessel emissions. In Cowlitz County, the largest increase in emissions for any one pollutant

[7] Diesel particulate matter is a toxic air pollutant as defined in WAC 173-460.

would be carbon monoxide and volatile organic compounds (VOCs) from vessel operations, which would increase approximately 69% and 63%, respectively. The increase would represent a less than 0.3% increase in the total Cowlitz County carbon monoxide and VOC emissions. Statewide, the largest increase in locomotive emissions for any one pollutant would be for carbon monoxide at 39%, followed by nitrogen oxides at 15%. For vessels, the largest increases would be for VOC at 12% and carbon monoxide at 11%.

Coal Dust

Coal dust is a form of particulate matter that can affect air quality. Particulate matter is composed of small particles that range in size that are suspended in the air. Coal loaded into train cars is made up of pieces and particles of differing size, including small particles or dust. During rail transit, wind and air moving over the train may blow coal dust off the rail cars and disperse it in the air before the dust settles onto the ground. Coal dust may also be generated and dispersed by wind during coal stockpiling and handling activities in the project area.

The study area for direct impacts related to coal dust consists of the area in and near the project area. The study area for indirect impacts differs for each co-lead agency. For Cowlitz County and Ecology, the indirect impacts study area includes the area along the Reynolds Lead and BNSF Spur. For Ecology, the indirect impacts study area also includes BNSF main line routes in Washington State expected to be used by Proposed Action-related trains.

The coal dust analysis estimated the amount of coal dust that could be deposited around the project area and rail lines in Washington State, and the concentrations of particulate matter that would occur. These concentrations were compared to the National Ambient Air Quality Standards for particulate matter.

There are no federal or state guidelines or standards that identify acceptable levels of dust deposition levels for nuisance-level particles. This EIS uses a New Zealand study as a nonregulatory benchmark for nuisance-level dust deposition. Coal dust nuisance impacts refer to coal dust that affects the aesthetics, look, or cleanliness of surfaces but not the health of humans and the environment.

Construction

Construction of the Proposed Action would not result in impacts related to coal dust because it would not include any coal-handling or transport activities.

Operations

Operation of the Proposed Action would emit coal dust from coal handling and transport activities in the project area. The Applicant would be required to follow dust-control requirements in the Notice of Construction permit. Unloading would involve equipment to rotate rail cars and discharge the coal from the rail cars into a large hopper. As the enclosed tandem rotary dumper rotates the rail cars and begins to unload the coal into hoppers beneath the dumper, sprayers would spray water to avoid and minimize dust dispersion within the enclosed structure. A network of belt conveyors would transport coal from the rail car unloading facilities to the stockpile area and from the stockpile area to the vessel-loading facilities or from rail cars directly to the vessel-loading facilities. All transfer stations and approximately one-third of the conveyors would be enclosed. The stockpile area and vessel-loading conveyors would not be enclosed due to their operational requirements.

The coal stockpile area would have a dust-suppression system. Vessels would be loaded using shiploaders that would include enclosed boom and loading spout. The loading spout would also be telescopic and inserted below the deck of the vessel during vessel loading to avoid and minimize dust dispersion.

The estimated maximum coal dust deposition (0.40 gram per square meter per month) from coal export terminal operations would be at the project area boundary (near Mount Solo Road) and would be below the benchmark used for the analysis (2.0 grams per square meter per month). Within a few thousand feet of the project area, the annual deposition of coal dust is estimated to be less than 0.1 gram per square meter per month. Implementation of proposed mitigation (Table S-2) to reduce and monitor coal dust emissions in the project area and to establish a reporting process for coal dust compliance in Cowlitz County could reduce coal dust impacts.

Proposed Action-related trains would result in coal dust emissions along the rail lines as discussed below.

- **Reynolds Lead and BNSF Spur, Cowlitz County:**
    - Estimated maximum PM10 and PM2.5 concentrations from coal dust emissions plus background would be **below** federal and state air quality standards.
    - Estimated maximum and average monthly deposition of coal dust would be **below** the benchmark used for the analysis.
- **BNSF Main Line, Cowlitz County:**
    - Estimated maximum PM10 and PM2.5 concentrations from coal dust emissions plus background would be **below** federal and state air quality standards.
    - Estimated maximum monthly deposition (at 100 feet from the rail line) and average monthly deposition (at 50 feet from the rail line) of coal dust would be **slightly above** the benchmark used for the analysis.
- **BNSF Main Line, Columbia River Gorge:**
    - Estimated maximum PM10 and PM2.5 concentrations from coal dust emissions plus background would be **below** federal and state air quality standards.
    - Estimated maximum monthly deposition (at 50 feet from the rail line) and average monthly deposition (at 50 feet from the rail line) of coal dust would be **slightly above** the benchmark used for the analysis.
- **BNSF Main Line, Washington State (outside Cowlitz County and Columbia River Gorge):**
    - Estimated maximum PM10 and PM2.5 concentrations from coal dust emissions plus background would be **below** federal and state air quality standards.
    - Estimated maximum and average monthly deposition of coal dust would be **below** the benchmark used for the analysis.

Overall, the impacts of PM10 and PM2.5 emissions from Proposed Action-related trains would not be significant because emissions would be below applicable federal and state air quality standards. While the average and maximum monthly deposition of coal dust on the BNSF main line in Cowlitz County (50 and 100 feet, respectively) and Columbia River Gorge (50 feet) was estimated to be above the benchmark used for the analysis, no state or federal standards apply, and this would be an unavoidable but not significant impact.

Implementation of proposed mitigation (Table S-2) to reduce coal dust emissions from rail cars and provide information to the Columbia River Gorge Commission could reduce coal dust impacts.

Greenhouse Gas Emissions and Climate Change

This section presents a discussion of greenhouse gas emissions resulting from construction and operations of the Proposed Action. Greenhouse gases are air pollutants that contribute to climate change. The greenhouse gas emissions discussion is followed by a summary of potential impacts on the Proposed Action from climate change.

Greenhouse Gas Emissions

The study area for impacts related to greenhouse gas emissions differs for each co-lead agency. For Cowlitz County, the county itself represents the greenhouse gas emissions study area. For Ecology, the study area evaluating greenhouse gas emissions outside Cowlitz County was based on the expected transportation routes and emissions from the combustion of coal. While the study areas for the co-lead agencies are different, the analysis used the same approach to calculate greenhouse gas emissions.

The analysis estimated greenhouse gas emissions for the Proposed Action under four coal market scenarios. Each coal market scenario represents a range of greenhouse gas emissions estimates based on economic and policy projections from 2020 through 2040. For each scenario, the greenhouse gas emissions from Asian coal combustion, U.S. coal combustion, and U.S. natural gas combustion are influenced by factors such as coal prices, transportation costs, and competing energy sources. Of the four scenarios, the 2015 U.S. and International Energy Policy scenario is the preferred scenario for the purposes of this EIS because it more accurately reflects current global conditions.

The EIS also describes potential future climate change impacts on precipitation, snowpack, temperature, and sea level in southwest Washington and the resulting impacts on the Proposed Action.

Construction

Construction of the Proposed Action would generate greenhouse gas emissions from operation of construction equipment, employees commuting to and from the project area, and construction materials delivered to and from the project area. Construction would also contribute to greenhouse gas emissions by clearing vegetation and removing surface soil from the project area, both of which store carbon. The analysis estimated construction activities related to the Proposed Action from 2018 to 2020 would result in greenhouse gas emissions in Cowlitz County of approximately 27,812 metric tons of carbon dioxide equivalent (CO_2e).

Operations

Greenhouse gas emissions were estimated for operational activities that would occur in Cowlitz County. Greenhouse gas emissions were also estimated for activities that would occur outside Cowlitz County, including rail transport from the mines and vessel transport to ports in Asia.

Changes in coal markets that could affect the use of coal in Asia and the United States were also considered.

Total emissions related to Proposed Action operations in Cowlitz County were estimated to be 568,778 metric tons of CO_2e, with annual emissions of 39,640 metric tons of CO_2e in 2028 when the coal export terminal would be fully operational. This would be the equivalent to adding approximately 8,300 passenger cars to the road each year.

Greenhouse gas emissions outside of Cowlitz County during operations attributable to the Proposed Action would be driven primarily by coal combustion in Asia and the United States. Across the four scenarios, emissions greatly vary. Under the preferred scenario, the average annual change in emissions, or the average net annual emissions related to the Proposed Action during the full operation from 2028 through 2038 would be an increase of 1.99 million metric tons of CO_2e.

The total net emissions for the preferred scenario from 2018 through 2038 (construction and operations) would be an increase of 22.36 million metric tons of CO_2e. The total net emissions are the sum of emissions for the Proposed Action, accounting for construction beginning in 2018 and operation through 2038, compared to a no-action scenario in which the Proposed Action would not be constructed. This would exceed various thresholds that are proposed in federal and state regulations and guidance. Since the net greenhouse gas emissions attributable to the Proposed Action in the preferred scenario would exceed these standards, the emissions are considered significant impacts. The climate change impacts resulting from this increase in greenhouse gas emissions would persist for a long period, beyond the analysis period, and would be considered permanent. The climate change impacts, while global in nature, would affect Washington State. Based on these considerations, emissions attributable to operations of the Proposed Action under the preferred scenario are considered adverse and significant.

Implementation of proposed mitigation measures (Table S-2) to develop a mitigation plan, reduce emissions, and improve efficiencies would reduce greenhouse gas emissions attributable to the Proposed Action. With implementation of proposed mitigation, there would be no unavoidable and significant adverse environmental impacts from greenhouse gas emissions.

Climate Change Impacts on the Proposed Action

This section summarizes potential impacts from climate change effects on the project area, access roads, and rail leading to the project area.

Construction and Operations

Potential climate change impacts relate to low water levels, flooding, and wildfires could result in service disruptions or damage affecting the Proposed Action.

Low water levels could impede the passage of large ships to and from the docks at the project area and could increase demand for electricity or otherwise force difficult choices on competing water usage. If reduced precipitation from snow and rain cause Columbia River water levels to decline, shipping could be restricted or dredging could be required more frequently.

Potential precipitation increases and intense downpours could cause flooding in basins that derive their water from both rainfall and snowfall, such as the Cowlitz River or Columbia River. Rising sea levels could also lead to flooding of public and private property, roads, and railways. Under current conditions, flooding is expected to be minimal in the project area. In the future, increases in fall and winter precipitation could increase flood risk. The BNSF Spur and Reynolds Lead that would carry Proposed Action-related trains to the project area could be subject to flooding. Because historical and recent crests have been reported on the Cowlitz River, flood risk from sedimentation is increasing, and future precipitation could increase, flooding of the Reynolds Lead is possible.

S.6.2.4 Cumulative Impacts

Cumulative impacts are impacts that would result from the incremental addition of the Proposed Action to impacts from past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant, actions that occur over time.

This EIS includes an assessment of cumulative impacts in 2038[8] that could result from construction and operation of the Proposed Action in combination with 19 other reasonably foreseeable future actions.

The following types of actions were accounted for in the cumulative impact analysis.

- Potential bulk product export (other than coal) projects that would introduce rail and vessel traffic.
- Potential coal export projects that would introduce rail and vessel traffic.
- Potential crude oil by rail projects that would introduce rail and vessel traffic.
- Potential actions that would result in local construction and operation activities in Cowlitz County, the City of Longview, and the City of Kelso.
- Potential actions that would modify existing railroad infrastructure (the Reynolds Lead, BNSF Spur, and BNSF main line in Washington State).

The cumulative impacts resulting from the Proposed Action and the reasonably foreseeable future actions vary depending on the environmental resource area and the geographic study area identified for the cumulative analysis. This analysis accounts for impacts related to activities in the project area, rail transport, and vessel transport. If the Proposed Action would not result in potential adverse impacts on a particular environmental resource area, it would not have the potential to contribute to cumulative impacts for that environmental resource area.

The potential impacts of the Proposed Action in combination with the reasonably foreseeable future actions could result in cumulative impacts on the following 21 environmental resource areas: land and shoreline use; social and community resources; aesthetics, light, and glare; cultural resources; tribal resources; geology and soils; surface water and floodplains; wetlands; water quality; vegetation; fish; wildlife; energy and natural resources; rail transportation; rail safety; vehicle transportation; vessel transportation; noise and vibration; air quality; coal dust; and greenhouse gas emissions. Chapter 6, *Cumulative Impact*s, of this EIS presents the findings of the cumulative impacts analysis.

[8] The cumulative impacts analysis year is 2038. This was selected as the analysis year because it is 20 years after beginning construction of the Proposed Action and the Proposed Action would be fully operational (throughput of up to 44 million metric tons of coal per year). In addition, this analysis year conservatively accounts for future actions that may only be in the planning stages now but that can reasonably be expected to be operational in the future.

S.7 Unavoidable and Significant Adverse Environmental Impacts

Proposed mitigation measures are outlined in Table S-2. If the proposed mitigation measures were implemented, they would reduce but not completely eliminate significant adverse environmental impacts resulting from construction and operation of the Proposed Action. Unavoidable and significant adverse environmental impacts could remain for nine environmental resource areas: social and community resources; cultural resources; tribal resources; rail transportation; rail safety; vehicle transportation; vessel transportation; noise and vibration; and air quality.

S.7.1 Social and Community Resources

The Proposed Action would add 16 train trips per day on the Reynolds Lead and BNSF Spur and increase average daily noise levels, which would exceed applicable criteria for noise impacts at noise-sensitive receptors. Noise impacts would occur near at-grade crossings on the Reynolds Lead (Industrial Way, Oregon Way, California Way, and 3rd Avenue) from train horn noise intended for public safety. These noise impacts would occur in areas with minority and low-income populations; therefore, the Proposed Action would have a disproportionately high and adverse effect on minority and low-income populations. If a Quiet Zone is implemented, it would eliminate the need for Proposed Action-related trains to sound horns as they approach the at-grade crossings, and it would eliminate the potential disproportionately high and adverse effect on minority and low-income populations. However, without approval and implementation of a Quiet Zone, the Proposed Action's disproportionately high and adverse effect on minority and low-income populations would be unavoidable and significant.

With the current track infrastructure on the Reynolds Lead, a Proposed Action-related train traveling during the peak traffic hour would result in a vehicle-delay impact at four public at-grade crossings (Industrial Way, Oregon Way, California Way, and 3rd Avenue) in minority and low-income areas in 2028. This would constitute a disproportionately high and adverse effect on minority and low-income populations. The disproportionate impacts related to vehicle delay would not occur with planned improvements to the Reynolds Lead. Without the planned improvements to the Reynolds Lead, the Proposed Action's disproportionately high and adverse vehicle delay effects on minority and low-income populations would be unavoidable and significant.

Use of Tier 4[9] locomotives by BNSF and UP would reduce but not eliminate the disproportionately high and adverse effects in the Highlands neighborhood related to increased risk of greater than 10 cancers per million from diesel particulate matter inhalation. This impact would be unavoidable and significant.

S.7.2 Cultural Resources

Demolition of the Reynolds Metals Reduction Plant Historic District is an unavoidable and significant adverse environmental impact. The Memorandum of Agreement is currently being negotiated among the Corps, Cowlitz County, DAHP, City of Longview, BPA, National Park Service, potentially affected Native American tribes, and the Applicant. The Memorandum of Agreement may resolve this impact in compliance with Section 106 of the National Historic Preservation Act of 1966.

[9] Locomotives that are compliant with EPA locomotive emissions standards that went into effect in 2015.

S.7.3 Tribal Resources

Construction and operation of the Proposed Action could result in indirect impacts on tribal resources through Proposed Action-related activities causing physical or behavioral responses in fish and affecting aquatic habitat. These impacts could reduce the number of fish surviving to adulthood and returning to areas east of Bonneville Dam (Zone 6), which could affect the number of fish available for harvest by Native American tribes. Proposed Action-related trains would travel through areas adjacent to and within the usual and accustomed fishing areas of Native American tribes and could restrict access to tribal fishing areas in the Columbia River. Because other factors besides rail operations affect fishing opportunities, such as the number of fishers, fish distribution, timing, and duration of fish migration periods and seasons, the extent to which Proposed Action-related trains would affect tribal fishing is difficult to quantify. Making a determination of significance related to treaty-reserved rights is not determined in this EIS.

S.7.4 Rail Transportation

Three segments on the BNSF main line routes in Washington State (Idaho/Washington State Line–Spokane, Spokane–Pasco, and Pasco–Vancouver) are projected to exceed capacity with projected baseline rail traffic in 2028. Proposed Action-related trains would contribute to these three segments exceeding capacity in 2028, based on the analysis in this EIS and assuming existing infrastructure. It is expected that BNSF would make the necessary investments or operating changes to accommodate the rail traffic growth, but it is unknown when these actions would be taken or permitted. If improvements to increase capacity were not made, Proposed Action-related trains would contribute to these capacity exceedances and could result in an unavoidable and significant adverse impact on rail transportation.

S.7.5 Rail Safety

Proposed Action-related trains would add rail traffic along rail routes in Cowlitz County and Washington State, which would increase the potential for train accidents. LVSW, BNSF, and UP could improve rail safety through investments or operational changes, but it is unknown when those actions would be taken or permitted. Therefore, the Proposed Action could result in an unavoidable and significant adverse impact on rail safety.

S.7.6 Vehicle Transportation

With current track infrastructure on the Reynolds Lead and BNSF Spur, four public at-grade crossings would operate below the benchmark used for the analysis if one Proposed Action-related train travels during the peak traffic hour in 2028. With planned track improvements to the Reynolds Lead and BNSF Spur, two public at-grade crossings would operate below the benchmark used for the analysis if two Proposed Action-related trains travel during the peak traffic hour in 2028.

While improvements for rail and road infrastructure have been proposed, it is unknown when these actions would be permitted and implemented. Therefore, the Proposed Action at full operations in 2028 could result in an unavoidable and significant adverse impact on vehicle transportation at certain at-grade crossings in Cowlitz County.

S.7.7 Vessel Transportation

If a Proposed Action-related vessel incident such as a collision or allision occurred, the impacts could be significant, depending on the nature and location of the incident, the weather conditions at the time, and the discharge of oil. Although the likelihood of a serious Proposed Action-related vessel incident is very low, there are no mitigation measures that could completely eliminate the possibility of an incident or the resulting impacts.

S.7.8 Noise and Vibration

The Proposed Action would add 16 trains per day on the Reynolds Lead and BNSF Spur and increase average daily noise levels. Noise levels would exceed applicable criteria for noise impacts at noise-sensitive locations. The noise impacts would occur near at-grade crossings on the Reynolds Lead from train-horn noise intended for public safety. Railroad noise is exempt from Washington State and local noise standards; however, it is possible for communities to work with the Federal Railroad Administration to apply for and implement a Quiet Zone to limit train horn sounding. The Applicant will work with the City of Longview, Cowlitz County, LVSW, the affected community, and other applicable parties to apply for and support the implementation of a Quiet Zone. However, if a Quiet Zone is not implemented and Proposed Action-related train horns are sounded for public safety, then the noise impacts would remain and would be an unavoidable and significant adverse impact.

S.7.9 Air Quality

Project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action would reduce air quality impacts related to construction and operation of the coal export terminal. Based on the inhalation-only health risk assessment, diesel particulate matter emissions from Proposed Action-related train locomotives traveling along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County would result in areas of increased cancer risk at or above 10 cancers per million which would represent an unavoidable and significant adverse impact.

S.8 Required Permits, Plans, and Approvals

The following permits, plans, and approvals would be required for the Proposed Action.

S.8.1 Local

- Cowlitz County Department of Building and Planning—Shoreline Substantial Development Permit
- Cowlitz County Department of Building and Planning—Shoreline Conditional Use Permit
- Cowlitz County Department of Building and Planning—Critical Areas Permit
- Cowlitz County Department of Building and Planning—Floodplain Permit
- Cowlitz County Department of Building and Planning—Building and Site Development Permits
- Three Rivers Regional Wastewater Authority—Wastewater Discharge Permit
- City of Longview—Utility Service Permit

- Southwest Clean Air Agency—Notice of Construction

S.8.2 State

- Washington State Department of Ecology—Clean Water Act Section 401 Water Quality Certification
- Washington State Department of Ecology—National Pollutant Discharge Elimination System Construction Stormwater Permit
- Washington State Department of Ecology—National Pollutant Discharge Elimination System Industrial Stormwater Permit
- Washington State Department of Ecology—Water Rights Permit
- Washington State Department of Ecology—Shoreline Conditional Use Permit
- Washington Department of Fish and Wildlife—Hydraulic Project Approval
- Washington State Department of Natural Resources—Site Use Authorization or Flow Lane Disposal Authorization
- Washington State Department of Natural Resources—Aquatic Lands Lease[10]

S.8.3 Federal

- U.S. Army Corps of Engineers—Clean Water Act Section 404 Permit
- U.S. Army Corps of Engineers—Rivers and Harbors Act Section 10 Permit
- U.S. Army Corps of Engineers—Rivers and Harbors Act Section 14 (Section 408)
- U.S. Army Corps of Engineers—Section 106 of the National Historic Preservation Act compliance
- U.S. Fish and Wildlife Service and National Marine Fisheries Service—Endangered Species Act Consultation
- National Marine Fisheries Service—Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996, Section 305 Consultation
- National Marine Fisheries Service—Marine Mammal Protection Act

S.9 Next Steps

The Final EIS provides information for public, local, and state agencies to support decision-making regarding permits for the Proposed Action. These agencies include Cowlitz County, City of Longview, Southwest Clean Air Agency, Three Rivers Regional Wastewater Authority, Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, and Ecology. Local, regional, and state agencies will conduct their respective reviews, defined in adopted local, regional,

[10] The project area landowner (Northwest Alloys) holds a 30-year aquatic lands lease (20-B09222) with the Washington State Department of Natural Resources (WDNR). According to WDNR, under the terms of the lease, Northwest Alloys must obtain WDNR's written consent prior to construction of improvements. Northwest Alloys has not yet requested and WDNR has not provided its consent to the improvements proposed by the Applicant (Palazzi pers. comm.).

and state rules. All primary local, regional, state, and federal permits must be issued before the Proposed Action may begin. The Final NEPA EIS, expected to be published in 2017, will also inform local, state, and federal decisions.

Table S-2. Summary of Impacts and Proposed Applicant Mitigation Measures

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
General Mitigation			
General Mitigation	Refer to the potential impacts identified in this table.	The Applicant will provide to Cowlitz County and the Washington State Department of Ecology an annual report of compliance with mitigation requirements of an issued permit. Mitigation compliance reports will be part of the public record.	No.
Chapter 3: Built Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures			
Section 3.1: Land and Shoreline Use	None.	Not applicable.	No.
Section 3.2: Social and Community Resources	Noise from Proposed Action-related trains on the Reynolds Lead during operations would increase average daily noise levels in a minority and low-income area. This would be a disproportionately high and adverse effect on minority and low-income populations.	**MM NV-2. Support Implementation of a Quiet Zone along the Reynolds Lead.** See discussion in Section 5.5, *Noise and Vibration,* in this table. **MM NV-3. Explore Feasibility of Reducing Sound Levels.** See discussion in Section 5.5, *Noise and Vibration,* in this table.	Yes, absent the implementation of a Quiet Zone or other measures to reduce train-related noise. Refer to Section S.7.1.
Section 3.2: Social and Community Resources	Operation of the Proposed Action would increase vehicle delay at four public at-grade crossings in a minority and low-income area if a Proposed Action-related train travels during the peak traffic hour and with current infrastructure on the Reynolds Lead. This would be a disproportionately high and adverse effect on minority and low-income populations.	**MM VT-1. Notify Local Agencies about Operations on the Reynolds Lead and BNSF Spur**. See discussion in Section 5.3, *Vehicle Transportation*, in this table.	Yes, absent improvements to reduce vehicle delay. Refer to Section S.7.1.
Section 3.2: Social and	Operation of the Proposed Action would increase the cancer risk from diesel	None.	Yes. Refer to Section S.7.1.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
Community Resources	particulate matter emissions in a minority and low-income area, primarily from Proposed Action-related train locomotive emissions. This would be a disproportionately high and adverse effect on minority and low-income populations.		
Section 3.3: Aesthetics, Light, and Glare	The Proposed Action would alter views and introduce sources of light and glare for on-water viewers and recreational users at Dibblee Point Beach.	**MM ALG-1. Modify Lighting and Appearance of Facility Surfaces to Minimize Visual Impacts.** To minimize the aesthetic, light, and glare impacts, the Applicant will: • Use directional lighting with full box cut-off fixtures, or equivalent, and use motion- or user-controlled light systems, where practicable and feasible. • Use neutral colors to blend with or complement surrounding environment for non-safety-related structures and equipment, and use nonreflecting materials and finishes, where practicable and feasible.	No.
Section 3.4: Cultural Resources	Construction of the Proposed Action could displace or damage undocumented archaeological resources within native soil below existing fill.	**MM CR-1. Monitor Ground-Disturbing Activities.** To protect archaeological resources that may occur in subsurface deposits, the Applicant will have a qualified professional archaeologist monitor ground-disturbing activities. If archaeological resources are discovered, construction could be halted in the area until the Corps, in consultation with the Department of Archaeology and Historic Preservation and the tribes, determine the appropriate course of action.	Yes, due to the demolition of the Reynolds Metals Reduction Plant Historic District. A Memorandum of Agreement is currently being negotiated among the Corps, Cowlitz County, DAHP, City of Longview, BPA, National Park Service, potentially affected Native American tribes, and the Applicant. The Memorandum of Agreement could resolve this impact in compliance with Section 106 of the National Historic

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
			Preservation Act of 1966. Refer to Section S.7.2.
Section 3.5: Tribal Resources	Activities related to the Proposed Action could cause physical or behavioral responses in fish or affect aquatic habitat in the Columbia River. These impacts could reduce the number of fish surviving to adulthood and returning to areas east of Bonneville Dam, thereby affecting the number of fish available for harvest by the tribes.	**MM WQ-2. Develop and Implement a Coal Spill Containment and Cleanup Plan.** See discussion in Section 4.5, *Water Quality*, in this table. **MM FISH-1. Implement a Best Available Noise Attenuation Methods for Pile-Driving.** See discussion in Section 4.7, *Fish*, in this table. **MM FISH-2. Implement a "Soft-Start" Method during Pile-Driving.** See discussion in Section 4.7, *Fish*, in this table. **MM FISH-3. Monitor Pile-Driving and Dredging Activities for Distress to Fish and Wildlife.** See discussion in Section 4.7, *Fish*, in this table. **MM FISH-4. Conduct Eulachon Surveys.** See discussion in Section 4.7, *Fish*, in this table. **MM FISH-5. Conduct Fish Monitoring during Hydraulic Dredging Operations.** See discussion in Section 4.7, *Fish*, in this table.	Activities related to the Proposed Action could reduce the number of fish surviving to adulthood, which could affect the number of fish available for harvest by the tribes. The significance of impacts related to treaty rights is not determined in this EIS. Refer to Section S.7.3.
Section 3.5: Tribal Resources	Operation of the Proposed Action would affect access to tribal fishing areas in the Columbia River.	None.	Proposed Action-related trains would travel through usual and accustomed fishing areas and could restrict access to tribal fishing areas in the Columbia River. The significance of impacts related to treaty rights is not determined in this EIS. Refer to Section S.7.3.
Section 3.6: Hazardous Materials	Operation of the Proposed Action could result in spills of	**MM WQ-1. Locate Spill Response Kits Near Main Construction and Operations Areas.** See discussion in Section 4.5, *Water Quality,* in this table.	No.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
	hazardous materials in the project area.		
Chapter 4: Natural Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures			
Section 4.1: Geology and Soils	None.	Not applicable.	No.
Section 4.2: Surface Waters and Floodplains	None.	Not applicable.	No.
Section 4.3: Wetlands	Construction of the Proposed Action would place fill material in 24.10 acres of wetlands, resulting in the permanent loss of wetland functions.	**MM WTL-1**. **Prepare a Comprehensive Mitigation Plan**. To address impacts on wetlands affected by placement of fill, the Applicant will prepare a comprehensive mitigation plan in coordination with the Corps, Ecology, and Cowlitz County. The mitigation plan will address the general requirements for mitigation planning consistent with all current local, state, and federal guidance and regulations.	No.
Section 4.4: Groundwater	Construction and operation of the Proposed Action could degrade groundwater quality due to spills of hazardous materials.	**MM WQ-1**. **Locate Spill Response Kits Near Main Construction and Operations Areas.** See discussion in Section 4.5, *Water Quality*, in this table.	No.
Section 4.5: Water Quality	Construction and operation of the Proposed Action could affect water quality due spills of hazardous materials.	**MM WQ-1. Locate Spill Response Kits Near Main Construction and Operations Areas.** The Applicant will locate spill response kits throughout the project area during construction and operations. The spill response kits will contain response equipment and personal protective equipment appropriate for hazardous materials that will be stored and used during construction and operations. Site personnel will be trained in the storage, inventory, and deployment of items in the spill response kits. Spill response kits will be checked a minimum of four times per year to ensure proper-functioning condition, and will otherwise be maintained and replaced per manufacturer recommendations. Should a spill response kit be deployed, the Applicant will notify Cowlitz County and Ecology immediately.	No.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
		The Applicant will submit a map indicating the types and locations of spill response kits to Cowlitz County and Ecology for approval prior to beginning construction and operations.	
Section 4.5: Water Quality	Operation of the Proposed Action could affect water quality from coal spills.	**MM WQ-2**. **Develop and Implement a Coal Spill Containment and Cleanup Plan**. To limit the exposure of spilled coal to the terrestrial, aquatic, and built environments during coal handling, the Applicant will develop a containment and cleanup plan. The plan will be reviewed by Cowlitz County and Ecology and implemented prior to beginning export terminal operations. In the event of a coal spill in the aquatic environment by the Applicant during export terminal operations, action will be taken based on the specific coal spill, and the Applicant will develop a cleanup and monitoring plan consistent with the approved containment and cleanup plan. This plan will include water quality and sediment monitoring to determine the potential impact of the coal spill on the aquatic habitat and aquatic species. The Applicant will develop the cleanup and monitoring plan in coordination with Cowlitz County, Ecology, and the Corps. The cleanup and monitoring will be similar in scope to the monitoring completed for the Aquatic Impact Assessment (Borealis 2015) associated with a coal spill in British Columbia, Canada, in 2014.	No.
Section 4.5: Water Quality	Operation of the Proposed Action would affect water quality by introducing contaminants from coal dust.	**MM CDUST-1**. **Monitor and Reduce Coal Dust Emissions in the Project Area**. See discussion in Section 5.7, *Coal Dust*, in this table. **MM CDUST-3**. **Reduce of Coal Dust Emissions from Rail Cars**. See discussion in Section 5.7, *Coal Dust*, in this table.	No.
Section 4.6: Vegetation	Construction of the Proposed Action would permanently remove vegetation from the project area. Operation of the Proposed Action would alter vegetation during maintenance activities. No special-status plant species have been recorded in the project area, but	**MM VEG-1**. **Conduct Rare Plant Surveys Prior to Construction**. To ensure that threatened, endangered, or rare plants are not affected, the Applicant will conduct rare plant surveys of the project area, including the ditches and stormwater conveyance features. Surveys for rare plants will be performed for those rare plants that may occur in Cowlitz County, according to the Washington Natural Heritage Program. Surveys will be performed prior to any Proposed Action-related ground disturbance and during the appropriate survey windows for each species. If such	No.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
	potentially suitable habitat is present.	plant species are found, the Applicant will notify and consult with the Washington State Department of Natural Resources, and the U.S. Fish and Wildlife Service (if federally protected species are found). The Applicant and the agencies will work together to determine the appropriate conservation and mitigation measures should potential impacts on any rare plants be possible as a result of ground disturbing activities.	
Section 4.6: Vegetation	Operation of the Proposed Action could affect vegetation along the rail tracks entering the project area, along the shoreline of the Columbia River, and in the shallow waters of the Columbia River near the project area.	**MM VEG-2**. **Conduct Aquatic Vegetation Surveys Prior to Construction**. To ensure that aquatic plants along the shoreline of the Columbia River are not affected, the Applicant will conduct an aquatic plant survey along the shoreline of the project area prior to commencing in-water work associated with construction of Docks 2 and 3 and construction-related dredging, including all areas within the shallow water zone adjacent to the proposed docks. If areas of aquatic vegetation are found, the Applicant will notify the Washington State Department of Natural Resources, Cowlitz County, and the U.S. Fish and Wildlife Service, and work with these agencies to develop appropriate conservation or mitigation measures before beginning any in-water work.	No.
Section 4.6: Vegetation	Construction of the Proposed Action along the edges of the project area could temporarily disturb adjacent vegetation and compact soil.	**MM VEG-3**. **Replant Areas Temporarily Disturbed during Construction.** To ensure that disturbed native vegetation is restored, after construction the Applicant will replant vegetated areas temporarily disturbed during construction with native vegetation suitable for site conditions post-construction. The Applicant will monitor replanted vegetation annually for 5 years and will ensure the survival of 80% of all replanted vegetation. The Applicant will submit annual monitoring reports to Cowlitz County.	No.
Section 4.6: Vegetation	Construction of the Proposed Action would permanently remove vegetation from the project area.	**MM VEG-4. Develop and Implement a Revegetation Plan**. To mitigate permanent removal of vegetation from project construction, the Applicant will develop and implement a revegetation plan for the project area. This plan will be approved by Cowlitz County prior to implementation and will be consistent with the Cowlitz County Critical Areas Ordinance (CCC 19.15).	No.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
Section 4.6: Vegetation	Operation of the Proposed Action would result in conditions in the project area that would favor colonization by noxious weeds.	**MM VEG-5. Control Noxious Weeds.** To limit further invasion and colonization of noxious weeds on disturbed land, the Applicant will monitor for noxious weeds during construction and operations and remove noxious weeds that invade new areas of the site. The Applicant will coordinate with the Cowlitz County Noxious Weed Control Board if Class A and B noxious weeds are detected.	No.
Section 4.6: Vegetation	Operation of the Proposed Action would generate and disperse coal dust on vegetation, soils, and sediments.	**MM CDUST-3. Reduce Coal Dust Emissions from Rail Cars.** See discussion in Section 5.7, *Coal Dust*, in this table.	No.
Section 4.6: Vegetation	Operation of the Proposed Action could affect vegetation from coal spills.	**MM WQ-2. Develop and Implement a Coal Spill Containment and Cleanup Plan.** See discussion in Section 4.5, *Water Quality*, in this table.	No.
Section 4.7: Fish	Installation of structural steel piles during construction of the Proposed Action would generate underwater noise during pile driving, which could affect fish in several ways, ranging from alteration of behavior to physical injury or mortality.	**MM FISH-1. Implement Best Available Noise Attenuation Methods for Pile Driving.** To minimize underwater noise impacts on fish during pile driving, the Applicant will employ the best available noise attenuation methods during pile driving. These methods may include, but are not limited to, confined bubble curtain, temporary noise attenuation pile, double-walled noise attenuation pile, or other similar technology. The Applicant is currently proposing use of a confined bubble curtain, but other methods may be found to be better at attenuating noise impacts during the Endangered Species Act Section 7 consultation or by the time construction begins. Should other methods in the future prove to attenuate underwater noise better than a confined bubble curtain, those methods will be employed. **MM FISH-2. Implement a “Soft-Start” Method during Pile-Driving.** To minimize underwater noise impacts on fish during pile driving, the Applicant will commence impact pile-driving using a “soft-start,” or other similar method. The “soft-start” method is a method of slowly building energy of the pile driver over the course of several pile strikes until full energy is reached. This “soft-start” method cues fish and wildlife to pile-driving	No.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
		commencing and allows them to move away from the pile-driving activity.	
Section 4.7: Fish	Pile installation, dredging, and dredge material disposal during construction of the Proposed Action would increase turbidity and underwater noise, which could result in adverse physical or behavioral responses in fish.	**MM FISH-3. Monitor Pile-Driving and Dredging Activities for Distress to Fish and Wildlife.** To minimize the potential harm to marine mammals, diving birds, or fish, a professional biologist will observe the waters near pile-driving and dredging activities for signs of distress from fish and wildlife during these activities. If any fish or wildlife species were to show signs of distress during pile driving, the biologist will issue a stop work order until the species are recovered, moved, or relocated from the area. The Applicant will immediately report any distressed fish or wildlife observed to the appropriate agencies (i.e., Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and National Marine Fisheries Service) and determine the appropriate course of action. **MM FISH-4. Conduct Eulachon Surveys.** Should in-water work occur between December and May, the Applicant will conduct advance underwater surveys at least 1 year before in-water work would occur for eulachon (adult, eggs and larvae) within those areas where in-water work would occur (i.e., Docks 2 and 3 and the dredge prism). Surveys would be conducted starting in December when water temperatures are near 40 degrees Fahrenheit (°F) in the lower Columbia River, which appears to trigger river entry for adults, and continue through May, when larval eulachon have generally hatched and drifted out of the system. Survey design and results would be provided to Washington Department of Fish and Wildlife and National Marine Fisheries Service. If adult or larval eulachon or eulachon eggs are observed and in-water work is proposed, the Applicant would coordinate with the fish and wildlife agencies on the appropriate measures to avoid and minimize impacts on eulachon and implement those measures. **MM FISH-5. Conduct Fish Monitoring during Hydraulic Dredging Operations.** The Applicant will develop and implement fish community monitoring in coordination with the Washington	No.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
		Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. Fish community monitoring will include surveys conducted prior to dredging to identify fish species and life-stages present in the area to be dredged. As part of the coordination with the Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and National Marine Fisheries Service measures to reduce the entrainment of fish anticipated to be present during dredging will also be developed, which may include timing restrictions for hydraulic dredging. The Applicant will also develop and implement dredge entrainment monitoring for hydraulic dredging, in coordination with the Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. Dredge entrainment monitoring will involve screening the dredge output at the point of discharge (i.e., barge) to determine the number, life-stage, and species of fish entrained by hydraulic dredging. The information gathered during dredge monitoring will be provided to the Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and National Marine Fisheries Service.	
Section 4.7: Fish	Operation of the Proposed Action would generate and disperse coal dust in the aquatic environment.	**MM CDUST-1. Monitor and Reduce Coal Dust Emissions in the Project Area**. See discussion in Section 5.7, *Coal Dust*, in this table. **MM CDUST-3. Reduce Coal Dust Emissions from Rail Cars.** See discussion in Section 5.7, *Coal Dust*, in this table.	No.
Section 4.7: Fish	Operation of the Proposed Action could affect fish from coal spills.	**MM WQ-2. Develop and Implement a Coal Spill Containment and Cleanup Plan.** See discussion in Section 4.5, *Water Quality*, in this table.	No.
Section 4.8: Wildlife	Installation of structural steel piles during construction of the Proposed Action would generate underwater noise during pile driving, which could affect marine mammals and	**MM FISH-2. Implement a "Soft-Start" Method during Pile-Driving.** See discussion in Section 4.7, *Fish*, in this table.	No.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
	diving birds and cause physical or behavioral responses.		
Section 4.8: Wildlife	Pile installation, dredging, and dredge material disposal during construction of the Proposed Action would increase turbidity and underwater noise, which could result in adverse physical or behavioral responses in marine mammals, diving birds, and terrestrial animals.	**MM FISH-3. Monitor Pile-Driving and Dredging Activities for Distress to Fish and Wildlife.** See discussion in Section 4.7, *Fish*, in this table.	No.
Section 4.8: Wildlife	Operation of the Proposed Action would generate and disperse coal dust in the aquatic and terrestrial environment. Coal dust could affect wildlife through physical or toxicological means.	**MM CDUST-1. Monitor and Reduce Coal Dust Emissions in the Project Area.** See discussion in Section 5.7, *Coal Dust*, in this table. **MM CDUST-3. Reduce Coal Dust Emissions from Rail Cars.** See discussion in Section 5.7, *Coal Dust*, in this table.	No.
Section 4.8: Wildlife	Operation of the Proposed Action could affect wildlife from coal spills.	**MM WQ-2. Develop and Implement a Coal Spill Containment and Cleanup Plan.** See discussion in Section 4.5, *Water Quality*, in this table.	No.
Section 4.9: Energy and Natural Resources	None.	Not applicable.	No.
Chapter 5: Operations: Existing Conditions, Project Impacts, and Proposed Mitigation Measures			
Section 5.1: Rail Transportation	Proposed Action-related trains and baseline rail traffic during full operations would exceed capacity on certain main line route segments with current infrastructure.	**MM RT-1. Notify BNSF and UP about Operations on Main Line Routes.** To allow for adequate planning to address Proposed Action-related trains contributing to segments exceeding capacity on main line routes in Washington State, the Applicant will notify BNSF and UP before each identified operational stage (Stage 1a, Stage 1b, and Stage 2) begins that will change average daily rail traffic on main line routes in Washington State. The Applicant will prepare a report to document the notification of BNSF and UP and	Without improvements to rail infrastructure to expand capacity, the Proposed Action could result in an unavoidable and significant adverse impact on rail

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
		changes to average daily rail traffic. The report will be submitted to BNSF, UP, Washington State Department of Transportation, Utilities Transportation Commission, and Cowlitz County at least 6 months before the change in average daily rail traffic.	transportation. Refer to Section S.7.4.
Section: 5.2 Rail Safety	The Proposed Action would increase the potential for train accidents by adding loaded and empty Proposed Action-related rail traffic on rail routes in Washington State.	**MM RT-1. Notify BNSF and UP about Operations on Main Line Routes**. See discussion in Chapter 5, Section 5.1, *Rail Transportation*.	Without improvements to rail infrastructure to improve rail safety, the Proposed Action could result in an unavoidable and significant adverse impact on rail safety. Refer to Section S.7.5.
Section 5.3: Vehicle Transportation	Operation of the Proposed Action would increase rail traffic at grade crossings, which would result in vehicle delay impacts during the peak vehicle traffic hour at certain crossings along the Reynolds Lead, BNSF Spur, and BNSF main line.	**MM VT-1. Notify Local Agencies about Operations on the Reynolds Lead and BNSF Spur**. To address vehicle delay impacts at grade crossings on the Reynolds Lead and BNSF Spur, the Applicant will notify Cowlitz County, City of Longview, Cowlitz Fire District, City of Rainier (Oregon), Port of Longview, and Cowlitz-Wahkiakum Council of Governments before each identified operational stage (Stage 1a, Stage 1b, and Stage 2) that will change average daily rail traffic on the Reynolds Lead and BNSF Spur. The Applicant will prepare a memorandum to document the changes to average daily rail traffic. The memorandum will be submitted to these agencies at least 6 months before the change in average daily rail traffic.	Without improvements to rail and road infrastructure, and if at least one Proposed Action-related train travels during the peak vehicle traffic hour, the Proposed Action could result in an unavoidable and significant adverse impact on vehicle transportation. Refer to Section S.7.6.
Section 5.4: Vessel Transportation	Operation of the Proposed Action would increase vessel traffic that would increase the likelihood of a vessel incident.	**MM VS-1. Attend Lower Columbia River Harbor Safety Committee Meeting.** The Applicant will attend at least one Lower Columbia River Harbor Safety Committee meeting per year before beginning operations and every year during operations. The Applicant will provide notification of attendance to Cowlitz County. **MM VS-2. Notify if Bunkering at Docks Occurs.** The risk of an oil spill at Docks 2 and 3 would primarily be during bunkering (refueling) operations. The Applicant has committed to no bunkering at Docks 2 and 3. If this changes and bunkering is proposed at Docks 2 and 3, the Applicant will notify Cowlitz	If an incident such as a collision or allision occurred, the impacts could be significant, depending on the nature and location of the incident, the weather conditions at the time, and, the discharge of fuel. Refer to Section S.7.7.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
		County and Ecology who will determine if additional environmental review is required before bunkering operations are conducted.	
Section 5.5: Noise and Vibration	Construction and operation of the Proposed Action is projected to result in noise levels that would exceed applicable noise standards at one noise-sensitive receptor.	**MM NV-1**. **Monitor and Control Increased Noise from Coal Export Terminal Construction and Operations at Closest Residences**. If agreed to by the property owner(s), the Applicant will monitor noise levels at the two residences nearest the project area to detect possible noise impacts from the Proposed Action during construction and operations. Noise will be monitored during construction and until at least 6 months after initiation of operations. The Applicant will submit monthly noise reports to Cowlitz County Building and Planning. If the monitoring identifies a noise impact due to coal export terminal operations, the Applicant will reduce the noise exposure with modifications to terminal operations or installation of building sound insulation at the noise receptor.	No.
Section 5.5: Noise and Vibration	Operation of the Proposed Action would result in moderate and severe noise impacts at noise-sensitive receptors along the Reynolds Lead from rail traffic noise related to sounding train horns for public safety.	**MM NV-2**. **Support Implementation of a Quiet Zone along the Reynolds Lead.** To address moderate and severe noise impacts along the Reynolds Lead due to rail traffic, before beginning full operations, the Applicant will coordinate with the City of Longview, Cowlitz County, Longview Switching Company, and the affected community to inform interested parties on the Federal Railroad Administration process to implement a Quiet Zone that will include the 3rd Avenue and California Avenue crossings. Public outreach on the Quiet Zone process will include low-income and minority populations. The Applicant will assist interested parties in the preparation and submission of the Quiet Zone application to the Federal Railroad Administration. If the Quiet Zone is approved, the Applicant will fund the Quiet Zone improvements, which could include electronics, barricades, and crossing gates. **MM NV-3**. **Explore Feasibility of Reducing Sound Levels**. If the Quiet Zone for the Reynolds Lead is not implemented, the Applicant will fund a sound reduction study to identify ways to mitigate the moderate and severe impacts from train noise from	Yes, absent the implementation of a Quiet Zone or other measures to reduce train-related noise. Refer to Section S.7.8.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
		Proposed Action-related trains along the Reynolds Lead. The study methods will be discussed with Cowlitz County, Ecology, and Washington State Department of Health for approval.	
Section 5.6: Air Quality	Operation of the Proposed Action would increase the cancer risk from diesel particulate matter emissions, primarily from Proposed Action-related train locomotive emissions.	None.	Yes. Refer to Section S.7.9.
Section 5.7: Coal Dust	Operation of the Proposed Action would emit and deposit coal dust in the project area due to coal handling and transport activities.	**MM CDUST-1. Monitor and Reduce Coal Dust Emissions in the Project Area.** To address coal dust emissions, the Applicant will monitor coal dust during operation of the Proposed Action at locations approved by the Southwest Clean Air Agency. A method for measuring coal dust concentration and deposition will be defined by the Southwest Clean Air Agency. If coal dust levels exceed nuisance levels, as determined by the Southwest Clean Air Agency, the Applicant will take further action to reduce coal dust emissions. Potential locations to monitor coal dust concentration and deposition will be along the facility fence line in close proximity to the coal piles, where the rail line enters the facility and operation of the rotary dumper occurs, and at a location near the closest residences to the project area, if agreed to by the property owner(s). The Applicant will conduct monthly reviews of the concentration and deposition data and maintain a record of data for at least 5 years after full operations, unless otherwise determined by the Southwest Clean Air Agency. If measured concentrations exceed PM air quality standards, the Applicant will report this information to the Southwest Clean Air Agency, Cowlitz County and Ecology. The Applicant will gather 1 year of fence line data on PM2.5 and PM10 prior to beginning operations and maintain the data as reference. This data will be reported to the Southwest Clean Air Agency, Cowlitz County, and Ecology. **MM CDUST-2. Establish Reporting Process for Coal Dust Complaints in Cowlitz County.** To address coal dust emissions,	No.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
		the Applicant will meet with the Southwest Clean Air Agency prior to the start of operations to design and implement a coal dust awareness and investigation system for community members in Cowlitz County. The system will be available in both English and Spanish to receive complaints or concerns, investigate, respond, resolve, and report findings to the complainant and Southwest Clean Air Agency. The system will be available during operation of the Proposed Action. The Applicant will operate the system or provide funding for Southwest Clean Air Agency to operate the system. A report will be submitted annually to Cowlitz County and the City of Longview and posted on Southwest Clean Air Agency website.	
Section 5.7: Coal Dust	Proposed Action-related trains during operations would emit coal dust while traveling on rail lines in Washington State.	**MM CDUST-3. Reduce Coal Dust Emissions from Rail Cars.** To address coal dust emissions, the Applicant will not receive coal trains unless surfactant has been applied at the BNSF surfactant facility in Pasco, Washington for BNSF trains traveling through Pasco. While other measures to control emissions are allowed by BNSF, those measures were not analyzed in this EIS and would require additional environmental review. For trains that will not have surfactant applied at the BNSF surfactant facility in Pasco, before beginning operations, the Applicant will work with rail companies to implement advanced technology for application of surfactants along the rail routes for Proposed Action-related trains. **MM CDUST-4. Provide Information to the Columbia River Gorge Commission.** To address statewide and regional public interests and concern of coal dust emissions, the Applicant will attend at least one Columbia River Gorge Commission public meeting per year and be available to present information on coal dust emissions and rail traffic related to the Proposed Action and discuss concerns.	No.
Section 5.8: Greenhouse Gas Emissions and Climate Change	Construction and operation of the Proposed Action would result in greenhouse gas emissions.	**MM GHG-1. Provide Fuel Efficiency Training to Equipment Operators.** To reduce greenhouse gas emissions from construction equipment, the Applicant will provide a fuel	No.

Environmental Resource Area	Potential Impacts Requiring Mitigation	Proposed Applicant Mitigation Measure(s)	Unavoidable and Significant Adverse Environmental Impact?
		efficiency training program to locomotive, vessel, and construction equipment operators. **MM GHG-2. Implement an Anti-Idling Policy**. To reduce emissions from vessel and locomotive idling in the project area, the Applicant will implement an anti-idling policy. **MM GHG-3. Reduce Emissions from Cars**. The Applicant will evaluate the use of electric cars for company cars, incentivize the use of electric vehicles by providing charging stations, and develop an incentive program for carpooling. **MM GHG-4. Mitigate for Impacts on Washington State from Net Greenhouse Gas Emissions Attributable to the Proposed Action**. To address the potential impacts of greenhouse gas emissions attributable to the Proposed Action, the Applicant will prepare a greenhouse gas mitigation plan that mitigates for 100% of the greenhouse gas emissions identified in the 2015 U.S. and International Energy Policy scenario. For operations at maximum capacity this is 1.99 million metric tons CO_2e per year from 2028 through 2038. The plan must be approved by Ecology. For mitigation that occurs in Cowlitz County, the plan will be approved by Cowlitz County and Ecology. The plan must be ready to implement prior to the start of full operations. The measures described in the plan may include a range of mitigation options. The measures must achieve emission reductions that are real, permanent, enforceable, verifiable, and additional. The emission reductions may occur in Washington State or outside of Washington State but must be demonstrated to meet all five criteria (e.g., using internationally recognized protocols). For example, carbon credits could be purchased through existing carbon markets, or through on-site reductions achieved through efficiency measures or changes in technology.	

Chapter 1
Introduction

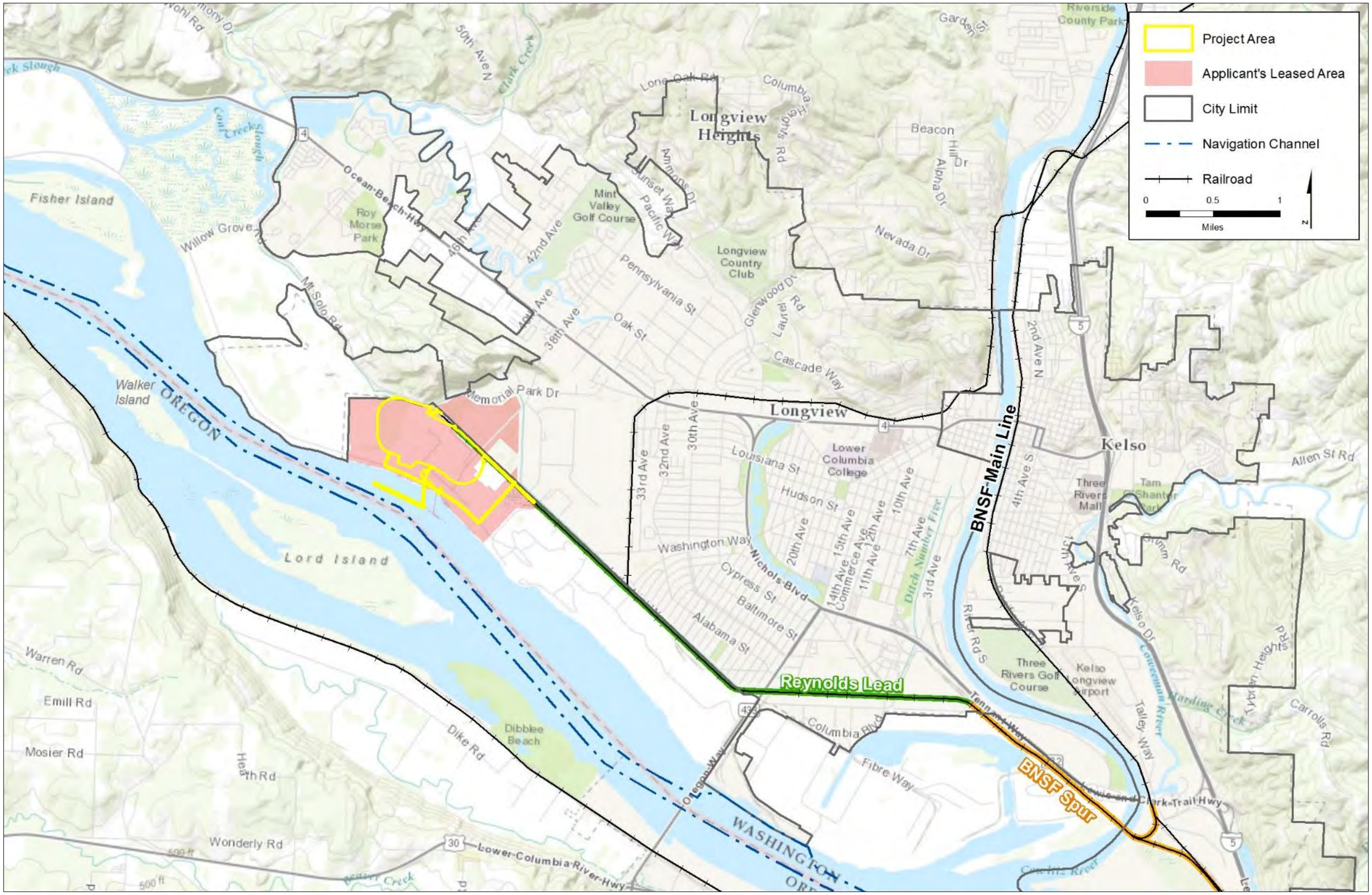
Millennium Bulk Terminals—Longview, LLC (Applicant) is proposing to construct and operate a coal export terminal (Proposed Action) on a 190-acre site (project area) in Cowlitz County, Washington, along the Columbia River (Figure 1-1). The project area is primarily located within a 540-acre site currently leased by the Applicant (referred to as the Applicant's leased area). The proposed coal export terminal would receive coal from the Powder River Basin in Montana and Wyoming and the Uinta Basin in Utah and Colorado via rail. The coal would be unloaded and stockpiled in the project area and then loaded onto vessels for transport to Asian markets via the Columbia River and Pacific Ocean.

The Proposed Action would be constructed in two stages with a maximum throughput of 44 million metric tons of coal per year. The coal export terminal would consist of one operating rail track, eight rail tracks for storing rail cars, rail car unloading facilities, a stockyard for coal storage, conveyor and reclaiming facilities, two new docks (Docks 2 and 3) in the Columbia River, and shiploading facilities on the two docks. Dredging would be required to provide access to and from the Columbia River navigation channel and for berthing at the two new docks. A detailed description of these proposed facilities, existing facilities, and operations in the project area is provided in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

1.1 Purpose of this Document

This Final Environmental Impact Statement (Final EIS) was prepared for the Proposed Action as required by the Washington State Environmental Policy Act (SEPA) (Chapter 43.21C of the Revised Code of Washington [RCW]), the SEPA Rules (Chapter 197-11 of the Washington Administrative Code [WAC]), and Cowlitz County Code (Chapter 19.11). The Proposed Action triggers SEPA review because it would require permits from state and local agencies. Agencies responsible for permits for the Proposed Action will use the Final EIS along with other information to support permitting decisions.

Figure 1-1. Project Vicinity



1.1.1 Environmental Review Process

In February 2012, the Applicant submitted a Joint Aquatic Resources Permit Application (JARPA)[1] for the Proposed Action. The JARPA contains permit application information for federal, state, and local agencies. The Applicant's submission of the JARPA triggered an environmental review process under SEPA. The Applicant withdrew the Clean Water Act Section 401 certification of the JARPA on February 6, 2013, after consulting with the co-lead agencies and determining that the EIS process would take longer than 12 months. The co-lead agencies agreed to continue with the SEPA and National Environmental Policy Act (NEPA) environmental review processes. As required by SEPA, an EIS must be prepared when a lead agency determines a proposal is likely to have significant adverse environmental impacts. In this case, SEPA environmental review of the Proposed Action involves two lead agencies (co-lead agencies) that made the determination an EIS is required, as further discussed below. In July 2016, the Applicant submitted a revised JARPA for the Proposed Action.

1.1.1.1 Co-Lead Agencies

The two co-lead agencies responsible for this Final EIS under SEPA are Cowlitz County and the Washington State Department of Ecology (Ecology). Cowlitz County is the designated nominal lead agency[2] for SEPA environmental review because the Proposed Action would occur within unincorporated Cowlitz County.

In April 2012, Cowlitz County requested Ecology participate as a co-lead agency due to the regional and statewide issues that would be assessed during the SEPA process. In May 2012, Ecology accepted the request to be a co-lead agency. As SEPA co-lead agencies, Cowlitz County and Ecology issued a Determination of Significance and Request for Comments on the Scope of the EIS on August 9, 2013, and a revised Determination of Significance on September 9, 2013, which determined that the Proposed Action is likely to result in significant adverse impacts on the environment, pursuant to SEPA (RCW 43.21C.080), and an EIS under SEPA is required.

The Proposed Action is also being reviewed under NEPA. The U.S. Army Corps of Engineers (Corps) is the NEPA lead agency. In October 2012, Cowlitz County, Ecology, and the Corps signed a Memorandum of Understanding amended on October 1, 2013, to serve as co-lead agencies to jointly oversee the preparation of an EIS under SEPA and an EIS under NEPA. Pursuant to this Memorandum of Understanding, the agencies agreed to synchronize the separate SEPA and NEPA environmental reviews. The Corps published a Draft EIS pursuant to NEPA on September 30, 2016.

1.1.1.2 Public Scoping

The co-lead agencies invited local agencies, state agencies, federal agencies, tribes, organizations, and members of the public to comment on the scope of the SEPA and NEPA EISs during a 95-day

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[1] To streamline the environmental permitting process, multiple federal, state, and local regulatory agencies created one application form—the Joint Aquatic Resources Permit Application (JARPA)—to use for a variety of federal, state, and local permits in Washington State. The JARPA avoids the need to prepare multiple application forms for certain federal, state, and local permits. An introduction to the JARPA environmental permitting process can be found at: http://www.epermitting.wa.gov/site/jarpa_introduction/10042/introduction.aspx

[2] The nominal lead agency is responsible for complying with the procedural requirements of SEPA (WAC 197-11-944).

scoping period. The scoping period began on August 16, 2013, and closed November 18, 2013. The co-lead agencies collected over 217,500 comments at in-person scoping meetings, online, and in writing. The co-lead agencies established the scope of the SEPA and NEPA Draft EISs based, in part, on comments received during the scoping period and identified elements of the environment that should be addressed in the SEPA and NEPA Draft EISs.

1.1.1.3 Draft EIS

The SEPA co-lead agencies published the Draft EIS for review and comment on April 29, 2016. Comments on the Draft EIS were received April 29 through June 13, 2016. All comments received during the comment period were reviewed, compiled, and considered in the development of this Final EIS. This Final EIS has been updated to include responses to comments received on the Draft EIS. Responses to all comments on the Draft EIS are presented in Volume IV of this Final EIS.

As stated previously, the Corps published a Draft EIS pursuant to NEPA on September 30, 2016. Comments on the NEPA Draft EIS were received September 30 through November 29, 2016. The NEPA Draft EIS was also considered in the development of this Final EIS.

1.2 Document Organization

This Final EIS includes four volumes: Volume I includes the Final EIS chapters, Volume II includes appendices, Volume III includes technical reports from which information presented in the Final EIS was extracted, and Volume IV includes responses to comments on the Draft EIS. The following describes the four volumes in more detail.

1.2.1 Volume I

Volume I is organized as follows.

Chapter 1, *Introduction.* Chapter 1 provides an introduction to this Final EIS.

Chapter 2, *Project Objectives, Proposed Action, and Alternatives*. This chapter describes the Applicant's project objectives, the Proposed Action, and the No-Action Alternative.

Chapter 3, *Built Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures*. This chapter presents the existing conditions, impacts of the Proposed Action and No Action Alternative on the built environment, and proposed mitigation measures. It is divided into the following sections: land and shoreline use; social and community resources; aesthetics, light, and glare; cultural resources; tribal resources; and hazardous materials.

Chapter 4, *Natural Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures.* This chapter presents the existing conditions, impacts of the Proposed Action and No Action Alternative on the natural environment, and proposed mitigation measures. It is divided into the following sections: geology and soils; surface water and floodplains; wetlands; groundwater; water quality; vegetation; fish; wildlife; and energy and natural resources.

Chapter 5, *Operations: Existing Conditions, Project Impacts, and Proposed Mitigation Measures*. This chapter presents the existing conditions, impacts of the Proposed Action and No-Action Alternative on the operational environment, and proposed mitigation measures. It is divided into the following sections: rail transportation; rail safety; vehicle transportation; vessel transportation; noise and vibration; air quality; coal dust; and greenhouse gas emissions and climate change.

Chapter 6. *Cumulative Impacts*. This chapter addresses the potential impacts of the Proposed Action when considered in combination with all other past, present, and reasonably foreseeable future actions.

Chapter 7. *Public Involvement and Agency Coordination*. This chapter addresses how the co-lead agencies involved the public and coordinated with agencies and tribes throughout the SEPA process.

Chapter 8. *Required Permits and Approvals*. This chapter lists the required permits and approvals to construct and operate the Proposed Action.

1.2.2 Volume II

Volume II includes Appendices A through J, which provide materials and data to support the information presented in Chapters 2 through 7 of this Final EIS. The table of contents in this Final EIS provides the title of each appendix.

1.2.3 Volume III

Information contained in this Final EIS was extracted from technical reports located in Volume III and incorporated by reference. The technical reports were prepared specifically for this Final EIS. The technical reports include the determination of study areas, methods used for analysis, existing conditions, and potential impacts.

1.2.4 Volume IV

Volume IV presents responses to comments on the Draft EIS. Copies of all comments received on the Draft EIS are included in an appendix to this volume.

1.3 Notable Changes to the Final EIS

This Final EIS reflects revisions to the Draft EIS. In general, revisions have been made to provide additional information, update and expand analyses, update analyses per the findings presented in the NEPA Draft EIS as appropriate, include additional analyses, refine measures to mitigate potentially significant impacts, and correct inadvertent errors. Notable substantive revisions are identified below.

Chapter 2, *Project Objectives, Proposed Action, and Alternatives*

- Section 2.3, *No-Action Alternative*
  - The description of the No-Action Alternative was revised to improve clarity and for consistency with the description of the No-Action Alternative in the NEPA Draft EIS.

Chapter 3, *Built Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures*

- Section 3.0, *Introduction*

- A new mitigation measure was added for the Applicant to prepare and submit a mitigation compliance report annually.

- Section 3.2, *Social and Community Resources*
  - The assessment of potential impacts on the local economy was removed.
  - A new assessment of potential impacts on pedestrians and bicyclists was added.
  - The potential for disproportionately high and adverse impacts on minority and low-income populations related to vehicle delay at at-grade crossings along the Reynolds Lead was reassessed.
  - An analysis of impacts on minority and low-income populations was added related to diesel particulate matter inhalation risk from the Proposed Action.
- Section 3.6, *Hazardous Materials*
  - The hazardous materials expected to be used during normal operations of the Proposed Action and stored in the project area were clarified.

Chapter 4, *Natural Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures*

- Section 4.0, *Introduction*
  - A new mitigation measure was added for the Applicant to prepare and submit a mitigation compliance report annually.
- Section 4.3, *Wetlands*
  - The direct and indirect impacts study areas were revised to reflect the wetlands study area defined by the Corps in the NEPA Draft EIS.
  - Additional context of wetlands in the vicinity of the project area but outside of the study area was provided.
  - A discussion was added regarding potential coal dust impacts on wetland vegetation from the Proposed Action.
- Section 4.5, *Water Quality*
  - Additional information was provided on potential propeller wash-related scour impacts from vessels during docking and undocking.
  - Additional information was provided on potential contaminant resuspension by Proposed Action-related vessel movements in the lower Columbia River.
  - Mitigation Measure MM WQ-2 was revised to include additional requirements for the Applicant to monitor the effects of a coal spill for those spills where the Applicant is the responsible party.
- Section 4.7, *Fish*
  - Additional information was provided on bull trout and eulachon.
  - A discussion was added on potential impacts related to the entrainment of aquatic organisms during hydraulic dredging.

    - Additional information was provided on potential impacts related to fish stranding from vessel wakes.
    - Mitigation measure MM FISH-4 was revised to specify the time period for performing surveys.
    - A new mitigation measure (MM FISH-5) was added to reduce potential impacts associated with hydraulic dredging.
- Section 4.8, *Wildlife*
    - The underwater noise impact analysis was revised based on National Oceanic and Atmospheric Administration's (NOAA) recently revised (July 2016) technical guidance for assessing the effects of underwater sound on marine mammals.
    - The federal listing status of the Columbian white-tailed deer was revised from endangered to threatened, consistent with the October 2016 U.S. Fish and Wildlife Service ruling.

Chapter 5, Operations: Existing Conditions, Project Impacts, and Proposed Mitigation Measures.

- Section 5.0, *Introduction*
    - A new mitigation measure was added for the Applicant to prepare and submit a mitigation compliance report annually.
- Section 5.1, *Rail Transportation*
    - The capacity of the Reynolds Lead and BNSF Spur was modeled, and the impact analysis was revised to reflect the updated capacity estimate. The mitigation measure (MM RT-1) to coordinate with the Longview Switching Company (LVSW) regarding operations on the Reynolds Lead and BNSF Spur was removed based on this revised analysis.
    - Cowlitz River Bridge inspection report data were provided.
    - Additional information on the type and number of baseline train traffic on main line routes outside Washington State was provided.
- Section 5.2, *Rail Safety*
    - The mitigation measure (MM RT-1) to coordinate with LVSW regarding operations on the Reynolds Lead and BNSF Spur was removed based on the revised analysis in Section 5.1, *Rail Transportation*.
- Section 5.3, *Vehicle Transportation*
    - The vehicle delay and queuing analyses were updated using new traffic volume data in the State Route 432 corridor and assuming four locomotives for each Proposed Action-related train.
    - A vehicle delay analysis for the peak traffic hour was conducted for intersections upstream of the study crossings on the Reynolds Lead and BNSF Spur.
    - The vehicle safety analysis was revised to reflect a new benchmark for a vehicle safety impact.

- Section 5.5, *Noise and Vibration*
  - The noise analysis was updated to reflect the revised assumption of four locomotives per Proposed Action-related train.
  - Potential impacts during construction of the export terminal were clarified to state there are no applicable regulatory noise standards.
  - Potential noise impacts were updated to reflect the pending Oregon Way/Industrial Way Intersection Project.
- Section 5.6, *Air Quality*
  - Rail emissions estimates were updated to reflect the revised assumption of four locomotives per Proposed Action-related train.
  - Fugitive emissions of particulate matter (PM) 2.5 and PM 10 from coal handling and storage were updated to reflect the silt content for western coal.
  - Emissions data from routine testing of emergency diesel generators and fire-fighting water pumps were added.
  - Emissions rates for rail and vessel operations in the project area were updated.
  - A new analysis was added for inhalation cancer risk related to diesel particulate matter from terminal operations and Proposed Action-related train locomotives.
- Section 5.7, *Coal Dust*
  - Coal dust emissions from coal handling and storage in the project area were updated to reflect the silt content for western coal.
  - Coal train data from a new coal train study in Whatcom County, Washington, and other coal train studies were reviewed and used to supplement knowledge regarding coal dust emissions, and to improve the reliability of the assessment of potential impacts from Proposed Action-related trains.
  - A dispersion model was run to assess the potential coal dust concentration and deposition from the Proposed Action-related loaded and unloaded trains traveling along the BNSF Railway Company main line in the Columbia River Gorge.
- Section 5.8, *Greenhouse Gas Emissions and Climate Change*
  - The coal market assessment, which examines the U.S. and Asian coal market changes in terms of coal production, consumption, distribution, and carbon dioxide (CO_2) emissions associated with the Proposed Action, was updated based on new data and analysis. The revised coal market assessment findings were incorporated into the greenhouse gas emissions analysis.
  - The revised vegetation, vehicle transportation, and air quality analyses were incorporated into the greenhouse gas emissions analysis.
  - Greenhouse gas emissions factors were updated.
  - Greenhouse gas emissions from sediment carbon and fuel use associated with dredging, emissions from production of materials used in the construction of the coal export terminal,

and emissions resulting from Proposed Action-related vessels traveling from Asia to the coal export terminal were added to the analysis.

- The *Emissions in Context* subsection was removed.
- A new analysis was added that examined how the impacts from construction and operation of the Proposed Action could be compounded by climate change.

Chapter 6, *Cumulative Impacts*

- Section 6.2, *Scope of Cumulative Impacts Analysis*
  - The reasonably foreseeable future actions were updated for the cumulative impacts analysis including associated rail and vessel traffic, as applicable.
- Section 6.3, *Cumulative Impacts by Resource Area*
  - The impact analyses were updated based on the revised list of reasonably foreseeable future actions and the resource-specific updates described above.

Chapter 7, *Public Involvement and Agency Coordination*

- Section 7.4, *Draft EIS Public Comments*
  - A summary of the Draft EIS comment period was provided.

Appendix I, *Sulfur Dioxide and Mercury Emissions*

- The estimates of sulfur dioxide and mercury emissions in Washington State from Proposed Action-related coal combustion in Asia were updated based on the revised coal market assessment findings.

1.4 Next Steps

The Final EIS provides information for the public, state, and local agencies to support decision-making regarding permits for the Proposed Action. These agencies include Cowlitz County, City of Longview, Southwest Clean Air Agency, Three Rivers Regional Wastewater Authority, Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, and Ecology. Local, regional, and state agencies will conduct their respective reviews as defined by adopted local, regional, and state rules. All primary local, regional, state, and federal permits must be issued before the Proposed Action may begin. The NEPA Final EIS, expected to be published in 2017, will also inform local, state, and federal permit decisions.

Chapter 2
Project Objectives, Proposed Action, and Alternatives

Millennium Bulk Terminals—Longview, LLC (Applicant) is proposing to construct and operate a coal export terminal for the shipment of coal (Proposed Action) on a 190-acre site (project area) in Cowlitz County, Washington, along the Columbia River. This chapter describes the Applicant's project objectives, the Proposed Action (project location, existing facilities and operations, and proposed facilities and operations) and the No-Action Alternative.

2.1 Applicant's Project Objectives

As part of the Washington State Environmental Policy Act (SEPA) process, the Applicant provided the SEPA co-lead agencies[1] with a description of the project objectives. This section presents the Applicant's objectives for the Proposed Action, which are listed below and described in the following sections.

- Enable western U.S. coal to compete in the Pacific international coal supply market.
- Diversify Washington State's trade-based economy.
- Reduce local unemployment.

2.1.1 Enable Western U.S. Coal to Compete in the Pacific International Coal Supply Market

The Applicant states the Proposed Action would enable western U.S. coal to compete in the Pacific international coal supply market by providing a terminal designed for the efficient transport of western U.S. coal from rail to ocean-going vessels. Further development of western U.S. coalfields and the growth of Asian market demand for U.S. coal are expected to continue, and existing West Coast terminals are unavailable to support this need. To derive benefit from economies of scale, implementation of the Proposed Action would provide a coal export terminal sufficient in throughput to give U.S. coal producers the opportunity to expand their share of the international coal market.

Further, the Proposed Action would reuse an existing industrial terminal and use existing rail infrastructure and a direct shipping route to Asia, which would promote efficiency and minimize costs for handling and transferring U.S. coal for shipment to Asian markets. These factors would enable U.S. coal to compete in Asian energy markets.

[1] The two co-lead agencies responsible for this Environmental Impact Statement (EIS) under the Washington State Environmental Policy Act (SEPA) are Cowlitz County and the Washington State Department of Ecology (Ecology). Cowlitz County is the designated nominal lead agency for SEPA environmental review since the Proposed Action would occur within unincorporated Cowlitz County.

2.1.2 Diversify Washington State's Trade-Based Economy

The Applicant states the Proposed Action would support the diversification of Washington State's trade-based economy by providing a new coal export terminal to accommodate the anticipated growth in demand for the export of U.S. coal. Approximately 40% of all jobs in Washington State relate to trade, making international trade a key driver of the state's economy (Washington Council on International Trade 2014). Economic diversification of the trade-based economy is vital to Washington State's long-term economic growth. In times of market volatility, an economy that branches out to other sectors—such as exporting services—can help protect existing, and create new, jobs. Implementation of the Proposed Action would help support the state's diverse economy, which is essential for maintaining economic sustainability.

2.1.3 Reduce Local Unemployment

The Applicant states the Proposed Action would help reduce unemployment in Cowlitz County by creating employment opportunities in the Longview area. As of February 2017, Cowlitz County's unemployment rate was 7.3%, which was higher than both the national and state averages (Washington State Employment Security Department 2017). The Applicant states the Proposed Action would create approximately 1,350 construction employment opportunities and add approximately 135 new family-wage[2] jobs to operate the coal export terminal. This would also generate needed tax revenues for local economies.

2.2 Proposed Action

Lighthouse Resources, Inc.[3] owns Millennium Bulk Terminals—Longview, LLC. In 2010, Millennium Bulk Terminals—Longview, LLC applied for and received a Shoreline Permit from Cowlitz County to build a coal export terminal. In March 2011, the permit was withdrawn. This SEPA EIS addresses a separate, second application. In January 2011, Lighthouse Resources, Inc. began looking for a suitable location between northwest Washington and southern California to construct a coal export terminal and determined a 540-acre site in Cowlitz County, Washington, on the Columbia River as the most suitable location.

The Proposed Action would construct and operate a coal export terminal for the shipment of coal in Cowlitz County, Washington, along the Columbia River. The coal export terminal would receive coal from the Powder River Basin in Montana and Wyoming and Uinta Basin in Utah and Colorado via rail shipment. The coal would be stored on site then loaded and transported by ocean-going vessels via the Columbia River and Pacific Ocean to overseas markets in Asia. The coal export terminal would be capable of receiving, stockpiling, and loading coal by conveyor onto vessels in the Columbia River for export.

[2] Income that is sufficient to support a family.

[3] In April 2015, Ambre Energy North America, Inc. announced that it had changed its name to Lighthouse Resources, Inc. In 2014, Ambre Energy North America, Inc. separated from its Australian parent company, Ambre Energy Limited, when Resource Capital Funds became the majority owner of Ambre Energy North America, Inc. (Lighthouse Resources, Inc. 2015).

The Applicant determined there is sufficient Asian market demand for U.S. low-sulfur coal to warrant the development of a coal export terminal in the western United States for shipping Powder River Basin and Uinta Basin coal to Asian markets. Japan, South Korea, and Taiwan lack substantial coal resources and depend almost exclusively on foreign imports. According to the Applicant, Pacific Northwest ports are well positioned to provide western U.S. coal to trade partners in Japan, South Korea, and Taiwan at rates that are competitive in the international marketplace, and to provide a diversification of coal supply to those importing countries.

2.2.1 Project Location

The Proposed Action is located adjacent to the Columbia River in unincorporated Cowlitz County, Washington near Longview, Washington. Under the Proposed Action, the Applicant would develop a coal export terminal on 190 acres within an existing 540-acre site that is currently leased by the Applicant.[4] The 190-acre upland site is referred to as the *project area*, and the 540-acre site is referred to as the *Applicant's leased area* in this Environmental Impact Statement (EIS). Figure 2-1 illustrates the project area and vicinity for the Proposed Action and the Applicant's leased area.

Cowlitz County Land Use and Development Code (CCC) Title 18 designates the project area for heavy industrial use. As illustrated in Figure 2-1, the project area is bounded by existing industrial uses within the Applicant's leased area to the south and east, the closed Black Mud Pond facility[5] within the Applicant's leased area to the west, and Industrial Way (State Route [SR] 432) and the Reynolds Lead to the north. Existing industrial uses within and adjacent to the project area are described in Section 2.2.2, *Existing Facilities and Operations*.

Vehicular access to the project area is provided via Industrial Way. The Reynolds Lead and BNSF Spur—both jointly owned by BNSF Railway Company (BNSF) and Union Pacific Railroad (UP), and operated by Longview Switching Company (LVSW)[6]—provide rail access to the project area from a point on the BNSF main line (Longview Junction, Washington) located to the east in Kelso, Washington. The distance from the BNSF main line along the BNSF Spur and the Reynolds Lead to the project area is approximately 7 miles. Vessels access the project area via the Columbia River and berth at an existing dock (Dock 1) in the Columbia River.

2.2.2 Existing Facilities and Operations

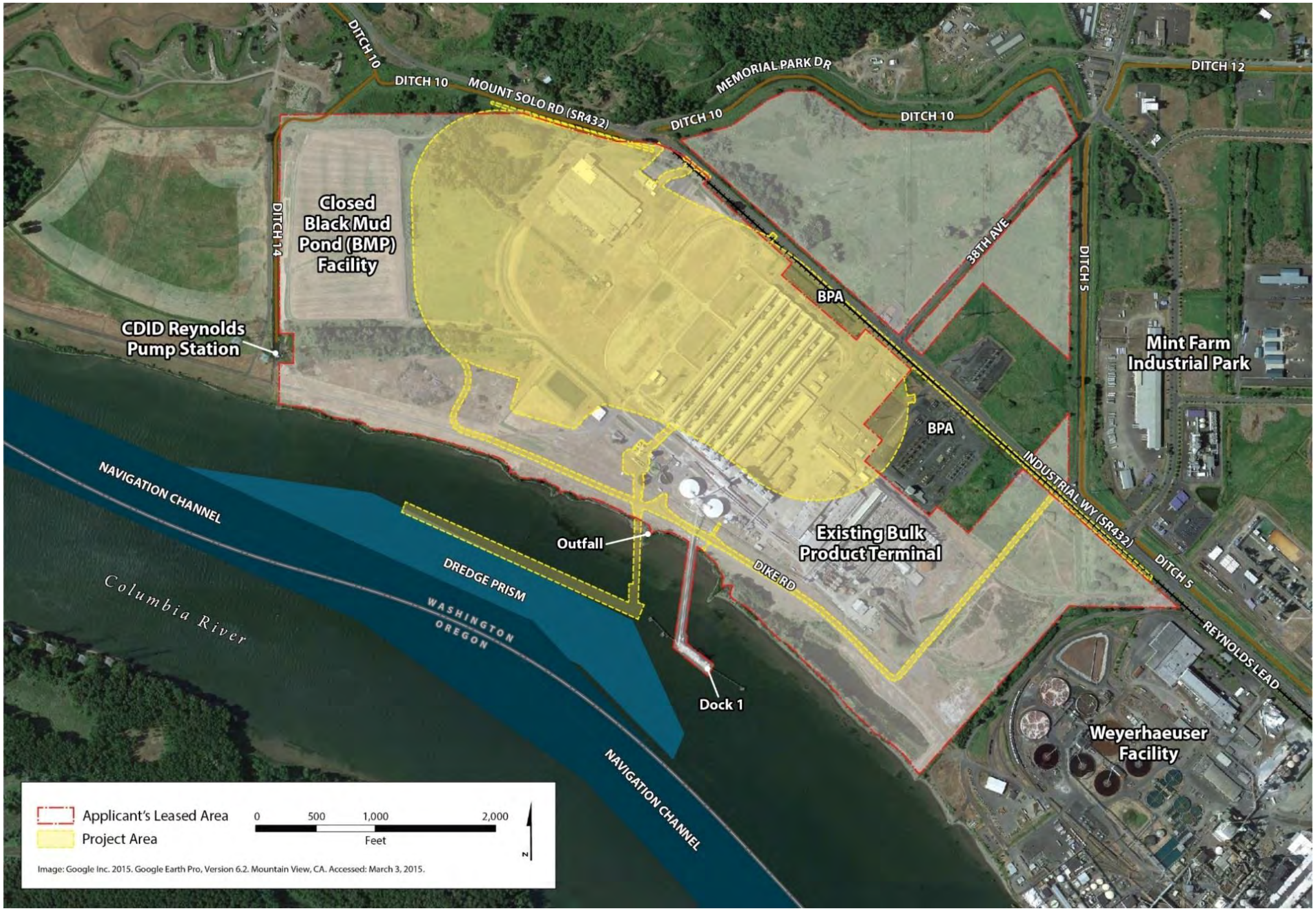
This subsection describes the existing facilities and operations within the Applicant's 540-acre leased area (Figure 2-1).

[4] The 190-acre area is within the Applicant's leased area, but does not include the access roads within the Applicant's leased area. The project area is also located on two parcels currently owned by Bonneville Power Administration and a portion of the Reynolds Lead jointly owned by BNSF Railway Company (BNSF) and Union Pacific Railroad (UP).

[5] More information about the closed Black Mud Pond facility can be found in Chapter 3, Section 3.6, *Hazardous Materials*, of this EIS.

[6] The Longview Switching Company (LVSW) is jointly owned BNSF and UP.

Figure 2-1. Project Area



2.2.2.1 Background and History of the Applicant's Leased Area

The Applicant's leased area is the location of the former Reynolds Metals Company facility (Reynolds facility). The facility was constructed in 1941 to support World War II efforts. Reynolds Metals Company expanded in 1968, and operated as an aluminum smelter until 2001 when smelter operations ceased. The former Reynolds facility was an intensive industrial use and, at the time of its closure in 2001, employed approximately 800 workers, and operated 24 hours per day, 7 days per week. In 2000, Reynolds Metals Company was acquired by Alcoa as a wholly owned subsidiary. In 2001, the Longview site's facility assets were sold to Longview Aluminum, but ownership of the land was retained by the Reynolds Metals Company. Longview Aluminum declared bankruptcy in 2003. In 2004, Chinook Ventures purchased Longview Aluminum's facility assets, including the buildings, structures and equipment, and entered into a long-term land lease with the Reynolds Metals Company, who owns the 540 acres. In 2005, Alcoa transferred ownership of the land from the Reynolds Metals Company to Northwest Alloys, a wholly owned subsidiary of Alcoa, Inc. Northwest Alloys also has an existing Aquatic Lands Lease No. 20-B09222 from the Washington State Department of Natural Resources (WDNR) through January 2038.

In 2011, Chinook Ventures sold the plant assets to the Applicant, at which time, the Applicant entered into a long-term land lease with Northwest Alloys, a subsidiary of Alcoa. The following work has been done.

- Removed equipment and storage sheds left behind by Chinook Ventures.
- Disposed of wastes generated during the removal process.
- Cleaned other equipment and buildings.

The 190-acre project area was separated from the Applicant's leased area through a lot boundary adjustment to develop a coal export terminal. The remaining land within the Applicant's leased area is intended to be used for other purposes including the existing bulk product terminal.

Portions of the Applicant's 540-acre leased area outside the 190-acre project area are also subject to ongoing hazardous materials cleanup activities resulting from contamination by the former aluminum smelting and casting uses. Northwest Alloys and the Applicant are actively engaged in site cleanup in the Applicant's leased area, and continue to work with local, state, and federal regulatory agencies to clean up the site. The Applicant's leased area continues to support industrial operations and is currently used as a bulk product terminal that includes both marine and upland facilities.

2.2.2.2 Existing Bulk Product Terminal

The Applicant currently operates, and would continue to operate, a bulk product terminal within its 540-acre leased area, separate from and independent of the proposed coal export terminal (Figure 2-1). The bulk product terminal includes buildings and equipment used for various activities. The terminal is served by Industrial Way and the Reynolds Lead. Vessels access the terminal from an existing dock (Dock 1) located on the Columbia River.

The existing bulk product terminal includes rail facilities, storage, conveyors and transfer stations, vessel facilities, and other buildings and employee-support facilities.

Rail Facilities

The existing bulk product terminal is located on the Reynolds Lead, an existing rail line connecting several industries via the BNSF Spur to the BNSF main line rail network approximately 7 miles away at Longview Junction. The BNSF Spur consists of a track through Longview Junction yard, across the Cowlitz River Bridge, and through the LVSW yard. The Reynolds Lead consists of a track from the LVSW yard to the project area. The Reynolds Lead covers the majority of the distance between the project area and the BNSF main line.

The Applicant has operating permits to load alumina and unload coal by rail. Bulk materials are received and shipped by railcars at an unloading area of the existing bulk product terminal called the Central Transfer Tower. The Central Transfer Tower is an enclosed building receiving bulk material from railcars using a gravity fed bin under the rail line.

Storage

Storage of alumina and coal at the existing bulk product terminal occurs in storage tanks (silos). Six vertical storage tanks, originally constructed by Reynolds Metals Company for alumina facility operations, store bulk material near the southern portion of the facility. Three of these tanks receive material from the Central Transfer Tower for storage prior to shipping the material by truck. Two of the remaining tanks are for the storage of bulk materials that then feed to the last of the six tanks for transfer and shipment by train. Maximum capacity for handling materials varies by tank from 30 to 100 tons per hour.

The existing bulk product terminal includes four additional storage tanks used during previous smelter operations. Currently, one tank is empty and the other three tanks contain material from previous operations, but are in the process of being emptied by the Applicant. In addition, there are miscellaneous storage tanks on site, including fuel tanks.

The bulk product terminal includes an area in the central portion of the site called the North Plant Potrooms, which contains six potline[7] buildings (approximately 600,000 total square feet). Various bulk products from previous operations were stored in these buildings. However, these products have been removed and the potrooms have been cleared by the Applicant.

Conveyors and Transfer Stations

A conveyor system extends from the bulk material unloading facilities to the storage silos or truck loading areas. Existing conveyors are enclosed and use a wet suppression system or dust-collection equipment to minimize emissions during the transfer of bulk materials.

Vessel Facilities

The bulk product terminal includes Dock 1, which is used to unload alumina from vessels and berth other ships. Dock 1 is directly south of the existing terminal's upland facilities and provides vessels access to the terminal via the Columbia River at the existing berthing area. The dock includes an overwater approach trestle and equipment to unload bulk materials from vessels. For alumina

[7] Potlines are defined as a row of electrolytic cells connected electrically in series, used in the production of aluminum.

operations, vessel traffic at the dock is expected to consist of approximately six to seven vessels per year.

The Applicant has operating permits to unload alumina from vessels. Unloading facilities include a vacuum ship unloader used for alumina shipments. The existing ship berth has been periodically dredged to support alumina shipments.

Buildings and Employee-Support Facilities

The bulk product terminal includes a former cable plant building, an approximate 270,000-square-foot facility with ancillary structures occupying the northwestern corner of the area. The plant was constructed in the late 1960s and, until 1992, produced electrical cable products, including aluminum wire, rods, and insulated low and medium voltage cable.

The terminal also includes various buildings and employee-support facilities including four office buildings, two cast house buildings, a carbon plant, and several maintenance sheds.

2.2.2.3 Current Operations and Transport

Current operations of the bulk product terminal, allowed under current permits and zoning, include storing and transporting alumina and up to 150,000 metric tons of coal per year. On-site operations and off-site transport activities are described below. The transport of alumina has been put on hold because Alcoa announced in November 2015 that it will curtail the Wenatchee smelter, temporarily ceasing production while maintaining the facility for restart. The on-site and off-site operations related to alumina are discussed in this EIS to describe alumina transport upon the Wenatchee facility restart.

On-Site Operations

On-site operations of the existing bulk product terminal involve receiving, storing, and loading (for transport) coal and alumina. Coal is delivered to the site by train, stored in the existing silos, and transferred by truck to the neighboring Weyerhaeuser facility. Alumina is delivered to Dock 1 by vessel, stored on site, and transported by train.

Portions of the project area are also undergoing hazardous waste cleanup activities resulting from contamination by former aluminum smelting operations (Washington State Department of Ecology 2014). Washington State Department of Ecology (Ecology) is overseeing work being done by Northwest Alloys, Alcoa, and the Applicant to investigate and cleanup the site under Washington's Model Toxics Control Act. A Remedial Investigation and Feasibility Study was finalized in January 2015. The study investigated contamination, identified soil and groundwater contaminants, and identified cleanup options. The draft Cleanup Action Plan and Consent Decree were issued in January 2016, which describe cleanup methods and standards. Additional hazardous materials are described in Chapter 3, Section 3.6, *Hazardous Materials*, and its corresponding appendix.

Off-Site Transport

Trains currently deliver coal to the bulk product terminal where it is transferred by truck to Weyerhaeuser, located 1 mile to the east of the bulk product terminal. Vessels would deliver alumina to Dock 1 on the Columbia River. Alumina would be stored and then shipped to Chelan

County, Washington, by train. Table 2-1 identifies current activities and the means for transporting the commodities to and from the existing bulk product terminal.

Table 2-1. Current Activities and Transport Operations at the Existing Bulk Product Terminal

		Transport Operations		
Commodity	**Activity**	**Truck**	**Train**	**Vessel**
Coal	Trains deliver coal where it is transferred by truck to Weyerhaeuser, located approximately 1 mile southeast of the existing bulk product terminal	Operate on a continual basis (24 hours a day; 7 days a week)	1 train (25 to 30 rail cars) 1 to 2 times per week	N/A (trains deliver coal; trucks transport)
Alumina[a]	Vessels deliver alumina to Dock 1; alumina is stored on site and then shipped to Chelan County, Washington by train	Not applicable (vessels deliver alumina; trains transport)	60 rail cars per week (12 rail cars per day, 5 days per week)	6 vessels per year

Notes:
[a] The transport of alumina has been put on hold; operations related to alumina describe the alumina transport as it will exist when transport resumes.
N/A = not applicable

2.2.3 Proposed Facilities, Construction, and Operations

As described in the Section 2.2.2, *Existing Facilities and Operations*, the Applicant currently operates and would continue to operate the bulk product terminal on land leased by the Applicant, separate from and independent of the Proposed Action. Under the Proposed Action, the coal export terminal would be developed on 190 acres (project area), within the Applicant's leased area and adjacent to the existing bulk product terminal (Figure 2-1). The proposed coal export terminal facilities and operations described in this section would occur within the 190-acre project area.

BNSF or UP trains would transport coal in unit trains (meaning all the rail cars carry the same commodity) from the BNSF main line at Longview Junction to the project area via the BNSF Spur and Reynolds Lead (Figure 2-2). Coal would be unloaded from rail cars, stockpiled, and loaded by conveyor onto ocean-going vessels at two new docks (Docks 2 and 3) to be located in the Columbia River. Figure 2-3 illustrates the Proposed Action.

Construction of the Proposed Action would involve clearing and grading, and construction of rail and coal handling facilities including one operating track and eight storage track loops to provide staging for arriving and departing trains, as well as a tandem rotary dumper, conveyors, stackers, and reclaimers. The stockpile area would be located within the rail loop and consist of four discrete stockpile pads. The stockpile area would require ground improvements, which would entail preloading[8] of the stockpile area. Approximately 2.1 million cubic yards of preloading material (i.e., rock, dirt, concrete or other appropriate debris) would be placed on the stockpile area to a height of approximately 35 feet.

[8] Preloading is the process of consolidating or compressing soils to support the weight of coal stockpiles and associated infrastructure to prevent excessive future settlement.

Figure 2-2. BNSF Spur and Reynolds Lead

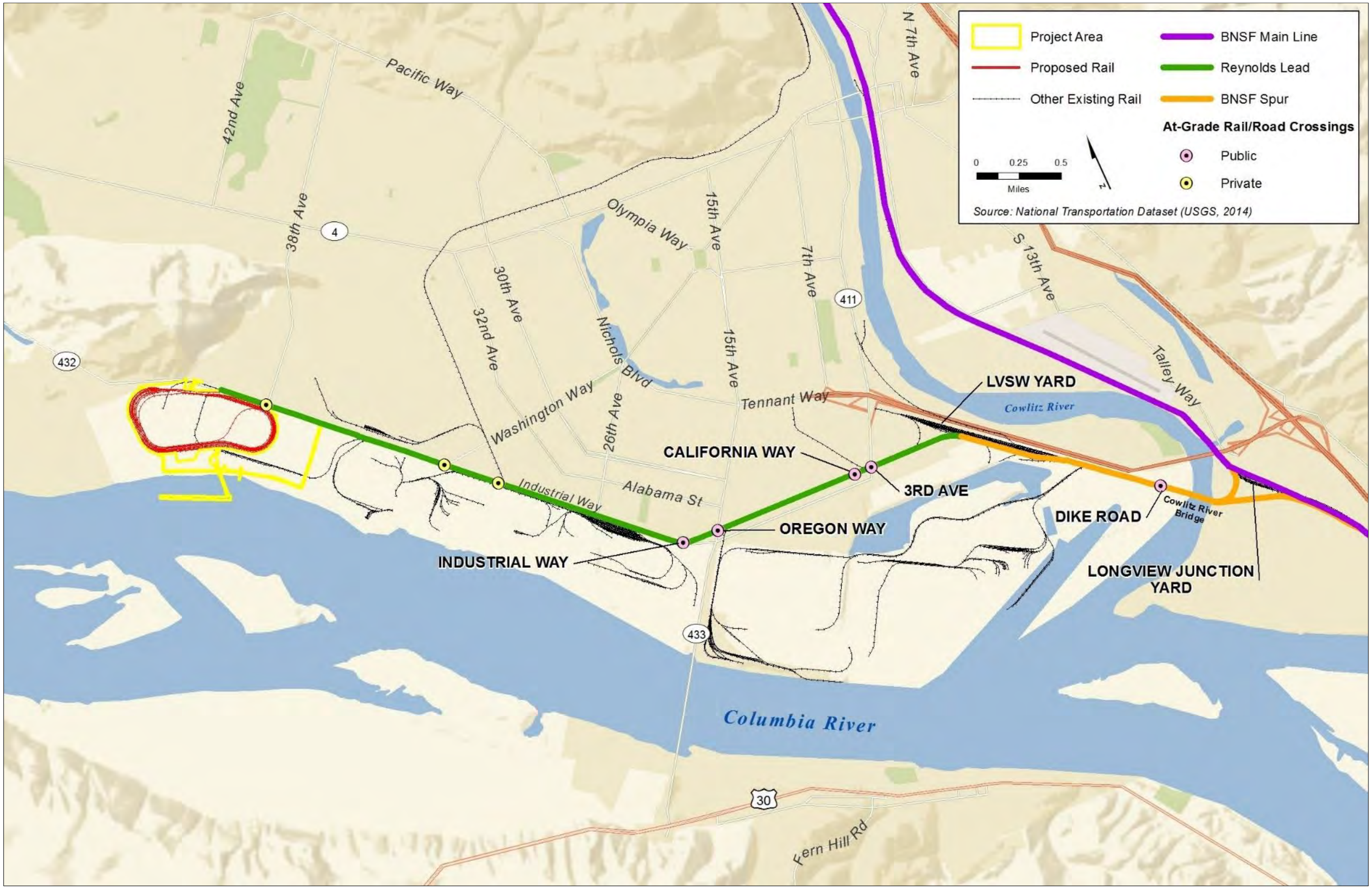
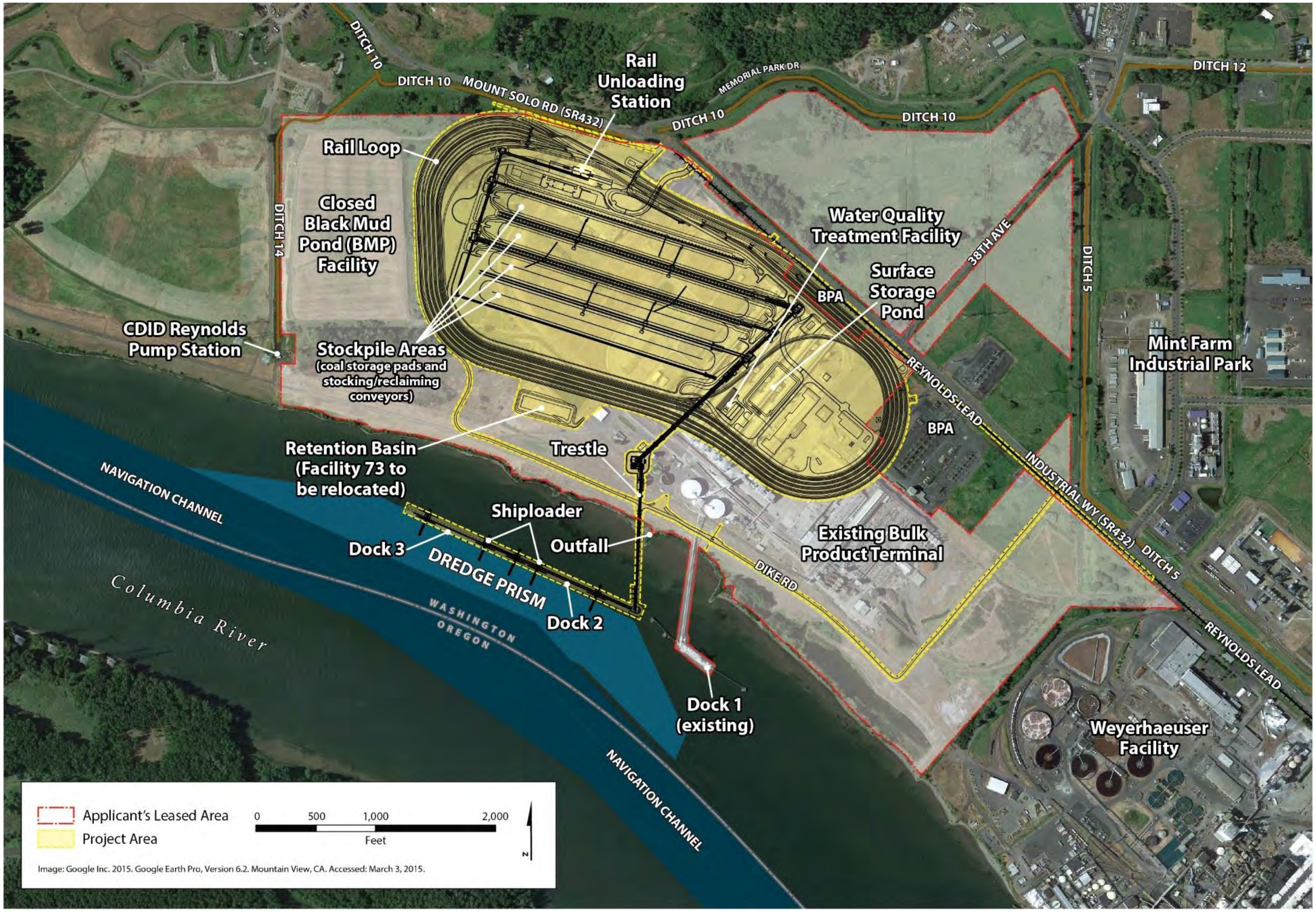


Figure 2-3. Proposed Action



Wick drains[9] would be placed within the stockpile area to reduce the time required for preloading, from an estimated 18 months to 9 months. The wick drains would allow groundwater to be expelled from beneath the stockpile area and would allow the necessary ground settlement to occur.

The Proposed Action would also involve constructing a trestle and two docks, with one shiploader on each dock. The trestle and docks would require 630 36-inch piles, 610 of which would be installed waterward of the ordinary high water mark (OHWM)[10] of the Columbia River. Most pilings would be installed approximately 140 to 165 feet below the mudline, using vibratory pile drivers and then using an impact pile driver for proofing. Shiploaders on the docks would consist of a traveling structural steel portal, shuttle, and boom and would be fed coal by a dedicated conveyor. Shiploaders would be rail mounted to allow movement along the dock.

The Proposed Action could have a maximum annual throughput capacity of up to 44 million metric tons of coal per year.[11,12] As illustrated in Figure 2-4, the Proposed Action would consist of one operating rail track, eight rail tracks for storing up to 8 unit trains, rail car unloading facilities, a stockpile area for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks 2 and 3), and shiploading facilities on the two docks. Dredging of the Columbia River would be required to provide access to the Columbia River navigation channel and for berthing at Docks 2 and 3. Figure 2-4 illustrates coal export terminal operations for unloading, stockpiling, transferring, and shipping coal.

Vehicles would access the project area from Industrial Way, and vessels would access the project area via the Columbia River and berth at Dock 2 or 3. Coal export terminal operations would occur 24 hours per day, 7 days per week. The Proposed Action would be designed for a minimum 30-year period of operation.

The Applicant anticipates construction would begin in 2018 and completed by 2024. Construction and operations would consist of two stages. Stage 1 would include two sub-stages: Stage 1a for start-up operations and Stage 1b for increased operations. Stage 2 would involve construction and operations for full build-out. For the purpose of the analysis in this document, it is assumed that the Proposed Action would be fully operational at maximum capacity by 2028.

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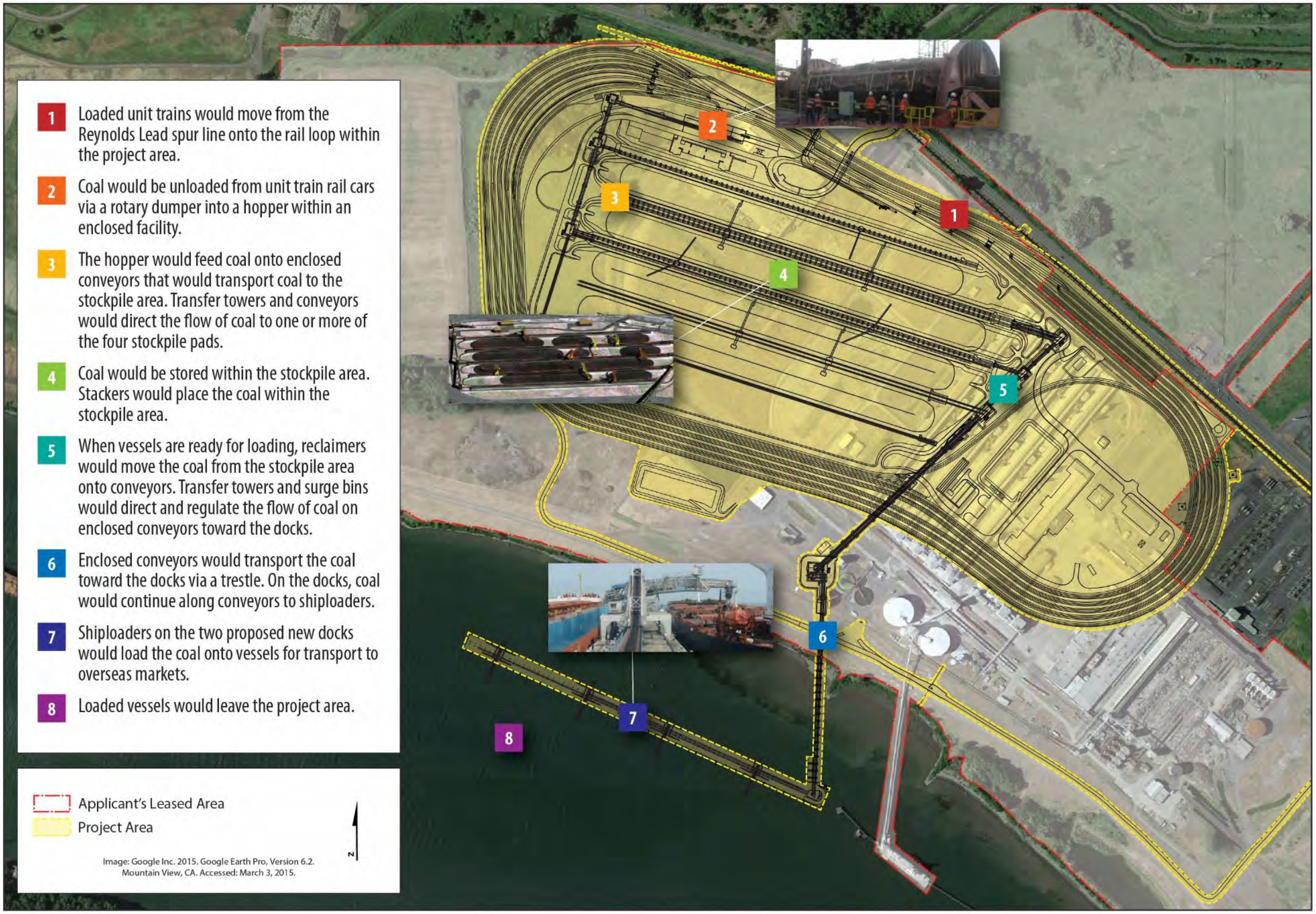
[9] Wick drains, also known as prefabricated vertical drains and vertical strip drains, are a ground-improvement technique that provides drainage paths for pore water in soft compressible soil, using prefabricated geotextile filter-wrapped plastic strips with molded channels.

[10] Per Washington State's Shoreline Management Plan, "that mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation as that condition exists on June 1, 1971, as it may naturally change thereafter, or at it may change thereafter in accordance with permits issued by a local government or the Department of Ecology, provided, that in any area where the ordinary high water mark cannot be found, the ordinary high water mark adjoining salt water shall be the line of mean higher high tide and the ordinary high water mark adjoining fresh water shall be the line of mean high water."

[11] According to the Applicant, proposed rail operations and coal export terminal design would support terminal throughput of 40 million metric tons per year. The Proposed Action is based on a throughput of up to 44 million metric tons per year. The Applicant assumes a 10% increase in throughput (4 million metric tons per year) is possible with rail car capacity increases, through process efficiencies and technological improvements which would occur by 2028, the first year of assumed full operations.

[12] 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 2-4. Proposed Action Operations



For the purposes of this EIS, analyses were based on a construction year of 2018 and full operations by year 2028. The following provides more information regarding the physical components, construction, and operation of the coal export terminal.

2.2.3.1 Proposed Facilities

The proposed facilities of the Proposed Action would include the following.

- Rail facilities
- Coal stockpile area
- Conveyors, transfer stations, and buffer bins
- Vessel facilities
- Supporting facilities

The following provides a summary of these proposed facilities, based on the project design and project description provided by the Applicant.

Rail Facilities

The Reynolds Lead would be modified within the project area to accommodate unit train access to and from the coal export terminal. Unit trains would move from the Reynolds Lead into a new rail loop system where the trains would be directed to an unloading station to unload coal (Figure 2-4). The rail loop would have one operating track and eight loop tracks to provide storage for trains, and access to the Reynolds Lead. Grade-separated roadways above the rail tracks would be provided to allow access to and within the project area.

A small portion of the rail loop would be constructed on two parcels currently owned by Bonneville Power Administration (BPA) (Figure 2-3). One parcel contains an access road and substation. To maintain or provide for pedestrian and vehicular access to BPA facilities, the Applicant would construct an access road between the Proposed Action access road and the BPA yard, and install a gate to the BPA yard at a location to be determined by BPA. According to the Applicant, BPA will not make a determination whether to sell or grant an easement to the Applicant until after the U.S. Army Corps of Engineers (Corps) publishes the National Environmental Policy Act Final EIS for the coal export terminal.

Unit trains would enter the coal export terminal from the east and move through the rail loop in a counter-clockwise direction until the train was contained within the terminal rail loop. The rail loop would be able to accommodate up to 8 unit trains. Once unloaded, trains would be redirected in a clockwise direction on the innermost rail loop and would then be able to exit the coal export terminal.

Unloading facilities would be constructed to unload coal from rail cars within an enclosed structure. Two rail cars would be simultaneously positioned inside a fully enclosed, metal-clad building (Appendix C, *Coal Export Terminal Engineering Plan Sheets*, Sheet 5). The unloading facilities would contain equipment to rotate rail cars and discharge the coal from the rail cars into a large hopper (Figure 2-5).

Figure 2-5. Typical Tandem Rotary Unloader

Note: The proposed rotary unloader would be housed inside a building.
Source: Millennium Bulk Terminals—Longview 2013

As the tandem rotary unloader rotates the rail cars and begins to unload the coal into hoppers beneath the unloader, sprayers would spray water to avoid and minimize dust dispersion within the enclosed structure. The hopper beneath the rotary unloader would feed coal onto a conveyor at a nominal rate of 7,500 metric tons per hour. The conveyor would move the coal to the stockpile area (Appendix C, *Coal Export Terminal Engineering Plan Sheets,* Sheets 5 through 13). During start-up operations of the Proposed Action, a rapid discharge (i.e., bottom) unloader, located within an enclosed building, would be used to unload rail cars. The rapid discharge unloader would be retained after start-up operations and might be used during periods when the rotary unloader is unavailable, such as during maintenance. Both unloaders would not be able to operate simultaneously.

Coal Stockpile Area

The inner portion of the rail loop would include coal stockpile storage pads and associated stacking and reclaiming equipment to place and move coal (Figure 2-6). The open-air stockpile area would consist of four parallel stockpile pads and five berms. The stockpile area would cover approximately 75 acres and would be served by four rail-mounted stackers and four bucket-wheel reclaimers with associated conveyors.

Figure 2-6. Representation of the Stockpile Area with Stackers and Reclaimers

Source: Millennium Bulk Terminals—Longview 2013

The stockpile pads together would be able to hold approximately 1,500,000 metric tons of coal. The pads would vary in length from 2,200 to 2,500 feet and could hold from 360,000 to 400,000 metric tons each. Coal would be stacked to approximately 85 feet above the pads. The pads and berms would be made of low-permeability engineered material. The stockpiles and berms would be graded to allow the water to drain and be collected for treatment and reuse or discharge. The use of low-permeability engineered materials for formation of the pads and berms would control water from entering subsurface soil or groundwater**.**

Water Systems

Industrial water needed for operation of the coal export terminal and fire protection would be supplied from treated water stored on site from the terminal's water-treatment facility. During dry weather, water would be supplemented from on-site wells as needed. An on-site storage reservoir would provide water required for normal operations (i.e., dust control, stockpile spray, equipment wash-down) and emergency fire demand. A separate pumping system would be designated for the emergency fire system, where appropriate, to provide redundancy and to supply additional pressure where needed. Peak process water demand would be approximately 5,000 gallons/minute (gpm). Peak emergency fire water demand would be approximately 1,500 gpm. Peak potable water demand would be approximately 185 gpm based on anticipated labor force at full build-out. The bulk product terminal's stormwater detention pond would be relocated (Appendix C, *Coal Export Terminal Engineering Plan Sheets*, Sheet 2) and would store stormwater, collected from the bulk product terminal area and treated in the stormwater-treatment facilities. All water (stormwater and process water) within the limits of the proposed rail loop, trestle and docks would be collected and conveyed to new water-treatment facilities (including a new detention pond). Treated water would be used to maintain process water supplies at the terminal.

Excess treated water would be discharged to the Columbia River at the existing outfall (Outfall 002A, refer to Chapter 4, Section 4.2, *Surface Water and Floodplains,* for more information). Process water would be used for operations, such as for dust control and sprayers at the tandem rotary unloader, along all conveyers, the stockpile areas and transfer towers and surge bins. Appendix C, *Coal Export Terminal Engineering Plan Sheets*, provides plan sheets for various project elements. Process water would also be used for wash-down and cleanup of equipment such as conveyors, under-belt plating, bins, hoppers, and walkways. All process water—as well as stormwater from the rail loop and those areas within the rail loop, trestle, and docks—would be collected, conveyed, treated, and stored on site. The proposed trestle and docks would have capture and containment measures and all water captured would be conveyed to water-treatment facilities. Excess treated water would be discharged to the Columbia River.

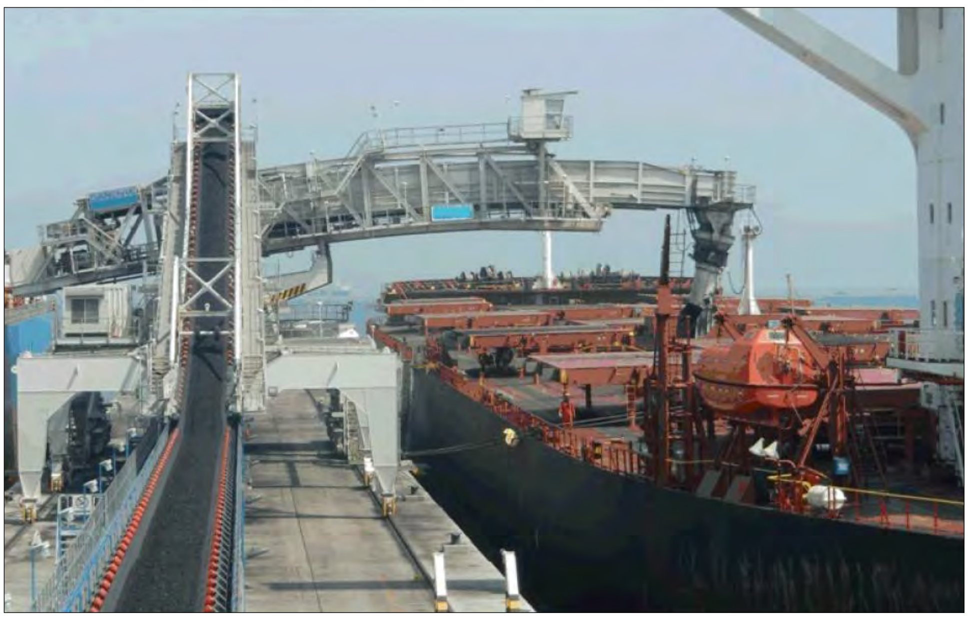
Conveyors, Transfer Stations, and Buffer Bins

A network of belt conveyors would transport coal from the rail car-unloading facilities to the stockpile area and from the stockpile area to the vessel-loading facilities or from rail cars directly to the vessel-loading facilities. Multiple conveyors would connect at transfer stations that would redirect the flow of coal. Buffer bins would provide storage capacity in the conveyor system to allow continuous coal reclaiming and transfer. All transfer stations and approximately one-third of the conveyors would be enclosed. The stockpile area and vessel-loading conveyors would not be enclosed due to their operational requirements.

Vessel Facilities

The Applicant would require authorization from WDNR to use aquatic lands for the Proposed Action as part of an Aquatic Lands Lease. The proposed Docks 2 and 3 would be constructed west (downstream) of Dock 1 (Figure 2-3). Dock 2 would be up to 1,400 feet long and would vary in width from approximately 100 to 130 feet. Dock 3 would be up to 900 feet long and approximately 100 feet wide. Vehicle and pedestrian access and coal transfer to the docks would be provided by a single trestle approximately 800 feet long, varying in width from approximately 35 feet on the northern, landward end, up to 60 feet on the southern end. Each dock would include a shiploader and associated loading equipment (Figure 2-7). The main shipping channel in the Columbia River is 43 feet deep at low tide (-43 feet Columbia River Datum). The docks and shiploaders would be able to accommodate Panamax-class vessels[13] and Handymax-class vessels.[14] The fleet mix would be approximately 80% Panamax-class vessels and 20% Handymax-class vessels. The Applicant has stated there would be no vessel bunkering at Docks 2 and 3.

Figure 2-7. Typical Shiploader



Source: Millennium Bulk Terminals—Longview 2013

Vessels would be loaded using shiploaders that would each include an enclosed boom and loading spout. The loading spout would also be telescopic and would be inserted below the deck of the vessel during vessel loading to minimize dust dispersion. Shiploader cleanup and washdown would be done with pressurized water and all water would be captured and contained, and then conveyed to upland water-treatment facilities.

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[13] Panamax vessels would have a dead weight tonnage (dwt) between 60,000 and 100,000 tons with a draft of between 42 and 49 feet. For more information, see Chapter 5, Section 5.4, *Vessel Transportation*.

[14] Handymax vessels have a dwt of up to 60,000 tons with a draft of between 36 and 39 feet (Chapter 5, Section 5.4, *Vessel Transportation*).

Dredging

Dredging of approximately 500,000 cubic yards of substrate from an approximate 48-acre berthing area along the riverward side of Docks 2 and 3 would be required to provide berthing access from the Columbia River navigation channel to the docks. Sediment transport, current, and river flow studies would be performed to determine the optimum dredge prism. The sediment to be dredged would be characterized and evaluated by the Dredged Material Management Program for suitability for flow lane disposal. Dredged material is expected to be suitable for flow-lane disposal or beneficial use in the Columbia River based on recent sediment sampling. A dredging and disposal quality control plan would be implemented in compliance with the dredged material management program as required by state agencies (Ecology and WDNR) and federal agencies (Corps and U.S. Environmental Protection Agency). Periodic future maintenance dredging of the berthing area would be required.[15]

Water Drainage and Treatment

Drainage systems would be designed such that runoff within the coal export terminal would be collected for treatment before reuse or discharge. The terminal's water-treatment facility would be designed to treat all surface runoff and process water with capacity to store the water for reuse. Treatment would be as required to meet reuse quality or Ecology's requirements for off-site discharge. Additional water storage would be provided in the coal storage area during large storm events. Water volumes exceeding the demands for reuse would be discharged off site via an existing outfall into the Columbia River. Water released off site would be treated and would meet Ecology's requirements and required permits.

Supporting Facilities

The Proposed Action would also include the following support facilities.

- Roadways and bridges to provide vehicular access throughout the coal export terminal
- Service and administration buildings
- Stormwater-management facilities
- Utility infrastructure
- Electrical transformers
- Switchgear and equipment buildings
- Process-control systems

2.2.3.2 Construction

Construction of the Proposed Action is divided into three sections: construction elements; construction staging; and construction environmental controls.

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[15] Based on sediment accretion rates measured in the berth at Dock 1, it is expected that accretion in the Docks 2 and 3 berthing/navigation basin could represent an annual volume of between approximately 5,000 and 24,000 cubic yards. Maintenance dredging is, therefore, anticipated to occur on a multiyear basis, or as needed following extreme-flow events. Therefore, the Proposed Action also includes a 10-year maintenance dredging program for Docks 2 and 3 to dredge up to 100,000 cubic yards of infill as frequently as annually to maintain authorized depths.

Construction Elements

This section summarizes the following primary construction elements.

- Demolition and site preparation
- Preloading
- Rail loop construction
- Trestle and dock construction

Demolition and Site Preparation

An existing cable plant building (approximately 270,000 square feet), existing potline buildings (approximately 600,000 total square feet), and smaller ancillary structures in the project area would be demolished under the Proposed Action. The structures are primarily steel, aluminum, concrete, and wood. The demolition phase would take approximately 6 months.

Site preparation would include operating heavy machinery to prepare the site, including clearing of vegetation, grading, earthmoving, earthworks, and constructing erosion-control facilities (including settlement ponds). Heavy machinery could include cranes, wheeled loaders, dozers, dump trucks, excavators, graders, rollers, compactors, drill rigs, vibratory and impact pile-driving equipment, portable ready-mix batch plant, ready-mix trucks, concrete pumps, elevated work platforms, forklifts, rail track laying equipment, welders, water pumps, and other similar machinery. Site preparation would last approximately 3 months.

Preloading

Preloading of the site would be required to strengthen the existing soil conditions and improve the load-bearing capacity of the coal stockpile areas. Import of preloading material and installation of wick drains would be required for ground improvement for the stockpile areas. Approximately 2.1 million cubic yards of material would be imported to be used as preloading material. Material imported for preloading would be clean and obtained from an approved facility. Approximately 2.5 million cubic yards of material would be moved around the project area during preloading activities.

Ground improvement would occur progressively and would take up to 7 years to complete. Preloading material would be imported by truck, rail, or barge[16] and could include suitable dredge spoils.

A rolling preload of material would be used to improve the load-bearing capacity of the soils (i.e., one stockpile pad at a time would be preloaded). Preloading material would be placed in a pile approximately 35 feet high covering the area of the berm and adjacent stockpile pads and would be left in place until soil consolidation is achieved. Following consolidation, preloading material would be moved to another berm and stockpile pad location, with supplementary import material added to achieve a pile approximately 35 feet high. The process would be repeated at each berm and stockpile location until soil consolidation is achieved across the entire stockpile area. After

[16] Most of the deliveries of preload material would occur early in the construction period. If barges were used, there could be up to 753 barges making deliveries in the first year.

completion of soil consolidation, the excess preloading material would be used on site, stockpiled, or removed from the area and disposed at an approved facility.

Rail Loop Construction

Rail loop construction would include the following activities.

- Importing ballast rock
- Constructing railroad foundations
- Placing railroad ties
- Laying steel rail
- Installing signaling
- Installing switching equipment
- Installing track lighting

This work would involve the operation of heavy machinery, cranes, and specialized rail-laying equipment.

The rail loop would include one operating track (i.e., turn-around track) and eight rail storage tracks. Construction of the rail loops would require 130,000 cubic yards of ballast rock for rail foundations. All construction activities work would involve operating heavy machinery, cranes, and specialized rail laying equipment. Once completed, trains would enter the coal export terminal from the east and move through the rail loop in a counter-clockwise direction until the train was contained within the terminal rail loop. The rail loop would be able to accommodate up to 8 unit trains. Once unloaded, trains would be redirected in a clockwise direction on the innermost rail track and would then be positioned to exit the terminal.

Trestle and Dock Construction

Dredging would occur as part of the construction of Docks 2 and 3, which would include removing approximately 500,000 cubic yards of material. Dock and trestle construction would include pile driving of approximately 630 36-inch-diameter steel pipe piles, 610 of which would be installed in aquatic areas below the OHWM. Most piles would be driven to a depth of 140 to 165 feet below the mudline. Each would be installed using a vibratory driver until the pile meets resistance and vibratory driving is no longer effective, at which point an impact driver would be used to complete pile installation. Docks 2 and 3 would consist of 36-inch-diameter piles driven into the riverbed to support the shiploader runway beams, shiploader conveyors, and reinforced concrete decking. The dock structures would be equipped with fenders, mooring bollards, and capstans to facilitate the docking of vessels.

Two existing timber pile dikes in the Columbia River are located in areas where dredging and dock and trestle construction would occur. As part of the dredging and dock and trestle construction, approximately 225 linear feet of the deepest portions of these pile dikes would be removed (125 feet from the westernmost pile dike and 100 feet from the easternmost pile dike).

Upon completion of Stage 2 construction, Docks 2 and 3 would be served by two rail-mounted shiploaders. Each shiploader would be fed coal by a dedicated conveyor that would move coal from the stockpile area to the shiploader.

Construction Scenarios and Staging

The Applicant has identified three construction-material-delivery scenarios: delivery by truck, rail, or barge.

- **Truck.** If material is delivered by truck, it is assumed approximately 88,000 truck trips would be required over the construction period. Approximately 56,000 truck trips would be needed during the peak construction year.
- **Rail.** If material is delivered by rail, it is assumed approximately 700 train trips would be required over the construction period. Approximately two-thirds of the rail trips would occur during the peak construction year.
- **Barge.** If material is delivered by barge, it is assumed approximately 1,130 barge trips would be required over the construction period. Approximately two-thirds of the barge trips would occur during the peak construction year. Because the project area does not have an existing barge dock, the material would be off-loaded at an existing dock elsewhere on the Columbia River and transported to the project area by truck.[17]

The Applicant would construct the Proposed Action in two stages and anticipates that construction activities would primarily occur during daylight hours.

Stage 1

Stage 1 of construction would consist of two sub-stages: Stage 1a Construction and Start-Up Operations, and Stage 1b Construction and Increased Operations. Stage 1 would include the following tasks.

- Perform project-area ground improvements.
- Construct one operating rail track and up to eight rail storage tracks.
- Construct the stockpile area including two stockpile pads.
- Construct rail car unloading facilities and associated facilities and infrastructure.
- Construct Docks 2 and 3, including the shiploader and related conveyors on Dock 2 and the berthing facilities on Dock 3.
- Perform the necessary dredging within the Columbia River for Docks 2 and 3.

After Stage 1 construction, nominal coal export terminal throughput capacity would be up to 25 million metric tons per year. To allow for a start-up of export activities during the project-area preloading activities and construction, Stage 1 would include a start-up facility that would directly unload coal from rail cars to an enclosed hopper and onto vessels via conveyors and would have a nominal throughput capacity of approximately 5 to 10 million metric tons per year (Table 2-2).

[17] This scenario is different from the truck scenario because the materials would be partially transported by barge. This scenario covers potential impacts related to transportation of construction materials via the river. Once off the barge, impacts associated with construction material delivery would be similar to either the truck or rail scenario, depending on which method was used for the final delivery to the project area.

Table 2-2. Construction Staging

Element	Stage 1a Construction and Start-Up Operations	Stage 1b Construction and Increased Operations	Stage 2 Construction and Full Build-Out Operations
Description	Start of Stage 1 construction for start-up operations	Continuation of Stage 1 construction through completion of Stage 1 construction	Start of Stage 2 construction through completion of Stage 2 construction and start of full operations
Approximate Timing and Duration	0–1.5 years (18 months) from the start of construction	0–3 years from the start of construction	4–6 years from the start of construction
Approximate Year	2018-2020	2020-2021	2022–2024
Year Used for the Analyses in this Document	2018	2018	2028[a]
Terminal Throughput Capacity During Stage of Construction	None	5 to 10 MMPTY	Up to 25 MMTPY
Terminal Throughput Capacity After Stage of Construction	5 to 10 MMTPY	Up to 25 MMTPY	Up to 44 MMTPY

Notes:
[a] The Applicant anticipates construction would begin in 2018 and would be completed by 2024. For the purpose of the analysis in this EIS, it is assumed that the Proposed Action would be fully operational by 2028.
MMTPY = million metric tons per year

Stage 2

Stage 2 Construction and Full Build-Out Operations would involve the following tasks.

- Construct a shiploader on Dock 3.
- Construct additional stockpile pads.
- Construct additional conveyors and associated infrastructure to support additional throughput.

After Stage 2 construction, nominal coal export terminal throughput capacity would increase to up to 44 million metric tons of coal per year. Table 2-2 summarizes the three construction stages. Table 2-3 identifies the primary elements of the Proposed Action that would be constructed for the Stage 1a Construction and Start-Up Operations, Stage 1b, Construction and Increased Operations, and Stage 2 Construction and Full Build-Out Operations.

Table 2-3. Primary Construction Elements by Stage

Construction Stage	Description	Primary Construction Elements
Stage 1a Construction and Start-Up Operations	Start of Stage 1 Construction and Start-Up Operations (construction activities for 5 to 10 MMTPY)	• One operating track and up to eight rail storage tracks. • One rapid discharge tandem rail car unloader (bottom dumper). • Conveyors, buffer bins, and transfer towers (approximately 4,300 lineal feet of conveyors, of which approximately 1,000 lineal feet would be open conveyors and approximately 3,300 lineal feet would be enclosed). • Construct Docks 2 and 3. • One shiploader on Dock 2. • Support structures, electrical transformers, switchgear and equipment, process-control systems, and buildings.
Stage 1b Construction and Increased Operations	Continuation of Stage 1 Construction and Increased Operations (construction activities for up to 25 MMTPY)	• Tandem rotary unloading facility (rotary unloader, capable of unloading two rail cars simultaneously). • Three berms for stackers and reclaimers. • Two stackers. • Two reclaimers. • Conveyors, buffer bin, and transfer towers (approximately 16,100 lineal feet of conveyors, of which approximately 4,900 lineal feet would be enclosed). • Support structures, electrical transformers, switchgear and equipment, process control systems, and buildings.
Stage 2 Construction and Full Operations	Construction and Full Operations (construction activities for up to 44 MMTPY)	• The remaining rail storage tracks (for a total of eight rail storage tracks). • The remaining two berms (for stackers and reclaimers) (for a total of five berms). • Two additional stackers (total of four). • Two additional reclaimers (total of four). • Conveyors, buffer bin and transfer towers (approximately 26,200 lineal feet of conveyors, of which 8,300 lineal feet would be enclosed). • One shiploader on Dock 3. • Support structures, electrical transformers, switchgear and equipment, buildings, process-control equipment, etc.

Notes:
MMTPY = million metric tons per year

Appendix D, *Coal Export Terminal Stages of Construction and Operations*, provides detailed information on the construction and operational elements associated with the start of Stage 1 Construction and Start-Up Operations (Stage 1a), continuation of Stage 1 Construction and Increased Operations (Stage 1b), and Stage 2 Construction and Full Operations.

2.2.3.3 Operations

This section describes on-site operations and off-site transport for the Proposed Action.

On-Site Operations

Similar to construction, operations of the Proposed Action would be implemented in two stages: Stage 1 and Stage 2.

- **Stage 1.** Stage 1 includes Stage1a Start-up Operations and Stage 1b Increased Operations.
- **Stage 2.** Stage 2 includes Full Build-Out Operations.

All operations stages would follow the completion of the appropriate construction stages (Stages 1a, 1b, and 2). Table 2-4 summarizes operations by stage and component. Appendix D, *Coal Export Terminal Stages of Construction and Operations*, provides detailed information on the operational elements associated with Stage 1 and Stage 2. Appendix E, *Coal Export Terminal Design Features*, provides design elements of the coal export terminal provided by the Applicant.

Off-Site Transport

Coal would be transported to the project area by rail and transported from the project area by vessel.

Rail

The coal 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. BNSF trains would most likely ship Powder River Basin coal and UP trains would ship Powder River Basin and Uinta Basin coal.[18]

Proposed Action-related train routes from mines in the Powder River Basin and Uinta Basin to the project area, and the return of empty trains from the project area, was assumed to be the same as current BNSF and UP train operational protocols in Washington State, as documented in adopted publications, including the *Washington State Rail Plan* (Washington State Department of Transportation 2014a) and *Washington State Freight Mobility Plan* (Washington State Department of Transportation 2014b). In 2012, BNSF changed its train operations protocol in Washington State using directional running to enhance use of existing capacity. This strategy routes all westbound-loaded unit trains (including coal) from Pasco via the Columbia River Gorge to Vancouver, where they continue on the BNSF north-south main line to their final destination. Empty unit bulk trains north of Vancouver, including Cowlitz County, return to Pasco and to points east via Auburn and Stampede Pass.

[18] UP has the capability to ship Powder River Basin coal. However, the route to the project area would be longer than the BNSF route from the Powder River Basin.

Table 2-4. Coal Export Terminal Operations by Stage and Component

Component	Stage 1a Start-Up Operations	Stage 1b Increased Operations	Stage 2 Full Build-Out Operations
All Coal Export Terminal Operations			
Appx. Timing	1.5 years from the start of construction	3 years from the start of construction	6 years from the start of construction
Appx. Years of Operation	2020–2021 Follows Construction Stage 1a (2018–2020)	2021–2024 Follows Construction Stage 1b (2018–2021)	2024 and beyond Follows Construction Stage 2 (2022–2024)
Year Used for the Analyses in this Document	N/A	N/A	2028[a]
Terminal Throughput Capacity	5 to 10 MMTPY	Up to 25 MMTPY	Up to 44 MMTPY[b]
Number of Employees	Approximately 60 employees for operations.	Approximately 115 employees for operations.	Approximately 135 employees for operations.
Operations Equipment	Same type of equipment for each stage: Wheel loaders, cranes, forklifts, trucks, welders, pumps, track dozers, and other similar equipment. The equipment would be powered by diesel, liquid petroleum gas, or gasoline engines.		
Land Operations			
Rail	• All coal would arrive by unit train. • Unit trains would typically consist of 4 locomotives and 125 coal cars, with a total length of 6,917 feet. • Up to 60 loaded unit trains would arrive and 60 empty unit trains would depart monthly (average of 120 unit train trips monthly). This equals approximately 4 trains a day (2 trains arriving and 2 trains departing). • Inbound/outbound trains would be stored on site, on a maximum of eight available storage tracks.	• All coal would arrive by unit train. • Unit trains would typically consist of 4 locomotives and 125 coal cars, with a total length of 6,917 feet. • An average of 150 loaded unit trains would arrive and 150 empty unit trains would depart monthly (average of 300 unit train trips monthly). This equals approximately 10 trains a day (5 trains arriving and 5 trains departing). • Inbound and outbound trains would be stored on site, on a maximum of eight available storage tracks.	• All coal would arrive by unit train. • Unit trains would typically consist of 4 locomotives and 125 coal cars, with a total length of 6,917 feet. • An average of 240 loaded unit trains would arrive and 240 empty unit trains would depart monthly (average of 480 unit train trips monthly). This equals approximately 16 trains a day (8 trains arriving and 8 trains departing). • Inbound and outbound trains would be stored on site on up to a maximum of eight available storage tracks.

Component	Stage 1a Start-Up Operations	Stage 1b Increased Operations	Stage 2 Full Build-Out Operations
Rail Car Unloading	• Delivered directly from the rail cars to the shiploader by way of a rapid discharge unloading facility and interconnecting conveyors. • No stockpiling of coal.	• Rail cars would be unloaded by an electrical-powered tandem rotary unloader. • A mechanical positioner would index unit trains, position two rail cars at a time, and dump the coal into a hopper and onto the stacking conveying system.	• The Stage 1 tandem rotary unloader would service Stage 2 Operations; no additional unloading equipment would be required. • The rapid discharger tandem rail car unloader installed for Stage 1 would remain operable and may be used during maintenance of tandem rotary unloader.
Conveyor Systems	• Conveyors would transport coal directly from the rail cars to the shiploader by way of a rapid discharge unloading facility and interconnecting conveyors.	• Conveyors would transport coal from rail car unloading to the stockpile area and from the stockpile area to the shiploader. • Conveyors would be enclosed except where required to feed onto or reclaim from stockpiles or onto the shiploaders. • When unloading rail cars, the conveyors from rail car unloading to the stockpile area would operate, and when loading ships, the conveyors from the stockpile area to the shiploader would operate. • Rail car unloading and shiploading would at times occur both independently and simultaneously. • Conveyors would operate for approximately 45% of the available time.	• Conveyors would transport coal from rail car unloading to the stockpile area and from the stockpile area to the shiploader. • Conveyors would be enclosed except where required to feed onto or reclaim from stockpiles or onto the shiploaders. • When unloading rail cars, the conveyors from rail car unloading to the stockpile area would operate, and when loading ships, the conveyors from the stockpile area to the shiploaders would operate. • Rail car unloading and shiploading could occur independently or simultaneously. • Conveyors would operate for approximately 80% of the available time.
Stockpiling	None.	Two electrical-powered traveling stackers would stockpile coal at an average rate of 7,500 metric tons per hour onto two longitudinal stockpiles with an estimated total storage capacity of 750,000 metric tons.	Four traveling stackers would stockpile coal at an average rate of 7,500 metric tons per hour onto two additional longitudinal stockpiles with a total storage capacity of up to 1.5 million metric tons.

Component	Stage 1a Start-Up Operations	Stage 1b Increased Operations	Stage 2 Full Build-Out Operations
Reclaimers	None.	Two electrical-powered traveling bucket wheel reclaimers would transfer coal from the stockpile to the shiploading system (each with an average rate of 6,500 metric tons per hour).	Two additional traveling bucket wheel reclaimers (total of four at Stage 2) would transfer coal from the stockpile to the shiploading system (each with an average capacity of 6,500 metric tons per hour).
Dock Operations			
Shiploading	Performed using an electrical-powered single traveling shiploader installed on Dock 2 with average capacity of 6,500 metric tons per hour.	Would use the shiploader installed for Stage 1 Start-Up Operations (Dock 2 only).	One additional traveling shiploader would be installed on Dock 3 with an average rated capacity of 6,500 metric tons per hour.
Vessels	Up to 15 vessels per month (80% Panamax, 20% Handymax) would be loaded.	Up to 40 vessels per month (80% Panamax, 20% Handymax) would be loaded.	Up to 70 vessels per month (80% Panamax, 20% Handymax) would be loaded.

Notes:

[a] The Applicant anticipates construction would begin in 2018 and would be completed by 2024. For the purpose of the analysis in this EIS, it is assumed that the Proposed Action would be fully operational by 2028.

[b] According to the Applicant, proposed rail operations and coal export terminal design would support terminal throughput of 40 million metric tons per year. The Proposed Action is based on a throughput of up to 44 million metric tons of coal per year. The Applicant assumes a 10% increase in throughput (4 million metric tons of coal per year) is possible with rail car capacity increases, through process efficiencies and technological improvements by 2028, the first year of assumed full operations.

MMTPY = million metric tons per year; N/A = not applicable

Loaded and empty Proposed Action-related BNSF trains would travel on the same route between the Powder River Basin and Pasco, Washington. West of Pasco, westbound loaded trains are expected to travel to the project area via the Columbia River Gorge route through Vancouver to Longview Junction. Empty trains are expected to travel from Longview Junction on the Stampede Pass route through Centralia, Auburn, and Yakima to Pasco, Washington (Figure 2-8).

However, as volume increases on any one-line segment, BNSF may revise its operations within Washington State to distribute the traffic over existing infrastructure. Railroad companies may also expand their infrastructure, which occurs on an ongoing basis based on demand. For these reasons, empty and loaded BNSF trains could travel through the Columbia River Gorge or across Stampede Pass, depending on BNSF system operations for maintenance or traffic flow.

Loaded and empty Proposed Action-related UP trains would travel on the same route between the Uinta Basin and Powder River Basin and Longview Junction. Within Washington State, UP operates over the same track that carries BNSF trains between Vancouver and Longview Junction (Figure 2-8).

Between Longview Junction and the project area, BNSF and UP trains would travel over the BNSF Spur and Reynolds Lead rail line. Rail transportation is discussed in detail in Chapter 5, Section 5.1, *Rail Transportation*.

Increased train traffic would consist of unit trains 125 cars long (approximately 1.3 miles long). Unit trains would be typically hauled by four locomotives. At full capacity, an average of 8 loaded trains and 8 empty coal trains per day (average of 16 trains daily; 480 trains monthly) would operate on BNSF and UP rail lines inside and outside of Washington State as they travel to and from the project area.

Vessel

Coal would be transported by ocean-going vessels from the project area to Asian markets. The Applicant anticipates these markets would be Japan, South Korea, and Taiwan. Vessels would travel from the project area via the Columbia River and across the Pacific Ocean. Vessel transportation is discussed in Chapter 5, Section 5.4, *Vessel Transportation*. The terminal would load Panamax-class (including new Panamax-class) and Handymax-class vessels. The fleet mix is estimated to be 80% Panamax and 20% Handymax vessels. At full capacity, the Proposed Action would result in an average of 840 vessel trips per year[19] (an average of 2.3 vessel trips per day) on the lower Columbia River.

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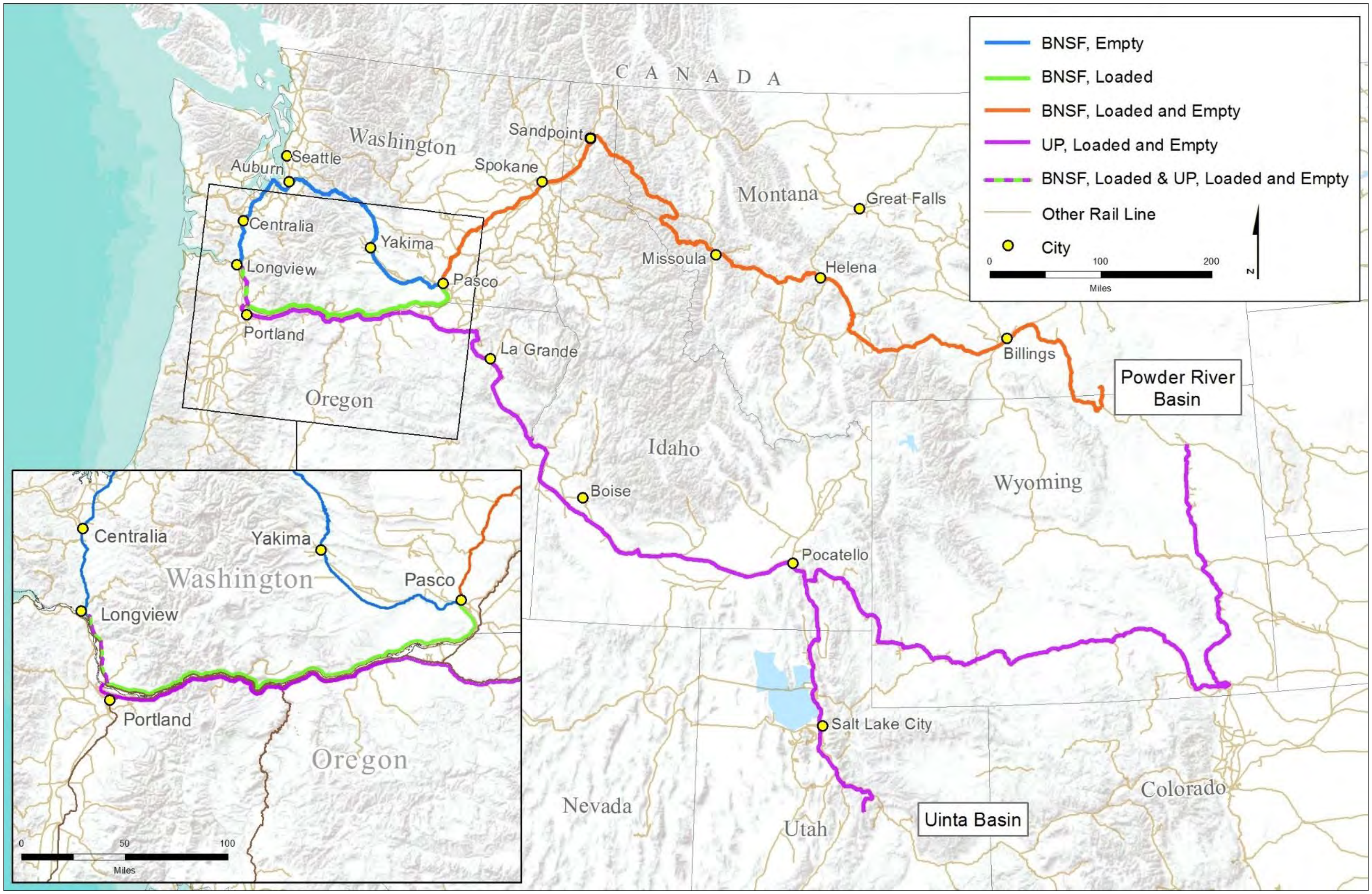
[19] A *vessel trip* is a round trip of two transits, one upriver transit, and one downriver transit. Thus, the Proposed Action operating at full capacity would involve 840 trips per year, or 1,680 transits between the Pacific Ocean and the project area.

Figure 2-8. Route of Loaded and Empty Trains



2.3 No-Action Alternative

The SEPA Rules (Washington Administrative Code 197-11) require an EIS to evaluate a no-action alternative. By evaluating a no-action alternative, decision-makers and the public can meaningfully compare the impacts of a proposed action with a no-action alternative.

Under the No-Action Alternative evaluated in this EIS, the Applicant would not construct the Proposed Action as described in Section 2.2, *Proposed Action*. In 2014, the Applicant described its planned operations and expansion, and potential future operations to evaluate under the No-Action Alternative.[20] The following sections describe planned operations and transport and potential future operations and transport under the No-Action Alternative.[21]

2.3.1 Bulk Product Terminal Planned Operations and Transport

The Applicant plans to continue current activities under existing permits at the existing bulk product terminal adjacent to the project area and increase commodities storage regardless of whether the Proposed Action in the 190-acre project area is built. Current operations include storing and transporting 150,000 metric tons per year of coal. Operations included storing and transporting alumina at the existing bulk product terminal, but in spring 2016, smelter operations were curtailed halting the import of alumina at Dock 1. If the curtailment is reversed, importing of alumina would continue using Dock 1. Maintenance of the bulk product terminal would continue, including maintenance dredging for Dock 1. Cleanup activities from past industrial uses would also continue as a separate and independent process.

On-site operations under the Applicant's planned operations would be similar to those associated with the current operations of the existing bulk product terminal. Under the terms of an existing lease between Northwest Alloys and WDNR,[22] expanded operations could increase upland storage and/or upland transfer of bulk products using new and existing buildings. Planned activities would include increasing the amount of the existing commodities stored and shipped (Table 2-5). Thus, planned operations for handling the increase in existing commodities would be similar to existing bulk storage handling operations, but more frequent. The Applicant would likely undertake demolition, construction, and other related activities to develop expanded bulk product terminal facilities adjacent to the project area. For the purposes of this EIS, it is assumed such expansion would not change the current impervious surface area, or require new docks. It is further assumed

[20] Draft Definition of No Action for Use in the NEPA and SEPA EISs, July 2014, Millennium Bulk Terminals—Longview, LLC.

[21] It is assumed that continued operation of the bulk product terminal within the 20-year analysis period (2018 to 2038) would continue to be economically viable.

[22] Northwest Alloys holds a 30-year aquatic lease (20-B09222) with the Washington State Department of Natural Resources (WDNR) allowing the use of WDNR property for three docks. The lease expires January 2, 2038. Per the existing lease:

- The existing dock can be used for off-loading alumina ore from vessels for transfer to rail car or trucks, off-loading cement for transfer to rail cars and trucks, and off-loading any product that can be moved by vacuum including any type of powder or granulated product.
- Two new fixed docks can be used for products not compatible with the existing system on Dock 1. The products include coal, silica sand, dry fertilizer, potash, coke, cement clinker and other general bulk cargo.

roadway and rail infrastructure near the project area planned for implementation by 2018 would be completed. Table 2-5 provides information about the means for transporting commodities to and from the existing bulk product terminal.

Table 2-5. Planned Activities and Transport Operations at the Existing Bulk Product Terminal

		Transport Operations[a]		
Commodity	**Activity**	**Truck**	**Train**	**Vessel**
Coal	Trains would continue to deliver coal where it would be stored on site and transferred as needed by truck to Weyerhaeuser, located approximately 1 mile southeast of the existing bulk product terminal. An increase in the receipt and transfer of Weyerhaeuser coal by 50% began in late 2014, and is separate from the coal export terminal.	Operate on a continual basis (24 hours a day; 7 days a week)	1 train (38 to 45 rail cars); 3 times per week	N/A (trains deliver coal; trucks transport)
Alumina	Vessels deliver alumina to Dock 1. Alumina is stored on site and then shipped to Chelan County by train.	N/A (vessels deliver alumina; trains transport)	80 rail cars per week (16 rail cars per day, 5 days per week)	8 vessels per year
Other Commodities	Other commodities that are assumed to be delivered by vessel, stored, and shipped via truck and train to various locations	Transported for local distribution at a rate of 16 trucks per day (4,160 trucks per year)	4 rail cars per day (1,040 rail cars per year) for non-local distribution	6 vessels per year

Notes:
[a] Includes existing transport operations as identified in Table 2-1.
N/A = not applicable

2.3.2 Potential Future Operations and Transport

This section describes potential future operations and transport for the existing bulk product terminal and the coal export terminal site under the No-Action Alternative.

2.3.2.1 Bulk Product Terminal

The Applicant has stated that they are in the process of seeking additional tenants for the existing bulk product terminal. The following are estimates of the amount and method for transporting each of the commodities permitted per the terms of the existing aquatic lands lease. These operations would be separate from, and independent of, the Proposed Action.

- Calcined pet coke, which would be imported by vessel from Asia, unloaded on Dock 1, and stored on site. Up to 600,000 tons of calcined pet coke per year could be imported.
- Coal tar pitch, which would be imported by vessel in super-sacks, and unloaded at Dock 1. Up to 200,000 tons of coal tar pitch per year could be imported.

- Cement, which would arrive by vessel and would be distributed by rail or truck.
- Fly ash, which would arrive by rail and depart by truck, or arrive by truck and depart by rail.
- Sand or gravel, which would arrive by rail and depart by truck, or arrive by truck and depart by rail.

Table 2-6 provides estimates of transport operations of the potential future commodities by the year 2028. Table 2-6 provides estimates of the transport operations of the potential future commodities combined with the existing and planned activities and transport operations at the bulk product terminal. These operations would be separate from, and independent of, the Proposed Action.

Table 2-6. Potential Future Commodities and Transport Operations at the Expanded Bulk Product Terminal by Year 2028

	Anticipated Transport Operations		
Future Commodity	**Truck**	**Train**	**Vessel**
Calcined pet coke, coal tar pitch, cement, fly ash, sand, or gravel	24 hours per day, 7 days per week	6 to 7 trains per week (30 rail cars per train)	10 to 12 additional vessels per year

Table 2-7. Total Transportation Operations for Existing, Planned, and Potential Future Activities at the Expanded Bulk Product Terminal

	Total Transport Operations		
Activities	**Truck**	**Train**	**Vessel**
Existing (Table 2-1), Planned (Table 2-5), and Potential Future (Table 2-6)	24 hours per day, 7 days per week	2 trains per day; 12 to 14 trains per week: • 2 to 4 incoming trains (between 38 and 45 rail cars) • 10 outgoing trains (between 12 and 16 rail cars)	26 vessels per year

2.3.2.2 Coal Export Terminal Site

In addition to current and planned activities described in Section 2.3.1, *Planned Operations and Transport*, the Applicant would likely propose expansion of the bulk product terminal business onto areas that would have been subject to construction and operation of the proposed coal export terminal. In 2014, the Applicant described a future expansion scenario under the No-Action Alternative that would involve handling bulk materials already permitted by WDNR for offloading at Dock 1, including pet coke, coal tar pitch, cement, fly ash, sand, and gravel. The existing dock can be used for off-loading product that can be moved by vacuum including powder or granulated product. 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 the No-Action Alternative in this EIS.

The Applicant has stated new development or operations would not require a Corps or shoreline permit. Upland areas of the project area are zoned Heavy Industrial and it is assumed future proposed industrial uses in these upland areas could be permitted. Any new construction would be limited to uses allowed under existing Cowlitz County development regulations (CCC Title 18, Land Use and Development).

The following activities could occur on the 190-acre site under the No-Action Alternative:

- Cast house and cable plant both have loading docks.
- Upland buildings could be demolished and replaced for new industrial uses.
- New or expanded industrial uses requiring either a new air permit or a modification to an existing air permit could be permitted.
- New or expanded industrial uses that would trigger a new National Pollutant Discharge Elimination System (NPDES) permit or modification could be permitted.
- Storage and upland (between train and truck) transfer activities could be accomplished using existing buildings or new buildings, including any product that could arrive loose, bagged, on pallets, or shrink-wrapped.

Chapter 3
Built Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures

3.0 Introduction

For the purposes of this Final Environmental Impact Statement (Final EIS), environmental resource areas have been divided into three categories: the Built Environment, the Natural Environment, and Operations (Chapters 3, 4, and 5, respectively). The purpose of this chapter is to provide a discussion of the built environment resource areas assessed for the Millennium Bulk Terminals—Longview project (Proposed Action).

Information contained in this Final EIS was extracted from technical reports prepared specifically for the Proposed Action. Provided in Volume III of this Final EIS, the technical reports are incorporated by reference and include the determination of study areas, analysis methods, existing conditions, and potential impacts.

Data sources used for this analysis are briefly discussed for each resource. In addition, a detailed list of sources is provided in Appendix A, *References*, of this Final EIS.

3.0.1 Built Environment Resource Areas

Chapter 3, *Built Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures*, evaluates the communities, cultural past, and use of land relevant to the Proposed Action. The resource areas reviewed as part of the built environment analysis include land and shoreline use; social and community resources; aesthetics, light, and glare; cultural resources; tribal resources; and hazardous materials (Table 3.0-1). Additional detailed information about these resources can also be found in the corresponding technical reports in Volume III of this Final EIS.

In addition to these resource areas, Chapter 6, *Cumulative Impacts*, discusses cumulative impacts resulting from the Proposed Action combined with other past, present, and reasonably foreseeable actions.

Table 3.0-1. Resource Areas and Corresponding Final EIS Chapters

Chapter	Section Number	Environmental Resource Area
Chapter 3, Built Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures	3.1	Land and Shoreline Use
	3.2	Social and Community Resources
	3.3	Aesthetics, Light, and Glare
	3.4	Cultural Resources
	3.5	Tribal Resources
	3.6	Hazardous Materials
Chapter 4, Natural Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures	4.1	Geology and Soils
	4.2	Surface Water and Floodplains
	4.3	Wetlands
	4.4	Groundwater
	4.5	Water Quality
	4.6	Vegetation
	4.7	Fish
	4.8	Wildlife
	4.9	Energy and Natural Resources
Chapter 5, Operations: Existing Conditions, Project Impacts, and Proposed Mitigation Measures	5.1	Rail Transportation
	5.2	Rail Safety
	5.3	Vehicle Transportation
	5.4	Vessel Transportation
	5.5	Noise and Vibration
	5.6	Air Quality
	5.7	Coal Dust
	5.8	Greenhouse Gas Emissions and Climate Change

3.0.2 Alternatives and Timeframe for Analysis

This chapter analyzes the impacts that could occur as a result of construction and operation of the Proposed Action. The analysis contained in this chapter assumes construction beginning in 2018 and full operations[1] occurring by 2028. Throughout this chapter, the 190-acre coal export terminal site is referred to as the *project area*. The impacts identified in 2028 would occur for the lifetime of the Proposed Action. Proposed mitigation measures are intended to apply for the lifetime of the Proposed Action.

This chapter also analyzes impacts that could occur if the Proposed Action were not approved (the No-Action Alternative). Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, of this Final EIS provides a description of the Proposed Action and No-Action Alternative.

[1] Full operation means the coal export terminal would have a maximum throughput of up to 44 million metric tons of coal per year, as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

3.0.3 Study Areas and Type of Impacts Analyzed

Each resource area has its own study area depending on its physical characteristics or regulations that oversee the resource area. Two types of study areas were identified—a direct impacts study area and an indirect impacts study area. Table 3.0-2 explains the differences between these two study areas. In some cases, both study areas are the same.

Table 3.0-2. Types of Impacts

Type of Impact[a]	Description	Description of Impact Categories
Direct	An impact resulting from either construction or operation of the Proposed Action that occurs in the project area.	• **Construction:** Temporary impacts within the project area that are resolved or mitigated by the end of construction activity, or permanent impacts that result from changes to the project area due to construction of the coal export terminal. • **Operation:** Impacts occurring in the project area resulting from rail unloading, coal storage, machinery operations, equipment, vessel loading, etc.
Indirect	An impact resulting from either construction or operations of the Proposed Action that occurs beyond the project area.	• **Construction:** Impacts from activities beyond the project area during construction, such as vehicle and rail traffic. • **Operation:** Impacts from activities beyond the project area during operations, such as rail, vehicle and vessel traffic.

Notes:
[a] Washington Administrative Code (WAC) 197-11-792.

Table 3.0-3 provides a summary of the direct impacts and indirect impacts study areas by Chapter 3 resource.

Table 3.0-3. Direct and Indirect Impact Study Areas by Resource

Section and Resource	Direct Impacts Study Area	Indirect Impacts Study Area: Cowlitz County	Indirect Impacts Study Area: Washington State (beyond Cowlitz County)
Section 3.1, Land and Shoreline Use	• Land and Shoreline Use: Project area and the area within 500 feet of the project area • Parks and Recreational Facilities: The area within 0.5 mile of the project area • Agricultural Land: Project area	• Land and Shoreline Use: Longview-Kelso urban area and nearby unincorporated areas • Parks and Recreational Facilities: The area within 0.5 mile of the project area • Agricultural Land: Within 500 feet of the project area	No additional study area[a]
Section 3.2, Social and Community Resources	• Social and Community Cohesion and Public Services: Project area and the area within 0.5 mile of the project area • Utilities: The project area and the area within 0.5 mile of the project area • Minority and Low-Income Populations: Project area and area within approximately 1 mile of the project area	• Social and Community Cohesion and Public Services: The area within 0.5 mile of rail routes for Proposed Action-related trains • Utilities: The area within 0.5 mile of the project area • Minority and Low-Income Populations: The area within 0.5 mile of rail routes for Proposed Action-related trains	No additional study area
Section 3.3, Aesthetics, Light, and Glare	The area within a 3-mile radius of the project area	The area within a 3-mile radius of the project area	No additional study area
Section 3.4, Cultural Resources	• Project area • Areas of the Columbia River • Land surrounding the project area • Vantage points of the project area	No additional study area[b]	

		Indirect Impacts Study Area	
Section and Resource	**Direct Impacts Study Area**	**Cowlitz County**	**Washington State (beyond Cowlitz County)**
Section 3.5, Tribal Resources	Areas in and near the project area	• Tribal resources and access to resources on rail routes for Proposed Action-related trains • Proposed Action-related vessel route along the Columbia River	• Tribal resources and access to resources on rail routes for Proposed Action-related trains • Proposed Action-related vessel route along the Columbia River between Zone 6 and 3 nautical miles offshore
Section 3.6, Hazardous Materials	Project area	Area within 1 mile of the project area	No additional study area

Notes:

[a] Appendix F, *Rail and Vessel Corridor Information*, provides additional information for the Proposed Action-related rail and vessel corridors from the *Tesoro Savage Vancouver Energy Distribution Terminal Facility Draft Environmental Impact Statement* (Washington State Energy Facility Site Evaluation Council 2015).

[b] Although Cowlitz County and Washington State were not included in the study area, existing conditions and potential impacts for the Proposed Action-related rail and vessel corridors are presented in this section.

3.0.4 Mitigation Measures Development Approach

Applicable regulations, potential permit conditions, and required planning documents were evaluated to determine if they would address potentially significant adverse environmental impacts identified in this Final EIS. When applicable, each section describes specific voluntary measures (Voluntary Mitigation) to be executed by the Applicant during construction or operations. When potential significant adverse environmental impacts remained, proposed mitigation measures were identified that would reduce the identified impact (Applicant Mitigation). Mitigation measures included in permit conditions would become legal requirements of the Applicant. In addition to the proposed mitigation measures identified in each section of this chapter, the following measure is proposed.

- The Applicant will provide to Cowlitz County and the Washington State Department of Ecology an annual report of compliance with mitigation requirements of an issued permit. Mitigation compliance reports will be part of the public record.

Proposed mitigation measures were identified as required by the Washington State Environmental Policy Act (SEPA) consistent with Washington Administrative Code (WAC) 197-11-660, which states that mitigation shall be reasonable, capable of being accomplished, and imposed to the extent attributable to the identified adverse impact of the proposal.

The thresholds of significance and proposed mitigation measures were determined by the co-lead agencies (Cowlitz County and the Washington State Department of Ecology). Additionally, when applicable, each section identifies proposed mitigation measures to be considered by other agencies, groups, or companies (Other Measures to be Considered) to reduce potential Proposed Action-related impacts that are beyond the Applicant's control or authority.

3.1 Land and Shoreline Use

Land and shoreline use refers to how land and shorelines are developed for various purposes, including residential, commercial, parks and recreation, agricultural, and industrial uses. It also refers to the preservation or protection of land for natural uses. Development projects, such as the Proposed Action, must be compatible with surrounding land uses and must comply with all state and local regulations and policies governing land and shoreline use.

This section describes land and shoreline use and zoning in the study areas, and the consistency of the Proposed Action with land use plans and public policies. It then describes impacts on land and shoreline use that could result from construction and operation of the Proposed Action and No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

3.1.1 Regulatory Setting

Laws and regulations relevant to land and shoreline use are summarized in Table 3.1-1.

Table 3.1-1. Regulations, Statutes, and Guidelines for Land and Shoreline Use

Regulation, Statute, Guideline	Description
Federal	
Clean Water Act (33 USC 1251 *et seq.*)	Authorizes EPA to establish the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.
State	
Washington State Growth Management Act (WAC 365-196, RCW 36.70A)	Requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands, designating urban growth areas, and preparing comprehensive plans and implementing them through capital investments and development regulations. Cowlitz County is required to designate and protect critical areas under the GMA, but is otherwise not required to fully plan under GMA.
Washington State Shoreline Management Act (WAC 173. 27 *et seq.*, RCW 90.58)	Governs the use and development of "shorelines of the state." Requires local jurisdictions with "shorelines of the state" to develop and adopt a shoreline master program to carry out the policies of the SMA.
Washington State Harbor Improvement Plans (RCW 53.20)	Requires port commissions to develop and adopt a comprehensive scheme of harbor improvements and to make harbor improvements substantially in accordance with the adopted plan.
State Water Pollution Control Law (RCW 90.48)	Provides Ecology with the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland water, salt waters, watercourses, and other surface and groundwater in the state.

Regulation, Statute, Guideline	Description
Local	
Cowlitz County Shorelines Management Regulations (CCC 19.20)	Adopted in 1977 in accordance with requirements of the SMA and Cowlitz County shorelines management regulations. Defines goals, policies, and objectives that apply to development within shoreline areas of Cowlitz County. A draft update is currently in review by Ecology.
Cowlitz County Critical Areas Regulations (CCC 19.15)	Designates critical areas within Cowlitz County and adopts development regulations to preserve them, in accordance with the requirements of GMA.
Cowlitz County Land Use Ordinance (CCC 18.10)	Establishes official land use controls (including zoning regulations) for unincorporated areas of Cowlitz County. The zoning regulations are the principal tool for implementing the goals and policies of the Cowlitz County Comprehensive Plan.
Cowlitz County Comprehensive Plan (Cowlitz County 1976)	Adopted in 1976 to manage Cowlitz County growth. A draft update is currently in development.
City of Longview Comprehensive Plan	Comprehensive plan adopted in 2006 to manage the City of Longview's growth.
City of Longview Zoning Ordinance (LMC Title 19)	Establishes zoning regulations for the City of Longview.

Notes:
USC = United States Code; EPA = U.S. Environmental Protection Agency; WAC = Washington Administrative Code; RCW = Revised Code of Washington; GMA = Growth Management Act;
SMA = Shoreline Management Act; Ecology = Washington State Department of Ecology; CCC = Cowlitz County Code; LMC = Longview Municipal Code

The plans and public policies that guide land use and shoreline resources in the study area are discussed in Section 3.1.4, *Existing Conditions*.

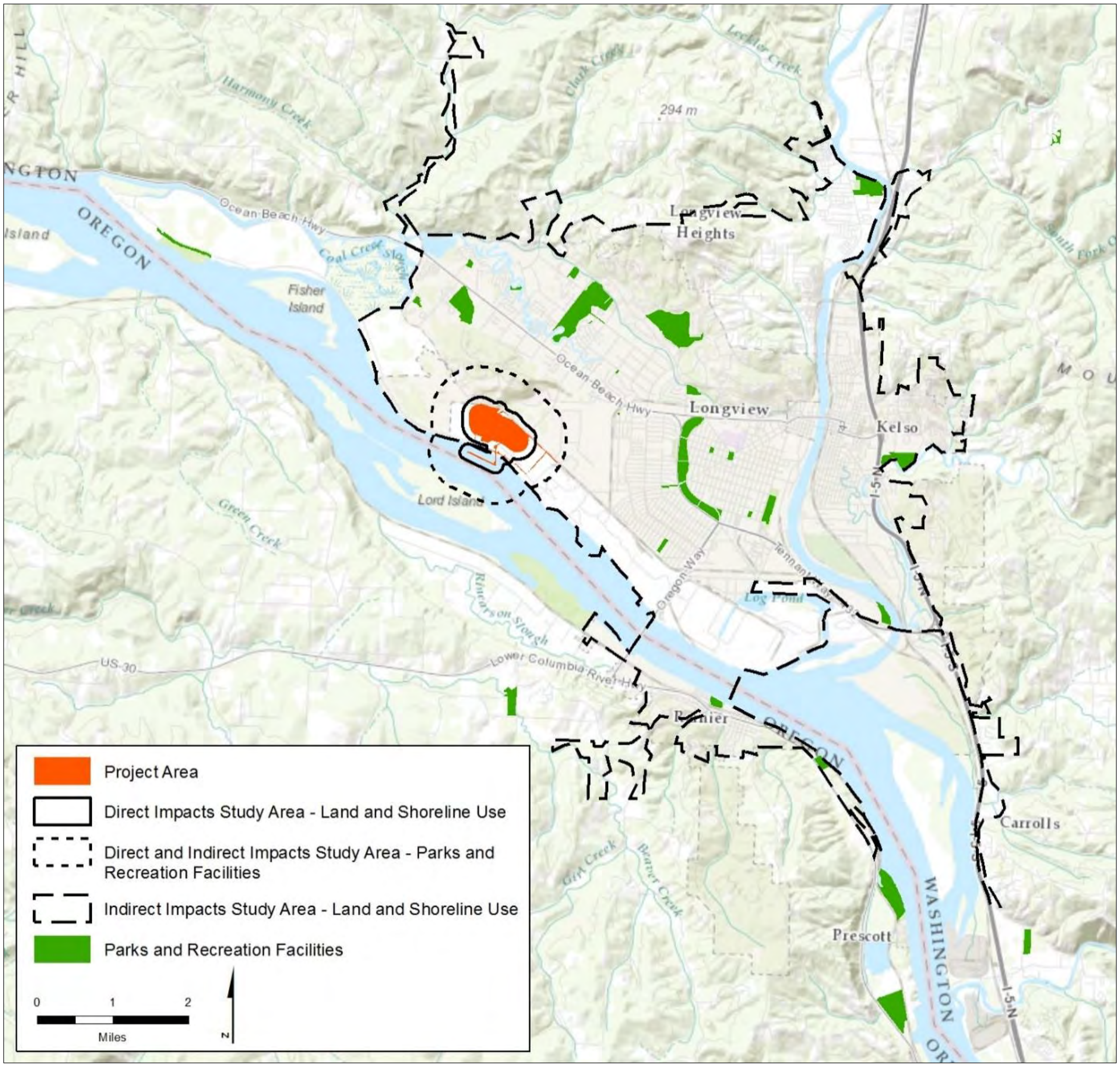
3.1.2 Study Area

The analysis of land and shoreline use encompasses three built environment elements, each of which has its own study area. The following identifies the study areas used for this analysis, which are also depicted in Figure 3.1-1.

- **Land and Shoreline Use, including Zoning and Consistency with Comprehensive Plans.** For direct impacts, the study area for land use and shoreline use is the project area and the area within 500 feet of it, including the Columbia River. For indirect impacts, the study area is the Longview-Kelso urban area and nearby unincorporated areas of Cowlitz County.[1] When assessing consistency with zoning regulations, comprehensive plans, and other public plans and policies, the study area is the project area and the area within 500 feet of it.

[1] This broader land use study area is the Longview-Kelso urban area as defined in the 2010 U.S. Census and adjusted to include the unincorporated areas of Cowlitz County adjacent to the project area, which are not part of the Census-defined urban area.

Figure 3.1-1. Land and Shoreline Use Study Areas



- **Parks and Recreation Facilities.** For direct and indirect impacts, the study area for parks and recreation facilities is the area within 0.5 mile of the project area. The study area also includes the nearby Willow Grove boat launch on the Washington side of the Columbia River and the Rainier Riverfront Park boat launch on the Oregon side. These boat launches are more than 0.5 mile from the project area, but provide public boating access to the Columbia River near the project area.
- **Agricultural Land.** For direct impacts, the study area for agricultural land is the project area. For indirect impacts, the study area is the area within 500 feet of the project area.

3.1.3 Methods

This section describes the information sources used to characterize the existing conditions and the methods used to assess the potential impacts of the Proposed Action and No-Action Alternative on land and shoreline use.

3.1.3.1 Information Sources

A variety of data sources were used to evaluate the land and shoreline use characteristics of the study areas and to define applicable public policies. These sources included field surveys, geographic information systems data, census data, comprehensive plans and shoreline master programs for Cowlitz County (County), other public policy documents, government and private business websites, and other documents. A full inventory of data sources used in the land use analysis is provided in the *SEPA Land and Shoreline Use Technical Report* (ICF and BergerABAM 2017).

3.1.3.2 Impact Analysis

The impact analysis assesses whether the changes to land and shoreline use in the project area would be compatible with surrounding land uses and with applicable land use plans and policies, zoning ordinances, and shoreline regulations. In general, the assessment of the compatibility of land and shoreline use is based on the types of uses, their intensities, and their proximity to one another.

3.1.4 Existing Conditions

This section describes the existing environmental conditions in the study areas related to land and shoreline use that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

3.1.4.1 Land Use Plans and Public Policies

Land use and shoreline resources in the study areas are guided by a variety of land use plans and public policies, which include comprehensive plans, shoreline master programs (SMPs), transportation plans, critical area regulations, and other plans. The applicable land use plans and public policies are discussed in detail in the *SEPA Land and Shoreline Use Technical Report*. The *Cowlitz County Comprehensive Plan* (Comprehensive Plan) (Cowlitz County 1976), *Shorelines Management Master Program for Cowlitz County, Washington* (SMP) (Cowlitz County 1977), and Cowlitz County Critical Areas Protection ordinance are summarized below.

Cowlitz County Comprehensive Plan

According to the Washington State Growth Management Act (GMA), counties and cities meeting specific population and growth criteria are required to prepare comprehensive plans in accordance with GMA goals. The County is not required to fully plan under the GMA, but counties not fully planning under the GMA are required to prepare a comprehensive plan with elements defined in Revised Code of Washington (RCW) 36.70.330.

The Comprehensive Plan designates the project area as Heavy Industrial (Cowlitz County 1976). The plan states that the purpose of the industrial classification is to “assure the presence of adequate amounts of land for industrial growth in Cowlitz County." Appropriate uses in the Heavy Industrial designation include lumber and plywood mills, metal manufacturing, sand and gravel operations, foundry or iron works, quarries, agriculture, nonresidential commercial, and forest management and processing (Cowlitz County 1976). The *SEPA Land and Shoreline Use Technical Report* includes the applicable Comprehensive Plan map for the project area. The technical report also summarizes the eight goals in the Comprehensive Plan that relate to the Heavy Industrial designation.

The draft Comprehensive Plan designates the project area as Economic Resource Lands – Industrial (Cowlitz County 2016a).

Cowlitz County Shoreline Management Master Program

The Shoreline Management Act (SMA) applies to all counties and cities that have "shorelines of the state," as defined in RCW 90.58.030. The County's current SMP was approved in 1977. It includes four basic shoreline environment designations: natural, conservancy, rural, and urban. The Columbia River, part of the project area, is a shoreline of statewide significance. The areas under shoreline jurisdiction in the project area include the Columbia River and all areas within 200 feet of the ordinary high water mark (OHWM) (Figure 3.1-2). The County's SMP designates the shoreline environment at the project area as urban, making it suitable for intensive recreation, residential, industrial, and commercial development (Cowlitz County 1977). The objective of the urban designation is to identify those defined areas that are currently in and potentially capable of such use to satisfy the socioeconomic needs of the present and future populations of Cowlitz County. Figure 3.1-2 shows the regulated shoreline jurisdiction within the project area.

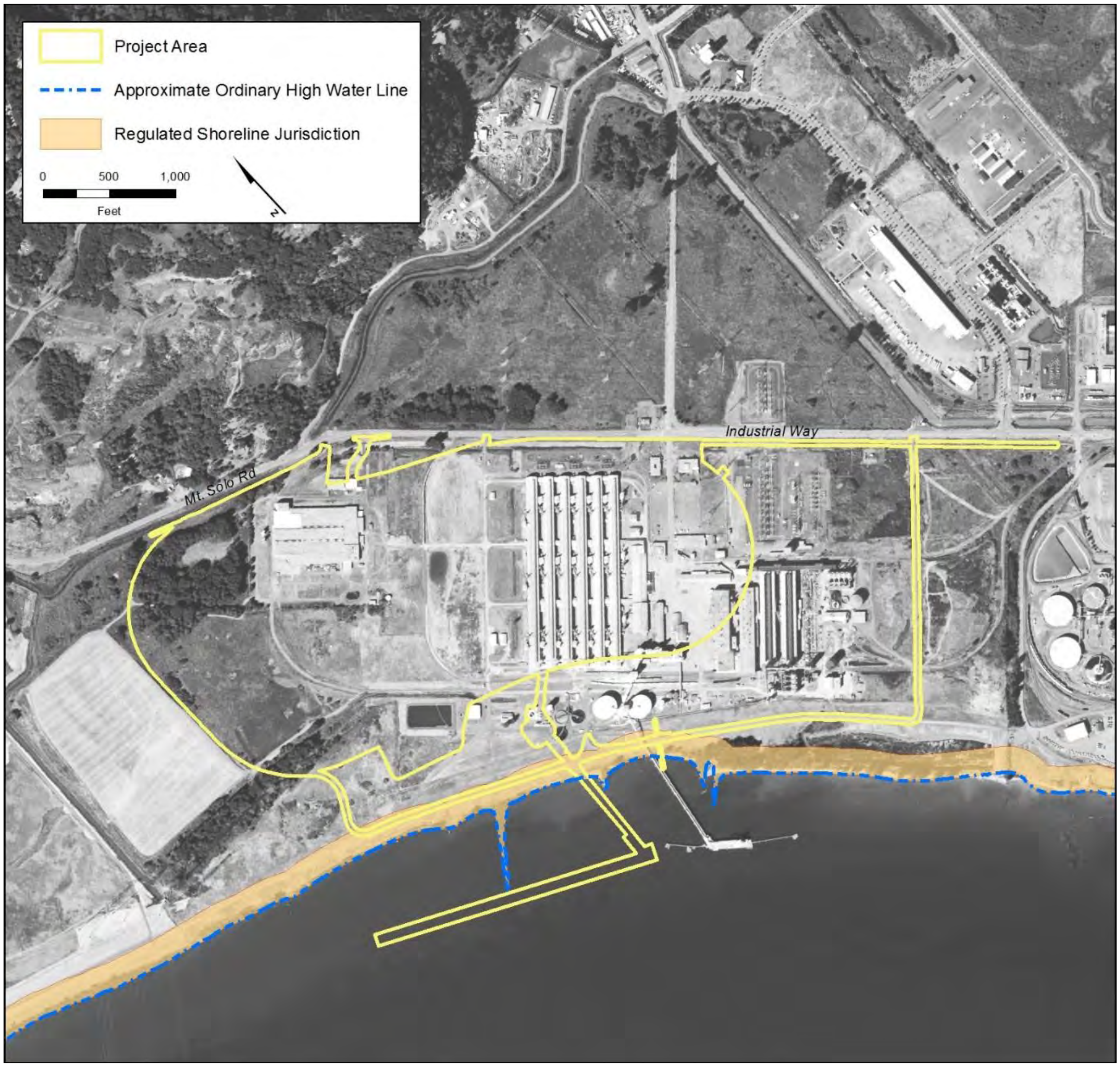
The County's SMP establishes use regulations for 21 shoreline use activities. These use regulations supplement other land use regulations and identify the shoreline management issues that must be addressed to implement the goals of the SMP. According to these regulations, ports and water-related industries are permitted uses in urban shorelines.

To achieve the overall goals of the Shoreline Management Act, the County's SMP also outlines a series of specific goals related to circulation, conservation, economic development, historical/cultural, recreation, residential, public access, and shoreline uses. Policies related to ports and water-related industries are identified under the economic development goal of the SMP.

The County's SMP is undergoing a comprehensive update to meet the requirements of the revised 2003 and 2011 Shoreline Master Program Guidelines based on Washington Administrative Code (WAC) 173-26. The draft updated SMP shoreline maps designate the shoreline environment at the project area as High Intensity and Aquatic (Cowlitz County 2016b). The draft updated SMP is subject to review and approval by the Washington State Department of Ecology (Ecology) and adoption by the Cowlitz County Board of Commissioners.

Portions of the shoreline just downstream from the project area are under the jurisdiction of the City of Longview. The City of Longview updated SMP became effective August 10, 2015.

Figure 3.1-2. Regulated Shoreline Jurisdiction



Cowlitz County Critical Areas Protection

CCC 19.15, the Cowlitz County Critical Areas Ordinance, provides protection for designated critical areas. As mandated by the GMA (RCW 36.70A.060), the County is required to develop and adopt a critical areas protection ordinance that designates critical areas in the County and sets out development regulations to ensure their protection. The ordinance must classify, designate, and protect critical areas, which include critical aquifer recharge areas, frequently flooded areas, geological hazard areas, wetland areas, and fish and wildlife habitat conservation areas. The critical areas identified on the upland portions of the project area include geologic hazard areas, critical aquifer recharge areas, and wetlands (URS Corporation 2014). Frequently flooded areas and fish and wildlife habitat conservation areas are found along the shoreline of and within the Columbia River.

These plans and policies set the context for land use and shoreline development in the study areas.

3.1.4.2 Land Use and Shoreline Resources

The following section presents the characteristics of the existing environment related to land use and shoreline resources by study area.

Direct Impacts Study Area

The direct impacts study area includes portions of unincorporated Cowlitz County and the City of Longview. Unincorporated areas of Cowlitz County, which includes the project area, are subject to Cowlitz County Code (CCC). County zoning regulations are established in the Land Use Ordinance (CCC 18.10). The zoning regulations establish permitted uses, various building and lot dimension standards, and other requirements for development in Cowlitz County. The zoning regulations are the principal tool for implementing the goals and policies of the Comprehensive Plan (Cowlitz County 1976).

The project area is zoned Heavy Manufacturing, as shown in Figure 3.1-3.

Per CCC 18.10.235, the purpose of the Heavy Manufacturing zone is as follows.

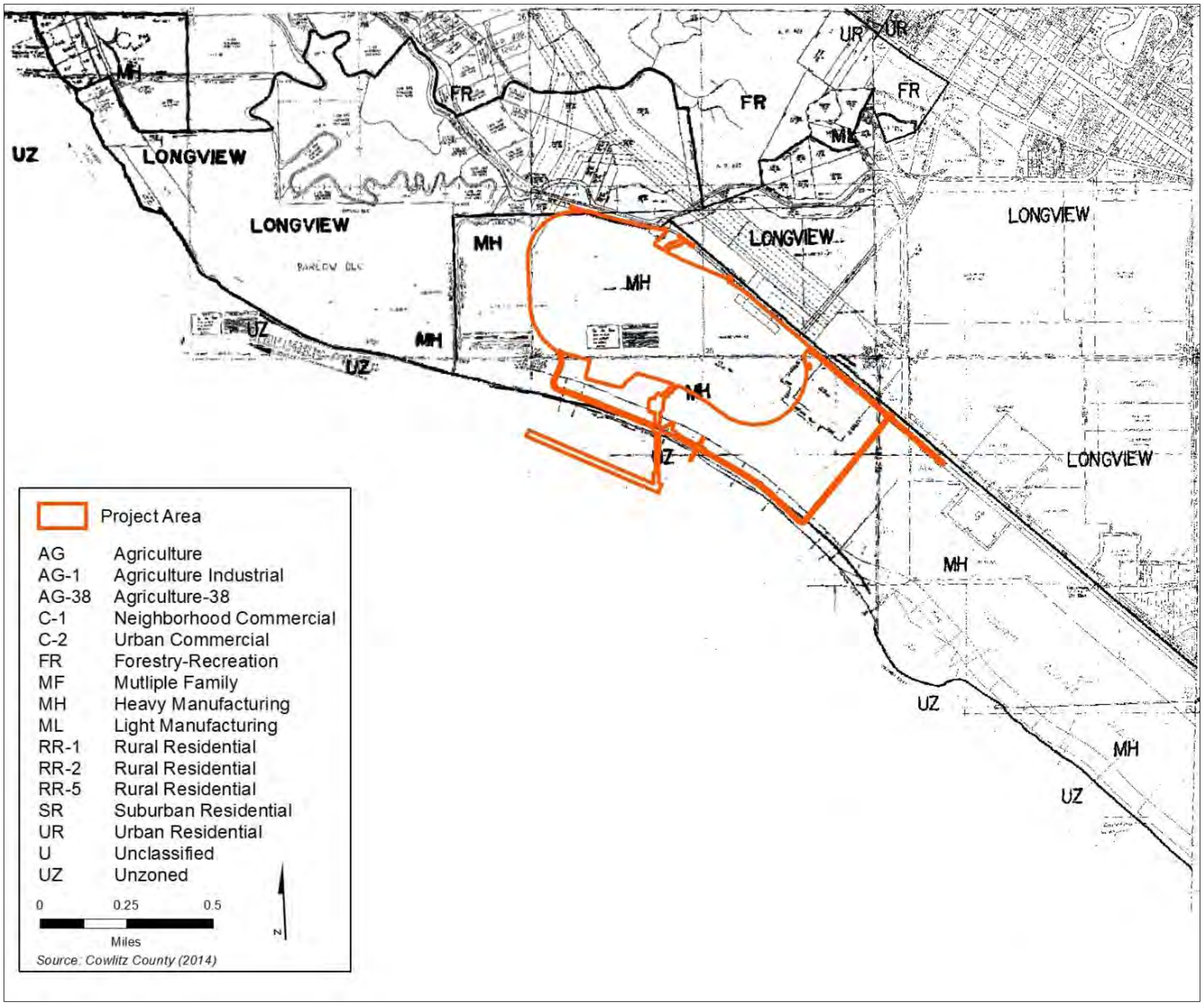
> … to allow Heavy Industrial uses or structures where the primary use involves fabrication, manufacturing, assembly, processing and distribution of raw materials, primarily serving nonlocal wholesale and retail markets. Heavy industrial uses may generate some noise, smoke, dust, odors, toxic gases, vibration, glare, heat and other environmental pollutants in conformance with applicable regulations and must be tolerated, to the benefit of the economy and general welfare of the county. Heavy industrial uses are dependent upon rail, water or arterial access to the interstate highway system.

The permitted uses in the Heavy Manufacturing zone are identified in CCC 18.10.236 and include "[s]torage and distribution of petroleum, propane, liquefied gas, coal, and wood." Minimum standards regarding lot area, setbacks, and lot coverage have not been established for Heavy Manufacturing zones, except for rear and side yard setback requirements for buildings exceeding 35 feet in height.

The project area is an approximate 190-acre site primarily within the Applicant's leased area, as well as the in-water area where two proposed docks would be constructed in the Columbia River. The project area consists of all or portions of eight Cowlitz County tax parcels (619530400, 61950, 61953, 6195303, 61954, 61951, 61948, and WI3100003). These parcels are owned by Northwest Alloys, BNSF Railway Company (BNSF), and the Bonneville Power Administration (BPA) (Cowlitz County 2014). The project area also includes portions of the Columbia River that are owned by the Washington State Department of Natural Resources and subject to an aquatic lands lease (Lease No. 20-B09222). Northwest Alloys leases the aquatic lands, but the Applicant is under contract as the operator of the marine and upland facilities at the project area.

The Applicant's leased area has been in industrial use since 1941. Reynolds Metals Company constructed and operated an aluminum smelter and aluminum casting facility within the project area from 1941 until 2000. Northwest Alloys purchased the site in May 2000 and remains the owner, and the Applicant now operates the existing facility on a ground lease with Northwest Alloys (Washington State Department of Ecology 2014).

Figure 3.1-3. Cowlitz County Zoning



The Reynolds Metals Company facility was an intensive industrial use and, at the time of its closure in 2001, it employed approximately 800 workers and operated 24 hours per day, 7 days per week. In December 2004, Chinook Ventures purchased the facility assets and obtained a ground lease to store and transport fly ash, petroleum coke, alumina, and cement from 2004 to 2010. The Applicant purchased the facility assets from Chinook Ventures in January 2011, and now operates on a ground lease with Northwest Alloys. Today, portions of the project area are used for industrial purposes,[2] but overall the project area is underused, with industrial activities occurring at a much lower intensity than historical levels.

Portions of the project area are also the subject of ongoing hazardous materials cleanup activities to address contamination from the former aluminum smelting and casting uses (Washington State Department of Ecology 2014).

[2] A full list of existing uses in the project area and the Applicant's leased area is provided in the *SEPA Land and Shoreline Use Technical Report.*

The Applicant states that facilities in the project area include four office buildings, maintenance sheds, potlines for storing materials, two cast house buildings, a combined stormwater and wastewater treatment facility, an industrial wastewater treatment plant, a carbon plant, the former cable plant building and associated structures and rail facilities associated with the Reynolds Metals Company operations. The project area also includes two parcels currently owned by BPA and parcels owned by BNSF. The BPA parcels contain BPA facilities, including an access road and substation along Industrial Way. The parcels owned by BNSF contain portions of the Reynolds Lead rail line.

While most of the project area is developed, its undeveloped western portion consists of open areas of grass and wetlands, and there is an approximate 6-acre forested wetland in the northwest corner of the property. No formally designated recreation sites or activities are located on the project area. An extensive levee system along the Columbia River is maintained by the Consolidated Diking Improvement District (CDID) #1.

Figure 3.1-4 shows the existing land uses in the vicinity of the project area; land uses in the indirect impacts study area are discussed further in this section.

The portions of the direct impacts study area in Longview are subject to the zoning established by Title 19 of the Longview Municipal Code (LMC).

The zoning designations for parcels in the direct impacts study area within 500 feet of the project area are provided in the *SEPA Land and Shoreline Use Technical Report*. The parcels in the City of Longview are within the Heavy Industrial and Mixed Use – Commercial/Industrial zones (City of Longview 2014).

LMC 19 states the Heavy Industrial zone is intended

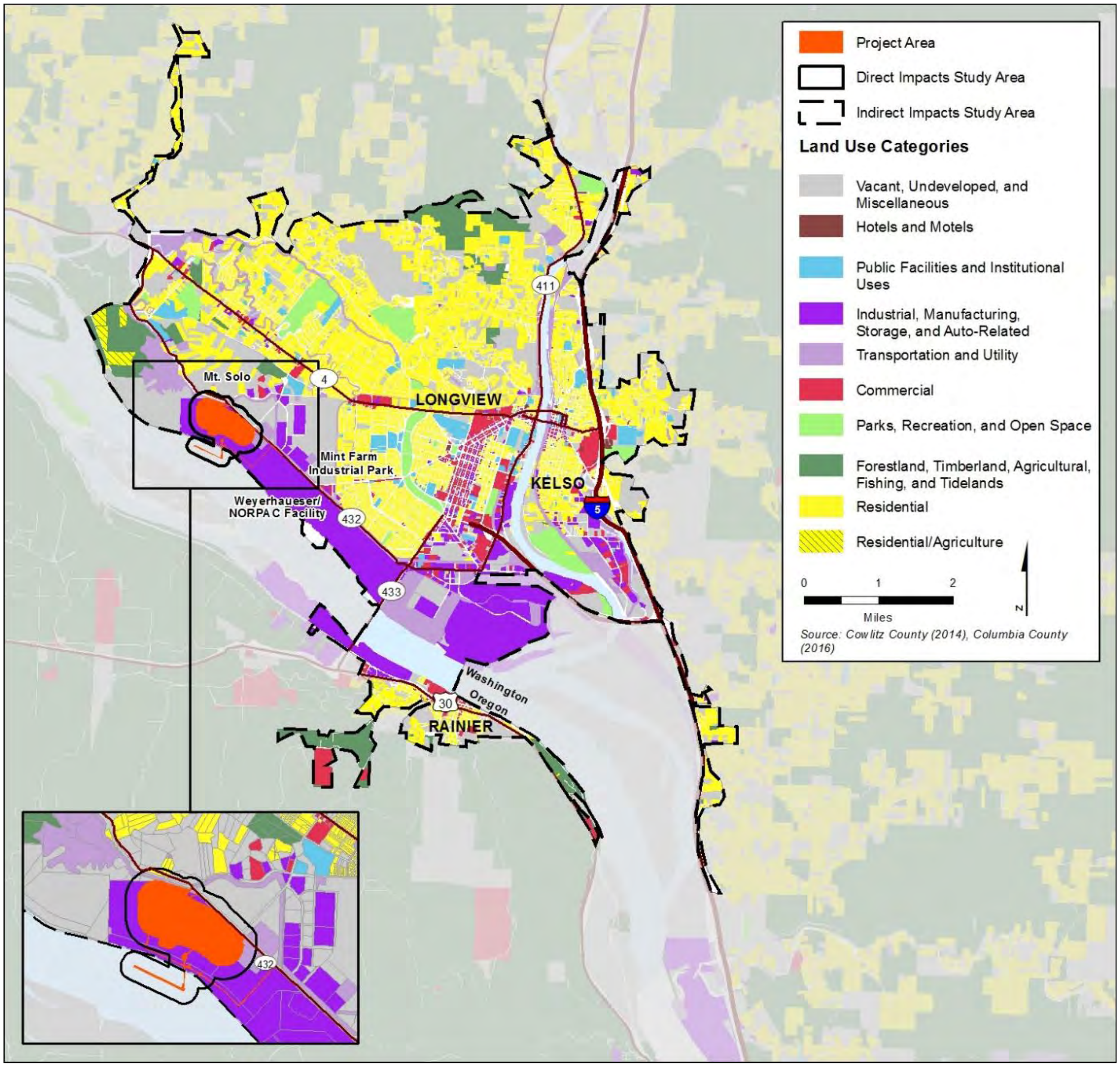
> … for industrial uses that tend to involve processing of natural and manmade materials into finished goods for sale, and may take place in interior and/or exterior settings. Uses in this district may require some handling of hazardous or flammable materials, may require outdoor storage, and may create some external emissions of noise, odor, glare, vibration, etc., but these are largely contained on-site.

LMC 19 states the Mixed Use – Commercial/Industrial zone is intended to

> … allow low intensity industrial uses, including light manufacturing, warehousing and distribution, research and development, and regional commercial services. Commercial uses should be compatible to and complement low-intensity industrial uses and provide a convenient business environment for employees and visitors. High quality employment facilities are encouraged, such as corporate office headquarters and technology centers.

LMC 19.58.030 establishes dimensional standards (i.e., minimum lot size, frontage, setbacks; maximum building heights, and maximum impervious area) for the Heavy Industrial and Mixed Use – Commercial/Industrial zoning districts.

Figure 3.1-4. Existing Land Use



The portions of the direct impacts study area within 500 feet of the project area contain predominantly industrial and transportation/utility land uses, along with two single-family residences. A portion of the direct impacts study area is occupied by an existing bulk products terminal within the Applicant's leased area, which includes upland facilities, a dock on the Columbia River capable of receiving Panamax-sized vessels, and rail and road connections. The bulk products terminal is used by the Applicant to import, store, and transfer bulk alumina and coal. Alumina imported by ship is stored and then transferred by rail to an Alcoa smelter near Wenatchee, Washington. The coal is currently imported by rail, stored, and then transferred by truck to the adjacent Weyerhaeuser lumber products manufacturing facility, where it is used to power the facility.

Industrial Way (State Route 432) is northeast of the project area. Trains on the Reynolds Lead deliver and ship alumina and coal from the existing bulk products terminal. The area east of Industrial Way from the project area is also part of the Applicant's leased area and contains open land with overhead electrical wires and towers.

Immediately west of the project area is the closed Black Mud Pond (BMP) facility, which previously served the Reynolds Metals Company facility. A cryolite recovery plant was constructed in 1953 as part of the Reynolds facility. A byproduct of the cryolite recovery process was black mud, which was disposed of in several fill deposits. One such pond was located in the West Plant area near Landfill 2. The 33-acre BMP impoundment, which was formally closed in 1992, has been subject to an approved ongoing maintenance and monitoring program overseen by Ecology. No further remedial activities related to the closed BMP facility are required in the final cleanup action plan.

Other uses in the direct impacts study area include rights-of-way for CDID #1 and various vacant lands owned by the Port of Longview. The CDID #1 rights-of-way contain flood protection facilities such as levees, drainage ditches, and pump stations.

Two single-family residences are across Industrial Way/Mt. Solo Road from the project area and are the only residential uses in the direct impacts study area. The residences are located in the City of Longview Heavy Industrial zoning district. These houses are on wooded lots set back from the street.

While no formally designated recreation areas or activities occur in the upland portion of the direct impacts study area, the Columbia River is used for boating, fishing, and other forms of water recreation. In addition, the 146-mile Lower Columbia River Water Trail on the Columbia River passes by the project area (Lower Columbia Estuary Partnership 2014).

No agricultural land or activities occur in the direct impacts study area.

The *SEPA Land and Shoreline Use Technical Report* lists the parcels and associated land uses located in the direct impacts study area.

Indirect Impacts Study Area

The indirect impacts study area includes the Longview-Kelso urban area as defined in the 2010 U.S. Census and the unincorporated areas of Cowlitz County adjacent to the project area (which are not part of the Census-defined urban area). The Cities of Longview and Kelso, Washington; and Rainier, Oregon, are in this study area (Figure 3.1-1).

The indirect impacts study area includes a range of industrial, residential, commercial, recreation, and public facility land uses. Development patterns throughout the study area generally consist of areas dominated by a single land use (e.g., residential neighborhoods, commercial shopping centers), except for limited mixed-use development in downtown Longview and Kelso.

Major road corridors through the indirect impacts study area include Ocean Beach Highway (State Route 4), Industrial Way (State Route 432), Interstate 5, State Route 433, and State Route 411 through Longview and Kelso, Washington, along with U.S. Route 30 (US 30) in Rainier, Oregon. Another prominent transportation link in the study area is the BNSF main line and the Columbia & Cowlitz Railway. The BNSF main line generally runs along the Columbia and Cowlitz Rivers, with spurs serving downtown Longview and the industrial areas along the Columbia River, including the project area (BNSF Spur and Reynolds Lead). The Columbia River is a key marine transportation link serving the study area. Overall, the integrated network of road, rail, and marine transportation in the indirect impacts study area has facilitated the area's development as an industrial and commercial hub along the Columbia River.

There is a wide corridor of industrial and transportation/utility land uses along the Columbia River in the indirect impacts study area. This corridor includes the project area; the 550-acre Weyerhaeuser Company lumber products manufacturing site/North Pacific Paper Corporation facility along the Columbia River; the Port of Longview's 478-acre Port Industrial Marine property, which includes eight marine terminals; and the Mint Farm Industrial Park, a partially developed 445-acre industrial site operated as a public-private partnership between the City of Longview and the Weyerhaeuser Real Estate Development Company. The Barlow Point property, an undeveloped area downstream (west) of the project area along the Columbia River and within the City of Longview, was recently purchased by the Port for future port improvements (Port of Longview 2011).

Aside from the two residences located across Industrial Way/Mt. Solo Road from the project area, nearby residential uses include several single-family residences on Mount Solo, a steep hill approximately 0.5 to 0.75 mile north of the project area. More densely developed residential areas are located at least 1 mile away from the project area to the north and east in Longview and across the Cowlitz River in the City of Kelso. Commercial uses in the indirect impacts study area include retail, office, and storage uses concentrated along Ocean Beach Highway and in downtown Longview and Kelso.

Development in Kelso is concentrated primarily between the Cowlitz River and Interstate 5. Land use patterns are characterized by commercial uses along Ocean Beach Highway. Residential uses exist further north and south of the corridor, and there is a mix of industrial, commercial, and undeveloped land uses in the southern portion of the City of Longview near the confluence of the Cowlitz and Columbia Rivers. As in Longview, residential uses in Kelso are predominantly low-density, single-family, detached dwellings.

As shown in Figure 3.1-1, the indirect impacts study area extends well beyond the project area and the downtown cores of Longview and Kelso. To the north, the outer portions of the indirect impacts study area encompass suburban and exurban areas with scattered residential development interspersed among forested areas.

The Lewis and Clark Bridge (State Route 433) spans the Columbia River upriver from the project area and provides access to Rainier, Oregon. This portion of the study area is approximately 2 to 5 miles from the project area; it is characterized by industrial and open-storage uses along the Columbia River, low-density residential and commercial development within Rainier, agricultural uses, and undeveloped and forested land.

A variety of public facility uses serve the indirect impacts study area, including schools, police and fire facilities, libraries, community centers, health care facilities, and government facilities. The *SEPA Land and Shoreline Use Technical Report* identifies the locations of the major public facilities in the indirect impacts study area.

3.1.4.3 Parks and Recreation Facilities

There are no parks or recreation facilities in the study area. However, the Columbia River is used for boating, fishing, and other forms of water-related recreation. The 146-mile-long Lower Columbia

River Water Trail, which extends from Bonneville Dam to the mouth of the Columbia River, passes by the project area. Recreational boaters must share the river with commercial vessels, including oceangoing cargo ships. The nearest parks are Roy Morse Park located 1 mile north of the project area, Mint Valley Golf Course located 1 mile northeast of the project area, and a primitive campsite (i.e., a campsite with no support facilities) on Lord Island 0.8 mile south of the project area (Lower Columbia Estuary Partnership 2014). The nearest boat launches are located at Rainier Riverfront Park, across the Columbia River in Rainier, Oregon, approximately 4 miles upriver of the project area, and at Willow Grove Boat Launch, located on the Washington side of the river approximately 4 miles downstream of the project area. The *SEPA Land and Shoreline Use Technical Report* includes a map of these nearby park and recreation uses.

3.1.4.4 Agricultural Land

As defined previously, the study area for agricultural land uses is the project area and the area within 500 feet of it. There are no agricultural zoned land or agricultural land uses in the study area.

3.1.5 Impacts

This section describes the potential direct and indirect impacts related to land and shoreline use that would result from construction and operation of the Proposed Action and No-Action Alternative.

3.1.5.1 Proposed Action

This section describes the potential impacts that could occur in the study areas as a result of construction and operation of the Proposed Action.

Construction would proceed in two stages and would last approximately 9 years. Construction activities would include building demolition, site preparation (e.g., clearing, grading, and earthwork), ground preloading in preparation for coal stockpiles, equipment installation, rail loop construction, dredging, and in-water and upland construction of docks, trestles, and conveyors. As construction of the initial stages of the Proposed Action is completed, start-up operations would commence while the remainder of the Proposed Action is under construction. Therefore, both construction and operational activities would occur at the project area during part of the overall construction period. Construction of the coal export terminal would temporarily generate traffic, noise, dust, smoke, vibration, and other impacts.

Construction—Direct Impacts

Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, describes construction-related activities within the project area. Construction would not result in direct impacts on land use because the project area is currently an industrial use and would remain an industrial use upon completion of construction activities.

Construction—Indirect Impacts

Construction of the Proposed Action would not result in indirect impacts on land and shoreline use because it would be limited to the project area and construction activities would not affect land and shoreline use outside the project area.

Operations—Direct Impacts

Operation of the Proposed Action would result in direct impacts. Operations-related activities are described in detail in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*. In operation, the Proposed Action could have a maximum annual throughput capacity of up to 44 million metric tons of coal per year. The Proposed Action would consist of one operating rail track, eight rail tracks for storing up to eight unit trains, rail car unloading facilities, a stockpile area for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks 2 and 3), and shiploading facilities on the two docks. Trains would transport coal in unit trains (meaning all the rail cars would carry the same commodity) from the BNSF main line at Longview Junction, Washington to the project area via the BNSF Spur and Reynolds Lead. Coal would be unloaded from rail cars, stockpiled, and loaded by conveyor onto ocean-going vessels at Docks 2 and 3. Dredging of the Columbia River would be required to provide access to and from the Columbia River navigation channel and for berthing at Docks 2 and 3. Vehicles would access the project area from Industrial Way, and vessels would access the project area via the Columbia River and berth at Dock 2 or 3. Terminal operations would occur 24 hours per day, 7 days per week.

Land Use and Shoreline Resources

Direct operations-related impacts on land and shoreline use are discussed below.

Modify Existing Land and Shoreline Uses in the Project Area

The Proposed Action would modify existing land use in the project area by replacing the existing industrial uses with a new export terminal. The export terminal would include a rail loop system and rail unloading facilities, coal handling and stockpile areas, shiploading facilities (including the two new docks in the Columbia River), and associated rail and coal handling facilities. The Proposed Action would be a more intensive industrial use of the project area than under existing conditions. However, because the project area and surrounding area already contain industrial uses, the Proposed Action would not change the land use of the project area substantially.

Introduce New, Intensive Industrial Use near Residential Land Uses

The Proposed Action would introduce new, intensive industrial uses near two single-family residences north of the project area in the direct impacts study area. These residences currently coexist with industrial uses in the project area and nearby and, as noted above, are located in the City of Longview Heavy Industrial zoning district. Therefore, the Proposed Action would not directly affect these uses with respect to land use compatibility.

Parks and Recreation Facilities

The Proposed Action would not directly affect the continued use of the Columbia River for recreation purposes, nor would it have any impact on the Willow Grove and Rainier Riverfront Park boat launches. There are no other parks or recreation facilities in the study area. Therefore, the Proposed Action would not result in any direct impacts on parks and recreation facilities.

Agricultural Land

There are no agricultural zoned land or agricultural land uses in the study area. Therefore, the Proposed Action would not result in any direct impacts on agricultural land uses.

Operations—Indirect Impacts

Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Land Use and Shoreline Resources

The Proposed Action would be compatible with land use conditions in the indirect impacts study area and the existing concentration of industrial land uses along the Columbia River, in particular the Weyerhaeuser and Port facilities immediately upriver from the project area.

The Proposed Action would not change land use patterns in the remainder of the indirect impacts study area. Most land uses outside the corridor of industrial and transportation/utility uses along the Columbia River are located at least 1 mile from the project area. Furthermore, the residential uses to the north on Mount Solo are approximately 0.5 mile north of the project area. Other residential neighborhoods to the north are buffered from the project area by Mount Solo. Land uses in the Rainier, Oregon, portion of the study area would continue to be separated from the project area by the Columbia River. Thus, the Proposed Action would not affect land use conditions in the Rainier area.

Increased rail traffic from the Proposed Action would use existing rail infrastructure and would not affect current land use. The Proposed Action would increase commercial ship traffic along the Columbia River. However, the Columbia River is currently used for marine transportation. The additional ship traffic would not change this ongoing use.

Overall, the Proposed Action would not affect land use trends or conditions in the indirect impacts study area.

Parks and Recreation Facilities and Agricultural Land

The Proposed Action at full capacity would introduce approximately 70 additional ships per month (840 per year) to the Columbia River. Although the Proposed Action would add commercial ship traffic to the river, recreational users (such as those using the river for fishing or boating) currently must take account of commercial vessels, including large ocean-going ships. With the additional vessels, the Proposed Action would result in an approximate 46% increase over current river vessel traffic.[3] While this would be a substantial increase, the vessels would operate in the navigation channel except when arriving or departing the proposed docks under the assistance of tugs, and operations would be similar to current vessel traffic. Recreational boats are smaller and are not limited to using the navigation channel, and the Willow Grove and Rainier Riverfront Park boat launches are distant from the project area. Therefore, it is not expected that recreational boaters would be substantially affected by vessels and tugs using the proposed docks. The Proposed Action would not result in indirect impacts on parks and recreation facilities or on agricultural land.

Consistency with Zoning

The Proposed Action would be consistent with the existing Heavy Manufacturing zoning designation and comply with the currently permitted uses and associated development standards and

[3] Based on 2014 large commercial vessel traffic in the Columbia River according to Bar Pilots records, which was 3,638 transits or 1,819 vessels. See Chapter 5, Section 5.4, *Vessel Transportation*, for additional information.

requirements. The Proposed Action would introduce a coal export terminal dependent on rail and marine transportation, and thus, would be consistent with the purpose of the Heavy Manufacturing zone. Per CCC 18.10.236, the proposed coal export terminal would be a permitted use. Furthermore, minimum standards regarding lot area, setbacks, and lot coverage have not been established for Heavy Manufacturing zones, except for rear and side yard setback requirements for buildings exceeding 35 feet in height (CCC 18.10.501). The Proposed Action would comply with the limited rear and side yard setback requirements for any proposed structures exceeding 35 feet in height. Overall, the Proposed Action would be consistent with existing zoning regulations.

Consistency with Land Use Plans and Public Policies

The Proposed Action's consistency with the Cowlitz County Comprehensive Plan, SMP, and Critical Areas Protection Ordinance are summarized below. A full discussion of the Proposed Action's consistency with all applicable land use plans and public policies is provided in the *SEPA Land and Shoreline Use Technical Report*.

Cowlitz County Comprehensive Plan

As discussed above, the current Comprehensive Plan designates the project area as Heavy Industrial. The purpose of this classification is to "assure the presence of adequate amounts of land for industrial growth in Cowlitz County." The Proposed Action would maintain and expand the industrial use of the project area and would be consistent with the Comprehensive Plan designation. Furthermore, the currently effective, adopted Comprehensive Plan articulates several goals regarding industrial development that are applicable to the Proposed Action. The Proposed Action would be consistent with these goals, as analyzed in the *SEPA Land and Shoreline Use Technical Report*.

The Proposed Action would also be consistent with the Economic Resource Lands – Industrial designation of the project area in the draft updated Comprehensive Plan. By redeveloping an existing industrial site with a new, active industrial use, the Proposed Action would be supportive of the draft Comprehensive Plan goals to identify and protect industrial land.

Cowlitz County Shoreline Management Master Program

The Proposed Action would result in development within the shoreline area regulated by the County's SMP. It designates the shoreline environment at the project area as urban, which includes areas suitable for intensive recreation, residential, industrial, and commercial development. The Proposed Action would be consistent with the objective of the urban designation. Furthermore, ports and water-related industries, such as the Proposed Action, are permitted uses on urban shorelines per the SMP.

The County's SMP is undergoing a comprehensive update to meet the requirements of the revised 2003 and 2011 Shoreline Master Program Guidelines based on WAC 173-26. The proposed industrial use is a preferred use under the Shoreline Management Act as a water-dependent use.

Newly proposed dredging is a conditional use on urban shorelines. Therefore, new development on the project area would require a Shoreline Substantial Development Permit for any new structures within the shoreline jurisdiction, and a Conditional Use Permit for proposed dredging activities.

The Proposed Action's consistency with the applicable policies and use activity regulations of the SMP are discussed in the *SEPA Land and Shoreline Use Technical Report*.

Cowlitz County Critical Areas Protection

The Proposed Action would result in development within designated critical areas, including geologically hazardous areas, critical aquifer recharge areas, wetlands, frequently flooded areas, and fish and wildlife habitat conservation areas. The Applicant would be required to obtain a critical areas permit, and any necessary mitigation measures would be required as a condition of the permit. With these mitigation measures, any impacts on regulated critical areas would be offset or minimized such that there would be no net loss of critical area functions and values. Therefore, the Proposed Action would be consistent with the policy related to critical areas protection.

3.1.5.2 No-Action Alternative

The following sections describe the potential impacts on land and shoreline use related to construction and operation of the No-Action Alternative.

Construction—Direct Impacts

Although the coal export terminal would not be constructed under the No-Action Alternative, new construction, demolition, or related activities to develop the project area into an expanded bulk product terminal would occur on previously developed upland portions of the project area. Upland areas of the site are zoned Heavy Industrial and it is assumed that newly proposed industrial uses in these upland areas could be permitted in the future. Construction of new buildings could involve demolition and replacement of existing buildings and new or modified permits. However, no new docks would be built and no new dredging would occur. Construction would not result in direct impacts on land use because the project area is currently an industrial use and would remain an industrial use upon completion of construction activities.

Construction—Indirect Impacts

The No-Action Alternative would not result in indirect construction impacts on land and shoreline use because construction would be limited to the project area. These activities would not change land and shoreline use outside the project area during construction.

Operations—Direct Impacts

The No-Action Alternative would continue and expand the existing bulk product terminal use in the project area. The following direct impacts on land use may result from operation of the No-Action Alternative.

Land and Shoreline Resources

Direct operations-related impacts on land and shoreline resources are discussed below.

Modify Existing Land Uses on the Project Area

As with the Proposed Action, the No-Action Alternative would expand existing or introduce a new industrial use to the project area. However, because the project area and surrounding area already contain industrial uses, the No-Action Alternative would not change the land use of the project area substantially.

Introduce Expanded or New Industrial Use near Residential Land Uses

Two single-family residential uses are located adjacent to the project area within the direct impacts study area. These uses currently coexist with existing industrial uses on the project area and nearby. Therefore, the No-Action Alternative would not likely directly affect the adjacent residential uses regarding land use compatibility. Potential impacts on these residential uses related to vehicle transportation, noise, air quality, and coal dust are discussed in Chapter 5, Sections 5.3, *Vehicle Transportation;* 5.5, *Noise and Vibration;* 5.6, *Air Quality*; and 5.7, *Coal Dust*.

Parks and Recreation Facilities and Agricultural Land

The No-Action Alternative would not directly affect parks and recreation land uses because of the distance between the project area and such uses, nor would it result in direct impacts on agricultural land uses.

Operations—Indirect Impacts

The No-Action Alternative would be compatible with land use conditions in the indirect impacts study area. In particular, the No-Action Alternative would be consistent with the existing concentration of industrial land uses along the Columbia River, and would not affect land use conditions in the remainder of the study area. Most land uses outside the corridor of industrial and transportation/utility uses along the Columbia River are located at least 1 mile from the project area. Furthermore, the nearest residential uses to the north on Mount Solo (aside from the two residences adjacent to the project area) are located approximately 0.5 mile from the project area and are buffered by dense vegetation on Mount Solo. Other residential neighborhoods to the north are buffered from the project area by Mount Solo.

The No-Action Alternative could increase rail and truck traffic due to expanded coal, alumina, and industrial chemical handling operations. This increase in rail and truck traffic would be compatible with existing industrial land uses along these transportation corridors. Land uses adjacent to the rail lines currently coexist with rail traffic, including the transportation of coal and other commodities. The No-Action Alternative would not change the land uses along the rail corridors. Overall, the operation of the No-Action Alternative would not result in indirect impacts on land or shoreline use.

Consistency with Zoning, Land Use Plans, and Public Policies

The No-Action Alternative would be consistent with the stated purpose of the County’s existing Heavy Manufacturing zoning designation and would comply with the permitted uses and associated development standards and requirements. The No-Action Alternative would maintain and expand the industrial use of the project area and would be consistent with the current Heavy Industrial designation of the project area in the Comprehensive Plan, as well as the Economic Resource Lands – Industrial designation in the draft update of the Comprehensive Plan.

The No-Action Alternative could result in development within the shoreline jurisdiction that would require a Shoreline Substantial Development Permit from the County. Development under the No-Action Alternative would be expected to be consistent with the objective of the urban designation of the site. As with the Proposed Action, the No-Action Alternative would be required to obtain a critical areas permit for any development within designated critical areas, including any required mitigation measures, and as a result would be consistent with public policy related to critical areas protection. The No-Action Alternative would also need to comply with legal restrictions or covenants tied to cleanup of the site.

Overall, the No-Action Alternative would be consistent with zoning and public land use plans and policies applicable to the project area.

3.1.6 Required Permits

The Proposed Action would require the following permits for land and shoreline use.

- **Shoreline Substantial Development—Cowlitz County Department of Building and Planning.** The Proposed Action would result in new development in the shoreline area regulated by the County's SMP. Therefore, it would require a Shoreline Substantial Development Permit.
- **Shoreline Conditional Use Permit—Cowlitz County Department of Building and Planning/Washington State Department of Ecology**. The Proposed Action may require dredging activities on urban shorelines. New dredging is a conditional use on urban shorelines; the Proposed Action would require a Conditional Use Permit from the County. The Conditional Use Permit requires final approval from Ecology.
- **Critical Areas Permit—Cowlitz County Department of Building and Planning**. The Proposed Action would be constructed within designated critical areas and therefore would require a Critical Areas Permit.
- **Building and Site Development Permits—Cowlitz County Department of Building and Planning**. The Proposed Action would require building and site development permits, such as fill and grade permits, plumbing permits, fire permits, mechanical permits, etc., from the Cowlitz County Department of Building and Planning for any earthwork, construction of new structures, or alteration of existing structures.

3.1.7 Proposed Mitigation Measures

The Proposed Action would be compatible with surrounding industrial land uses and consistent with the existing zoning and comprehensive plan designations for the project area. Although the Proposed Action would introduce a new industrial use nearby the two single-family residences adjacent to the project area, the Proposed Action would not directly affect these uses with respect to land use compatibility. Therefore, no land use and shoreline use mitigation measures are proposed.

3.1.8 Unavoidable and Significant Adverse Environmental Impacts

There would be no unavoidable and significant adverse environmental impacts on land and shoreline use.

3.2 Social and Community Resources

The social and community resources of an area include the public services in a community that bring people together and create cohesion. These resources include population characteristics, economic activity, and utility services. Changes to social and community resources occur when a project affects any of these elements. This section evaluates the potential adverse impacts on social and community resources resulting from construction and operation of the Proposed Action and No-Action Alternative. Social and community resources addressed in this section include social and community cohesion, public services, and utilities.

Potential impacts on minority and low-income populations are also evaluated in this section, in an environmental justice analysis.[1] The environmental justice analysis addresses potential disproportionately high and adverse effects on minority and low-income populations. This analysis describes the minority and low-income populations in the study area. It then describes impacts on these populations that could result from construction and operation of the Proposed Action and No-Action Alternative, and assesses whether these impacts would be disproportionately high and adverse.

This section also presents the measures identified to mitigate impacts resulting from the Proposed Action and any remaining unavoidable and significant adverse impacts.

3.2.1 Regulatory Setting

Laws and regulations relevant to social and community resources are summarized in Table 3.2-1. As shown, these laws and regulations pertain to the assessment of minority and low-income populations.

Table 3.2-1. Regulations, Statutes, and Guidelines for Minority and Low-Income Populations

Regulation, Statute, Guideline	Description
Federal	
Title VI of the Civil Rights Act of 1964 (42 USC 2000d) as amended by the Civil Rights Restoration Act of 1987 (P.L. 100-209)	Prohibits discrimination based on race, color, sex, and national origin in the provision of benefits and services resulting from federally assisted programs and activities.
Americans with Disabilities Act, 42 USC 126 § 12101, *et seq*. (as amended)	Prohibits discrimination based on disability.
Presidential Executive Order 12898, Environmental Justice	Promotes nondiscrimination in federal programs substantially affecting human health and the environment and provides minority and low-income community access to public information on, and an opportunity for public participation in, matters relating to human health or the environment.

Notes:
USC = United States Code; P.L. = Public Law

[1] The U.S. Environmental Protection Agency (EPA) defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."

3.2.2 Study Area

The study area for direct and indirect impacts on social and community resources include study areas for each element of the social and community resource analysis: social and community cohesion and public services, utilities, and minority and low-income populations. The study areas for each element are listed below.

- **Social and Community Cohesion and Public Services.** For direct impacts, the study area is the project area and the area within 0.5 mile of the project area. For indirect impacts, the study area is the area within 0.5 mile of the affected rail lines in Cowlitz County (Reynolds Lead, BNSF Railway Company [BNSF] Spur, and BNSF main line). Figure 3.2-1 illustrates these study areas.
- **Utilities.** For direct impacts, the study area is the project area and the area within 0.5 mile of the project area. This study area only relates to construction and operation of the Proposed Action. For indirect impacts, the study area is the area within 0.5 mile of the project area.
- **Minority and Low-Income Populations.** For direct impacts, the study area is the project area and the area within approximately 1 mile of the project area (Figure 3.2-2). This study area only relates to construction and operation of the Proposed Action. For indirect impacts, the study area is the area within 0.5 mile of the affected rail lines in Cowlitz County.

3.2.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on social and community resources associated with the construction and operation of the Proposed Action and No-Action Alternative.

3.2.3.1 Information Sources

The following sources of information were used to define the existing conditions relevant to social and community resources, and identify the potential impacts of the Proposed Action and No-Action Alternative on social and community resources.

- U.S. Census Bureau, Census 2000 and 2010 data (U.S. Census Bureau 2000 and 2010) and 2009–2013 American Community Survey (ACS) data (U.S. Census Bureau 2013a) available on American FactFinder
- State of Washington Office of Financial Management data
- Cowlitz-Wahkiakum Council of Governments data
- Various websites to inventory public service facilities in the study areas, including Google Maps and websites for Cowlitz County and the Cities of Castle Rock, Kelso, Woodland, and Longview.

Figure 3.2-1. Study Areas for Social and Community Cohesion and Public Services

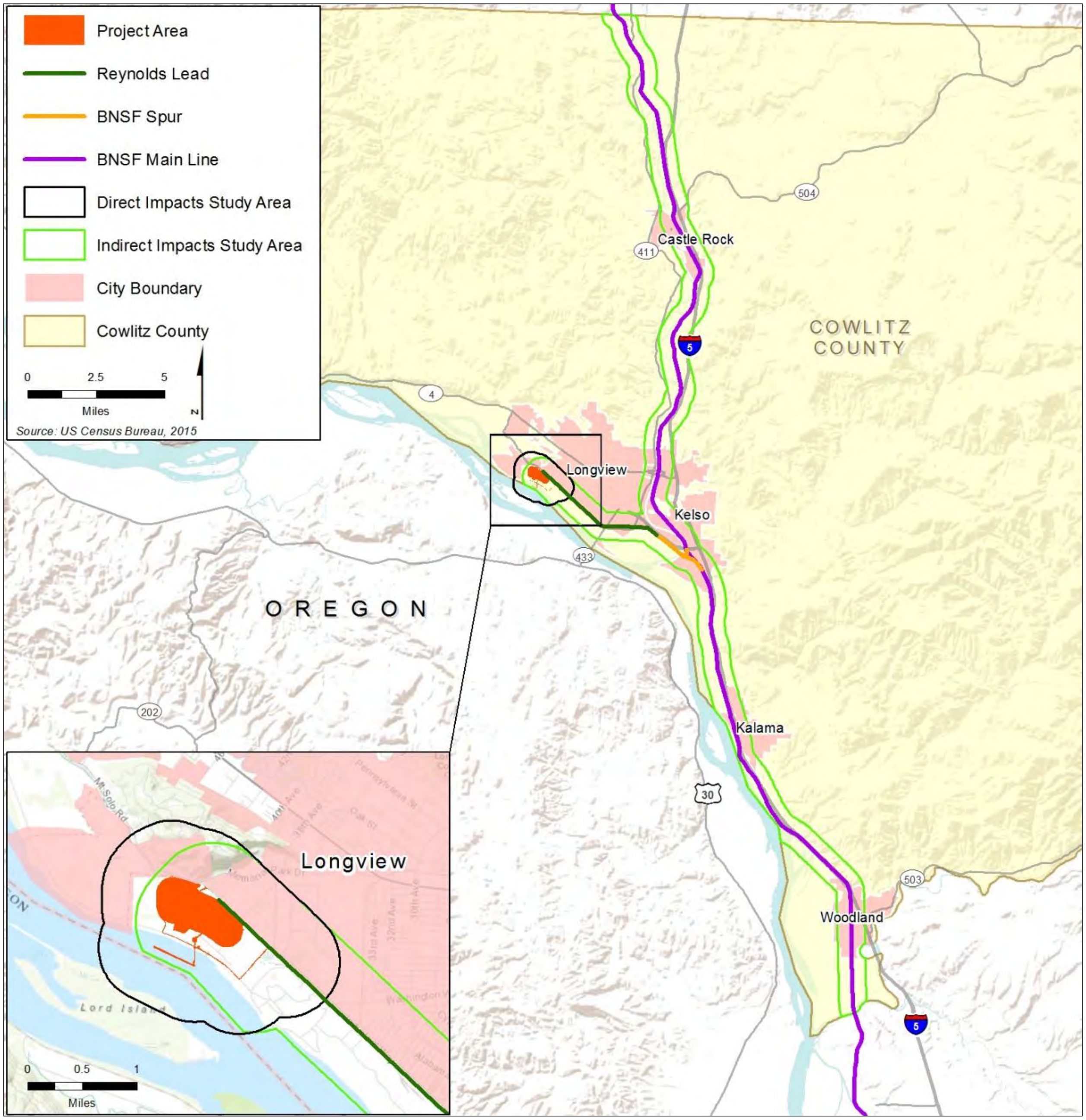
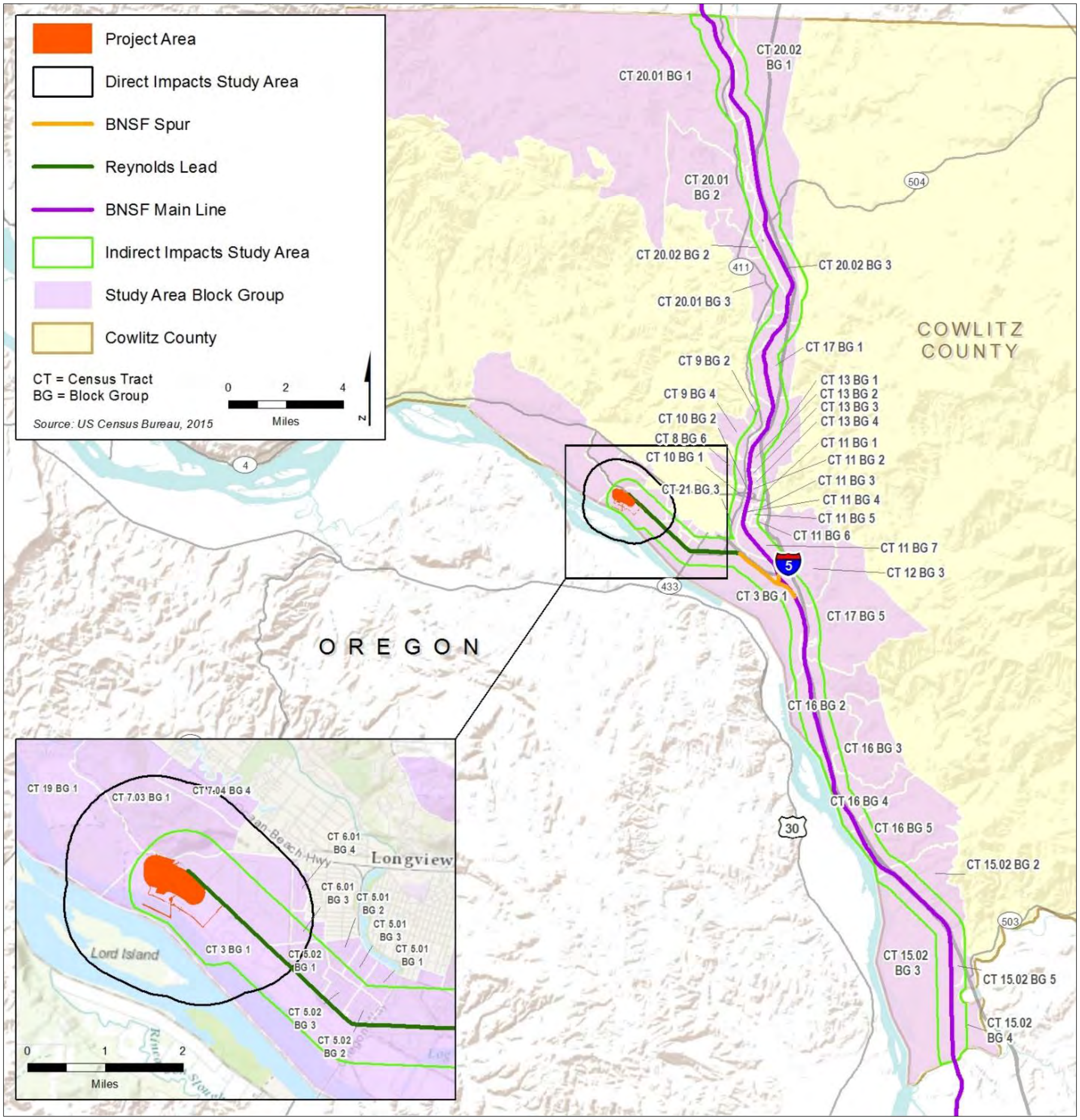


Figure 3.2-2. Minority and Low-Income Populations Study Area



3.2.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No Action Alternative on social and community resources.

Social and Community Cohesion and Public Services

This analysis describes existing social and community cohesion in terms of the area's population characteristics, the various public services and social institutions that serve the community and create cohesion (such as parks, schools, and places of religious worship), and the access and linkages between the community and those services. Demographic data were compiled based on the U.S. Census Bureau (census) block group boundaries within the social and community cohesion study area: Census Tract 3 Block Group 1, Census Tract 7.03 Block Group 1, and Census Tract 19 Block Group 1 (Figure 3.2-3).

The analysis then evaluates if the Proposed Action could affect social and community cohesion by altering population characteristics, dividing or isolating a neighborhood, or separating residents from public services by changing travel patterns. This evaluation considers the location of public services in the study areas relative to characteristics of the Proposed Action. Impacts on social and community cohesion occur when an action does one of the following.

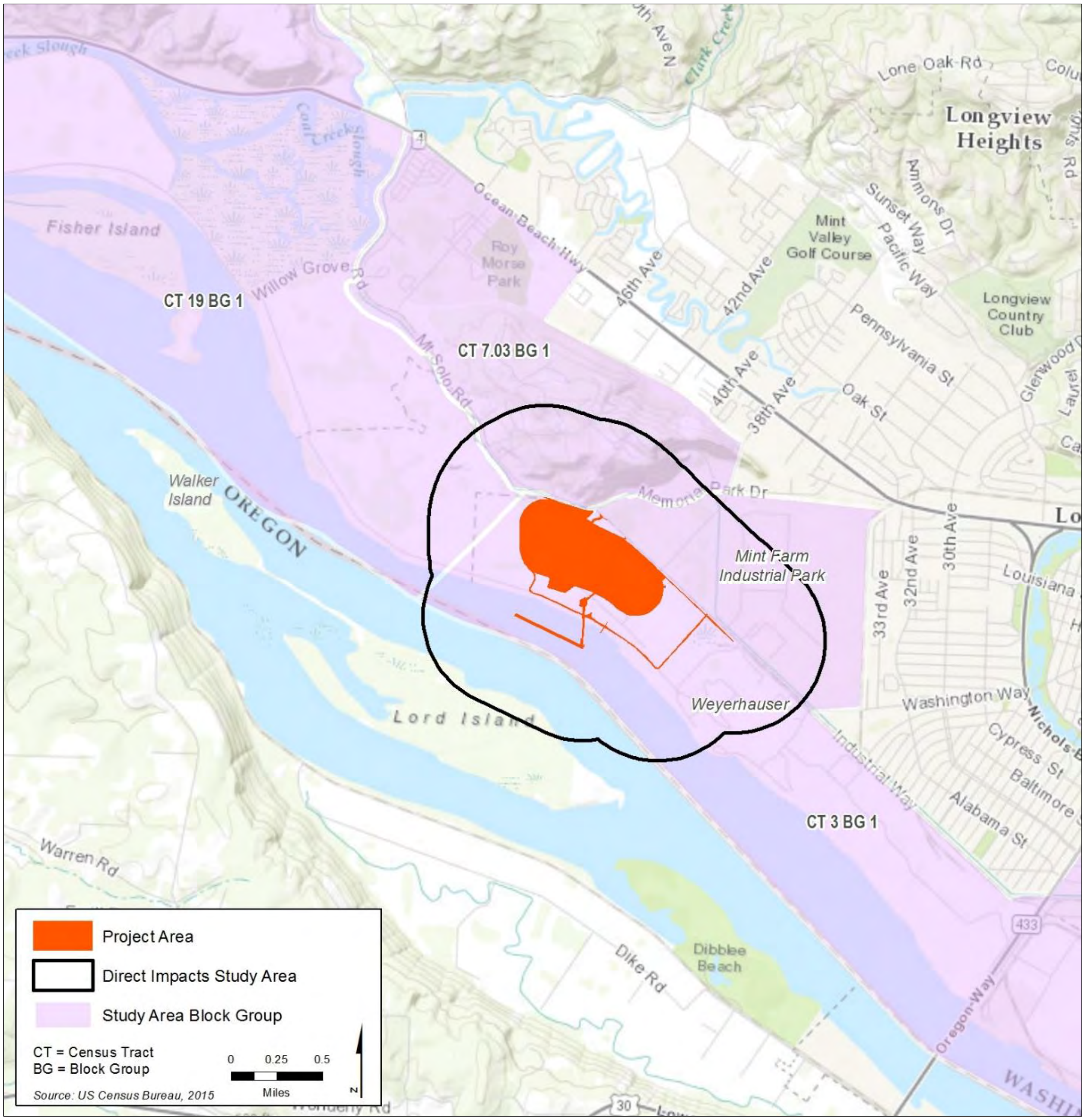
- Divides or isolates part of a neighborhood.
- Displaces or alters a public service facility, such as an educational facility, library, public park, or recreational facility.
- Generates substantial new development or changes property values leading to the displacement of substantial portions of the existing community.

Impacts on public services occur when an action introduces a new population or service demand that affects the services delivered by a public service facility, or if an action separates residents from public services by changing travel patterns or access to the service.

Utilities

The assessment of utilities focuses on water utilities, including potable water and wastewater service, and electrical utilities. Electricity and natural gas consumption are addressed in Chapter 4, Section 4.9, *Energy and Natural Resources*. This evaluation assesses whether the Proposed Action would have the potential to affect utility service directly by altering the water supply or wastewater conveyance system or electrical utilities. The evaluation also assesses the potential for indirect impacts from new demands on water supply capacity and/or wastewater treatment capacity.

Figure 3.2-3. Census Tract and Block Groups in the Direct Impacts Study Area for Social and Community Cohesion and Public Services



Minority and Low-Income Populations

The assessment of minority and low-income populations used guidance published by the Council on Environmental Quality (CEQ) (1997), which involved the following six steps.

1. Identify the area where the Proposed Action could cause adverse effects either during construction or operation (i.e., the study area, described in Section 3.2.2, *Study Area*).
2. Compile minority and low-income data for the census block groups in the study area and identify minority and low-income populations.
3. Identify the Proposed Action's potential adverse effects on minority and low-income populations.
4. Evaluate the Proposed Action's potential adverse effects on minority and low-income communities relative to the effects on the overall population to determine if potential adverse effects on those communities would be disproportionately high and adverse.
5. Discuss proposed mitigation measures for any identified disproportionate adverse effects.
6. Describe the public outreach and participation process for effectively engaging minority and low-income populations in the decision-making process.

Identification of Minority and Low-Income Populations

Census block groups were selected as the geographic unit for analysis to avoid artificially diluting or inflating the affected populations, consistent with CEQ guidance. As shown in Figure 3.2-2, the study area for direct and indirect effects includes 46 census block groups.

Data on race, ethnicity, and poverty status were gathered from the U.S. Census Bureau's 2009–2013 ACS for the census block groups in the study area. For comparison purposes, data for the City of Longview and Cowlitz County were also compiled. Based on census data and CEQ guidance, potential minority and low-income populations were identified as follows.

- **Minority populations**. CEQ guidance defines minorities to include American Indians or Alaskan Natives, Asian and Pacific Islanders, African Americans or Black persons, and Hispanic persons. This analysis also considers minority populations to include persons who identified themselves as being either "some other race" or "two or more races" in the 2009–2013 ACS. Following CEQ guidance, minority populations were identified where either 1) the minority population of the affected area exceeds 50%; or 2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate comparison unit of geographic analysis (Council on Environmental Quality 1997). For the purposes of this analysis, *meaningfully greater* is interpreted as *at least 50% greater*. This analysis used Cowlitz County as the primary comparison area. In Cowlitz County, the minority population in the 2009–2013 ACS was 14.6% of the total population. Therefore, this analysis considers any study area block group with a minority population of greater than 21.9% to be a minority community.
- **Low-income populations.** This study defines low-income populations as the percent of individuals living below the poverty level in each census block group, as presented in the 2009–2013 ACS. CEQ guidance does not specify a threshold for identifying clusters of low-income populations. Therefore, for this analysis, any census block group with a percentage of low-income population at least 50% greater than the percentage in Cowlitz County as a whole was

considered a low-income community. In Cowlitz County, the low-income population (the population with incomes below the poverty level) is approximately 17.6% of the total population. Therefore, this assessment identifies low-income communities as those in which the census block group population living below the poverty level exceeds 26.4%.

Identification of Potential Disproportionately High and Adverse Effects

The determination of the Proposed Action's potential to result in disproportionately high and adverse effects involved the following considerations.

- If the adverse project impact is considered significant.
- If the impacts on minority or low-income populations would appreciably exceed, or would be likely to appreciably exceed, the risk or rate to the general population.
- If the minority or low-income population would be affected by cumulative or multiple adverse exposures from environmental hazards.[2]

In making this determination following CEQ guidance, it was recognized that effects on minority or low-income populations may be different from effects on the general population (e.g., due to a community's distinct cultural practices, such as a pattern of living that relies on subsistence fish, vegetation, or wildlife consumption). The determination of disproportionately high and adverse effects also involved consideration of proposed mitigation measures and offsetting benefits.

All resource sections in Chapters 3, 4, and 5 present the impacts resulting from construction and operation of the Proposed Action. These impacts were evaluated for their potential to result in disproportionately high and adverse effects on minority and low-income communities in the *SEPA Social and Community Resources Technical Report* (ICF and BergerABAM 2017). A summary of the evaluation is provided in Section 3.2.5, *Impacts*.

As discussed in the *SEPA Social and Community Resources Technical Report*, the assessment of disproportionately high and adverse effects on minority and low-income communities focused on potential impacts that could affect minority and low-income populations, including impacts related to aesthetics, light, and glare; air quality; cultural resources; tribal resources; fish; geology and soils; groundwater; noise and vibration; and vehicle transportation. In other resource areas, the Proposed Action would not result in adverse impacts or would result in low or minor impacts that would be avoided or minimized with standard best management practices or other mitigation measures. In certain resource areas (e.g., climate change and greenhouse gas emissions), the Proposed Action would result in impacts that occur within a global context. Based on the analysis presented in the *SEPA Social and Community Resources Technical Report*, the Proposed Action would not have the potential to result in disproportionately high and adverse effects on minority and low-income populations in these resource areas.

[2] According to CEQ guidance, the term "environmental hazard" means a chemical, biological, physical, or radiological agent, situation, or source that has the potential for deleterious effects to the environment and/or human health.

3.2.4 Existing Conditions

This section describes the existing environmental conditions related to social and community resources that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

3.2.4.1 Social and Community Cohesion and Public Services

This section describes social and community cohesion in terms of population, the various public services and social institutions that serve the community, and the access and linkages between the community and those services.

The direct impacts study area (project area and within 0.5 mile of the project area) is characterized by predominantly industrial and transportation/utility land uses, along with limited residential uses to the north of Mount Solo Road. The area east of the project area is part of a wide corridor of industrial land uses along the Columbia River. Notable uses include the Weyerhaeuser Company lumber products manufacturing site/North Pacific Paper Corporation (NORPAC) facility and Mint Farm Industrial Park. The area west of the project area is Barlow Point, which includes an undeveloped parcel owned by the Port of Longview, the closed Mount Solo Landfill, and large-lot residential and agricultural land uses south of Industrial Way. Neighborhoods in the direct impacts study area include Barlow Point, Memorial Park, and Mint Farm (City of Longview 2007).

The indirect impacts study area along the Reynolds Lead and BNSF Spur (within 0.5 mile of these rail lines) includes the Highlands neighborhood and the Industrial and California Way neighborhood in Longview. The Highlands neighborhood is predominantly residential. The Industrial Way and California Way neighborhood includes a mix of commercial and industrial uses. On the BNSF main line, the indirect impacts study area (within 0.5 mile of the rail line) includes undeveloped and low-density rural land uses, and urban areas, including Castle Rock, Kelso, Kalama, and Woodland.

Population Characteristics

Key population characteristics, including local population and population projections, are summarized below. The *SEPA Social and Community Resources Technical Report* provides a full discussion of population characteristics, including local population, population projections, age distribution, households, family composition, race and ethnicity, limited English proficiency, disability status, median household income and poverty status, and housing characteristics.

Table 3.2-2 presents the population for the direct impacts study area, Longview, and Cowlitz County in 2000, 2010, and 2013. The population of the study area has declined by approximately 3% since 2000. In comparison, the populations of both Longview and Cowlitz County grew from 2000 to 2010 and remained flat from 2010 to 2013. Census Track and Block Groups are shown in Figure 3.2-3.

Table 3.2-2. Population Estimates for Years 2000, 2010, and 2013

Area	Population 2000	Population 2010	Percent (%) Change 2000–2010	Population 2013	Percent (%) Change 2010–2013
Direct Impacts Study Area (Project Area and within 0.5 mile of the Project Area)					
Census Tract 3 Block Group 1[a]	868	509	-41.4	570	12.0
Census Tract 7.03 Block Group 1[b]	1,367	1,601	--	1,373	-14.2
Census Tract 19 Block Group 1	827	956	15.6	1,021	6.8
	3,062	**3,066**	**0.1**	**2,964**	**-3.3**
Longview	**34,660**	**36,648**	**5.7**	**36,656**	**0.0**
Cowlitz County	**92,948**	**102,410**	**10.2**	**102,110**	**-0.3**

Notes:

[a] The drop in population in this census tract is largely due to the displacement of mobile home units from 2000 to 2010. In particular, the 166-space River City RV and Mobile Home Park, located near the corner of California Way and 7th Avenue, closed in 2009 for the development of a Super Walmart.

[b] Census Tract 7.03 Block Group 1 applies to demographic data for 2010 and 2013. In the 2000 Census, this area is closely approximated by Census Tract 7.01 Block Group 4. The 2000 Census data are presented for informational purposes, but a percent change is not presented because the geographic areas are not identical.

Source: U.S. Census Bureau 2000; U.S. Census Bureau 2010; U.S. Census Bureau 2013a.

Table 3.2-3 shows Cowlitz County population projections to 2040 (Washington State Office of Financial Management 2012). The population of Cowlitz County is projected to grow by approximately 6% from 2010 to 2020. Lower growth rates are estimated from 2020 to 2040. Over the coming decades, it is projected that the age distribution in Cowlitz County will shift, with an increase in the elderly population (age 65 and over) and a decrease in the school-age population (age 0 to 17) (Cowlitz County 2015). It is also expected that the proportion of the population with a disability will increase as the share of elderly population increases.

Table 3.2-3. Cowlitz County Population Projections to 2040

Area	Population 2010	Population 2020	Population 2030	Population 2040	Percent (%) Change 2010–2040
Cowlitz County	102,410	108,588	114,158	116,897	14.1
Percent Change over Previous 10 Years	--	6.0	5.1	2.4	--

Notes:

Source: Washington State Office of Financial Management 2012.

Public Services

For the purposes of this assessment, public services include educational facilities, religious institutions, social institutions, medical facilities, fire protection and emergency medical services, police services, cemeteries, public park and recreation facilities, and other notable public services and government institutions.

There are no public service facilities in the direct impacts study area (project area and within 0.5 mile of the project area). Table 3.2-4 illustrates the public service facilities in the indirect impacts study area (within 0.5 mile of the Reynolds Lead, BNSF Spur, and BNSF main line).

Table 3.2-4. Public Service Facilities in the Indirect Impacts Study Area

	Area					
Type of Facility	**Longview**	**Kelso**	**Kalama**	**Castle Rock**	**Woodland**	**Unincorporated Cowlitz County**
Educational Facility	2	3	2	3	4	1
Religious Institution	4	11	2	6	3	6
Social Institution	1	4	1	3	3	0
Medical Facility	2	2	0	1	2	0
Fire Protection	1	2	1	1	1	2
Police Facility	1	3	1	1	1	0
Cemetery	0	0	0	0	0	3
Library	0	1	0	1	1	0
Parks and Recreation Facility	3	10	1	4	3	1
Other	7	14	2	2	2	1
Total	**21**	**50**	**10**	**22**	**20**	**14**

Access and Linkages

A variety of roadway, pedestrian, transit, and bicycle transportation facilities provide access to and among the various public service facilities. Local roadways, Interstate 5, and state highways provide access to public service facilities and between the urban areas within Cowlitz County. In general, pedestrian access is better in the downtown urban areas located along the rail line, such as in Longview and Kelso, than in more rural, suburban, and industrial areas.

River Cities Transit provides public transit throughout the Longview/Kelso area. The closest transit route to the project area is Route 31, which runs along 32nd Avenue, Washington Way, and Alabama Street into downtown Longview. The nearest portion of Route 31 is approximately 1 mile from the project area. Route 33 and Route 44 both run along Ocean Beach Highway and are approximately 1 to 2 miles from the project area. No fixed transit routes directly serve the project area, nor do any routes cross the Reynolds Lead. Frequent and comprehensive transit service is a critical support service to residents with no access to a vehicle, especially those who are low-income, homeless, and/or reliant on public transit (River Cities Transit 2015).

Within Cowlitz County, there are various bicycle trails in parks and along certain waterfront areas and in the indirect impacts study area. Several bicycle trails are located along the Columbia and Cowlitz rivers; however, there are no designated bicycle trails within the direct impacts study area (0.5 mile from the project area). The Highlands Trail is a 2-mile trail that runs along Industrial Way from Oregon Way to 32nd Avenue and Washington Way. Bicycle trails that may provide access to public services are discussed in more detail in the *SEPA Social and Community Resources Technical Report*.

Fire Protection and Emergency Medical Services

The Cowlitz 2 Fire & Rescue District and American Medical Response (AMR) provide emergency medical services and fire protection for the project area. A brief description of each of these service providers is below; additional information on the stations, facilities, and apparatus of each is provided in the *SEPA Social and Community Resources Technical Report*.

Cowlitz 2 Fire & Rescue provides fire protection services, and serves approximately 34,000 citizens in the City of Kelso and unincorporated Cowlitz County, responding to approximately 4,100 calls per year (Cowlitz 2 Fire & Rescue 2015). The district is staffed by approximately 120 full-time and volunteer members in five active fire stations, two of which are staffed with full-time EMT and paramedic firefighters. Volunteer firefighter EMTs also respond on an on-call basis.

AMR is a private ambulance company that provides emergency and non-emergency medical transport service. AMR includes approximately 35 paramedics and EMTs, and handles an average of 7,500 calls annually (American Medical Response 2015). The medical transport vehicles are based out of the facility near the Cowlitz Way intersection with Long Avenue.

3.2.4.2 Utilities

This section describes existing utility services provided to the project area. This assessment focuses on water utilities, including potable water and wastewater service, and electrical utilities. Electricity and natural gas consumption are addressed in Chapter 4, Section 4.9, *Energy and Natural Resources*. For direct impacts on utilities, the study area is the project area and the area within 0.5 mile of the project area. For indirect impacts on utilities, the study area is the area within 0.5 mile of the project area.

An existing on-site industrial wastewater treatment facility and stormwater/wastewater collection and treatment system provides wastewater treatment. The Applicant replaced pre-existing sanitary sewer collection and treatment systems with a new collection system and connection to the Longview sewer system (URS Corporation 2014). With the new connection, project area sewage flows are conveyed to the Three Rivers Regional Treatment Plant. This wastewater treatment plant has a design capacity of 26.0 million gallons per day (Washington State Department of Ecology 2012). From 2001 to 2009, the plant received an average wet-weather (typically the highest rate) flow of 3.04 million gallons per day (City of Kelso 2011).

The Mint Farm Regional Water Treatment Plant supplies drinking water to more than 45,000 people in the Longview area. Groundwater is tapped from wells in the Mint Farm Industrial Park, and the water plant consists of four high-capacity (4,000 gallons per minute) groundwater wells. The project area receives potable water from Longview through a connection on Industrial Way. This water is for domestic usage such as sinks and toilets in existing facilities (URS Corporation 2014).

For stormwater, the project area also includes on-site stormwater ponds that provide water for dust control and other production needs. The stormwater ponds are supplemented with groundwater well withdrawals during dry periods (URS Corporation 2014).

As noted in Chapter 4, Section 4.9, *Energy and Natural Resources*, the Cowlitz Public Utility District provides electricity service to the project area. The project area also includes two Bonneville Power Administration (BPA) parcels. One parcel includes high-power transmission lines and the second parcel includes a power substation with an access road.

3.2.4.3 Minority and Low-Income Populations

This section describes the existing minority and low-income populations in the study areas that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative. For direct impacts on minority and low-income populations, the study area is the project area and the area within approximately 1 mile of the project area. The study area for indirect impacts is the area within 0.5 mile of the affected rail lines in Cowlitz County.

Race, ethnicity, and poverty characteristics were compiled for the study area's block groups, Longview, and Cowlitz County as a whole. Table 3.2-5 provides the population, percent minority, and percent low-income for each block group in the study areas. Of the 46 census block groups within the study area, 16 have minority populations that exceed the 21.9% threshold, ranging from 23.7 to 42.4%. In addition, 18 of the census block groups have low-income populations that exceed the 26.4% threshold, ranging from 26.6 to 57.6%. The *SEPA Social and Community Resources Technical Report* provides detailed data on race, ethnicity, and poverty status for the study area. Overall, 21 of the study area's 46 block groups are considered minority and/or low-income communities for the purposes of this analysis. The remaining 25 block groups are not considered minority or low-income communities. Figure 3.2-4 shows the location of minority and low-income communities within the study area.

Table 3.2-5. Minority and Low-Income Status by Block Group

Census Block Group	2013 Total Population	Percent Minority[a]	Percent Low-Income[a]
Direct Impacts Study Area Census Block Groups (Project Area and Area within 1 Mile of the Project Area)			
Census Tract 3, Block Group 1	570	35.4	44.7
Census Tract 6.01, Block Group 3	1,025	42.4	32.0
Census Tract 6.01, Block Group 4	881	20.0	31.4
Census Tract 7.03, Block Group 1	1,373	15.1	23.7
Census Tract 7.04, Block Group 4	1,912	11.9	18.8
Census Tract 19, Block Group 1	1,021	2.0	23.5
Direct Impacts Study Area Census Block Groups[b]	**6,782**	**18.7**	**26.3**
Indirect Impacts Study Area Census Block Groups (Within 0.5 Mile of the Reynolds Lead, BNSF Spur, and BNSF Main Line)			
Census Tract 5.01, Block Group 1	846	24.3	24.7
Census Tract 5.01, Block Group 2	1,047	23.7	21.2
Census Tract 5.01, Block Group 3	952	8.3	18.8
Census Tract 5.02, Block Group 1	1,587	33.1	39.6
Census Tract 5.02, Block Group 2	1,841	28.1	57.6
Census Tract 5.02, Block Group 3	1,454	26.4	44.8
Census Tract 8, Block Group 6	1,203	5.2	7.7
Census Tract 9, Block Group 2	2,980	21.9	5.5
Census Tract 9, Block Group 4	1,891	11.3	8.7
Census Tract 10, Block Group 1	899	35.2	41.6
Census Tract 10, Block Group 2	288	2.1	28.5
Census Tract 11, Block Group 1	717	9.6	24.1

Census Block Group	2013 Total Population	Percent Minority[a]	Percent Low-Income[a]
Census Tract 11, Block Group 2	506	25.1	46.6
Census Tract 11, Block Group 3	704	30.5	39.2
Census Tract 11, Block Group 4	579	13.5	27.8
Census Tract 11, Block Group 5	1,361	35.9	37.5
Census Tract 11, Block Group 6	716	12.7	24.7
Census Tract 11, Block Group 7	714	16.8	33.8
Census Tract 12, Block Group 3	1,338	11.0	17.8
Census Tract 13, Block Group 1	977	3.6	21.5
Census Tract 13, Block Group 2	899	29.1	26.7
Census Tract 13, Block Group 3	752	19.9	11.7
Census Tract 13, Block Group 4	983	26.6	47.8
Census Tract 15.02, Block Group 2	934	13.8	6.2
Census Tract 15.02, Block Group 3	599	23.7	57.8
Census Tract 15.02, Block Group 4	1,602	32.8	14.0
Census Tract 15.02, Block Group 5	504	26.8	38.5
Census Tract 16, Block Group 2	881	5.3	7.7
Census Tract 16, Block Group 3	1,510	1.8	4.2
Census Tract 16, Block Group 4	1,470	17.9	11.4
Census Tract 16, Block Group 5	2,233	7.5	11.2
Census Tract 17, Block Group 1	535	0.0	10.8
Census Tract 17, Block Group 5	1,900	12.9	4.8
Census Tract 20.01, Block Group 1	847	17.7	26.6
Census Tract 20.01, Block Group 2	1,172	5.6	1.2
Census Tract 20.01, Block Group 3	1,083	4.5	3.4
Census Tract 20.02, Block Group 1	1,378	11.7	12.1
Census Tract 20.02, Block Group 2	1,294	16.1	12.1
Census Tract 20.02, Block Group 3	1,031	0.0	3.4
Census Tract 21, Block Group 3	1,164	18.0	17.7
Indirect Impacts Study Area Census Block Groups[c]	**45,371**	**17.1**	**20.4**
Longview	**36,656**	**18.4**	**22.6**
Cowlitz County	**102,110**	**14.6**	**17.6**

Notes:

Shading indicates a minority and/or low-income community. The threshold for a minority community was a percent minority of at least 21.9%. The threshold for a low-income community was a percent low-income of at least 26.4%.

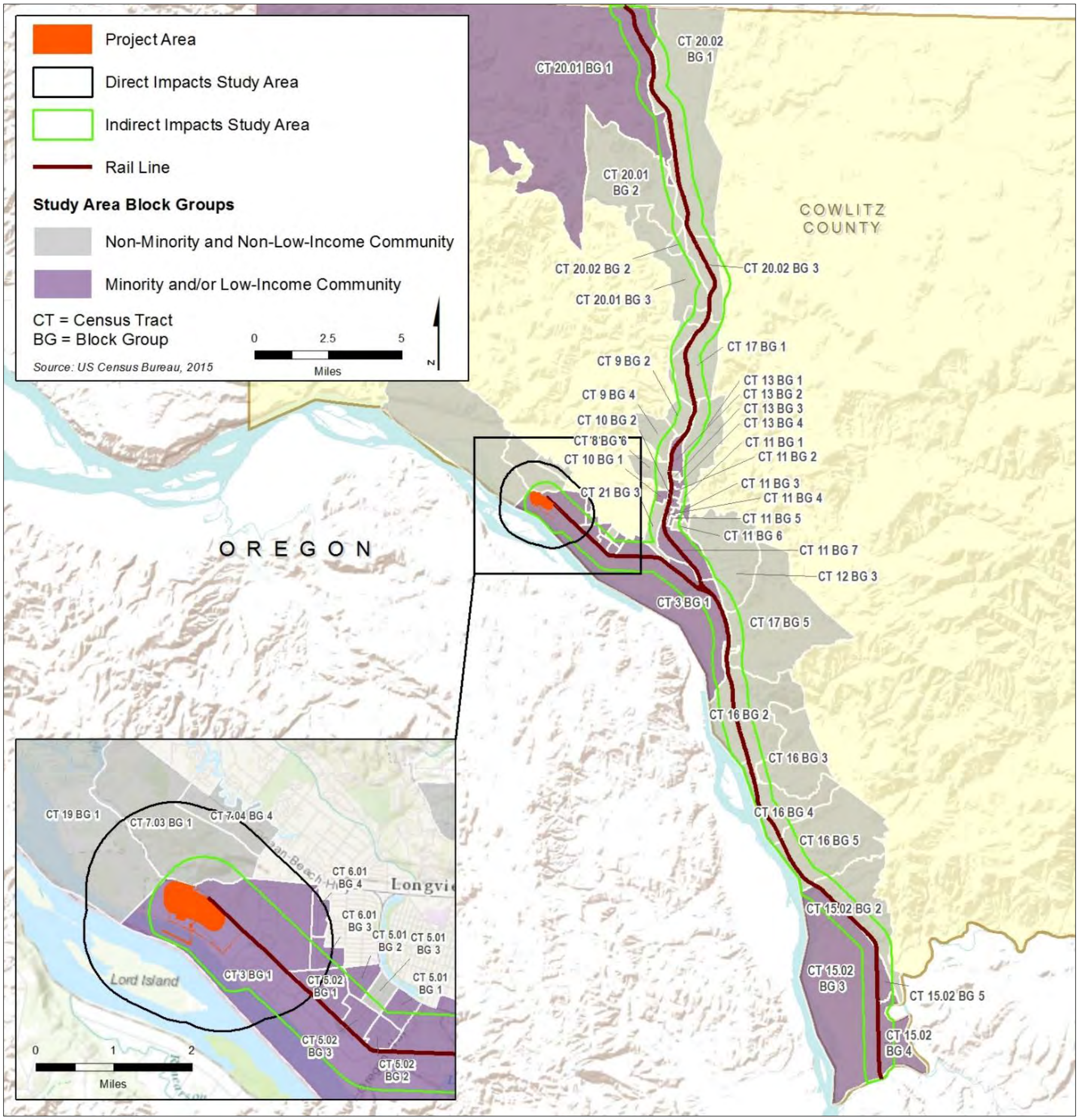
[a] Minority status includes individuals defined in the census as any race or ethnicity other than white alone and not Hispanic or Latino. Percent low-income is based on the population for whom the Census Bureau can determine poverty status. For some block groups, the population for whom poverty status is determined is slightly smaller than the total population.

[b] Census Block Groups within 1 mile of the project areas.

[c] Census Block Groups within 0.5 mile of affected rail lines in Cowlitz County.

Source: U.S. Census Bureau 2013a.

Figure 3.2-4. Minority and Low-Income Communities



Within the direct impacts study area, three of six block groups are identified as minority or low income communities. These block groups are located to the east of the project area. These block groups contain industrial uses in the areas nearest the project area, and residential uses are located approximately 1 mile or more from the project area. The nearest residences to the project area (those located north of State Route 432) are not located within a minority and/or low-income community.

Within the indirect impacts study area, 18 of 40 block groups are identified as minority or low income communities. These block groups are located along the Reynolds Lead and BNSF Spur in Longview and along the BNSF main line primarily in Longview, Kelso, and Woodland.

During interviews conducted for the Proposed Action's public involvement plan, stakeholders expressed that the Highlands neighborhood in the City of Longview warranted environmental justice consideration under Executive Order 12898. Consistent with that recommendation, this analysis identifies the Highlands neighborhood in the City of Longview as a minority and low income community. The Highlands neighborhood corresponds with Census Tract 5.02, Block Groups 1, 2, and 3, which are shown in Figure 3.2-4.

3.2.5 Impacts

This section describes the potential direct and indirect impacts related to social and community resources that would result from construction and operation of the Proposed Action and the No-Action Alternative.

The study areas for direct and indirect impacts for each element of this social and community resources are listed below.

- **Social and Community Cohesion and Public Services.** For direct impacts, the study area is the project area and the area within 0.5 mile of the project area. For indirect impacts, the study area is the area within 0.5 mile of the affected rail lines in Cowlitz County.
- **Utilities.** For direct impacts, the study area is the project area and the area within 0.5 mile of the project area. For indirect impacts, the study area is the area within 0.5 mile of the project area.
- **Minority and Low-Income Populations.** For direct impacts, the study area is the project area and the area within approximately 1 mile of the project area. For indirect impacts, the study area is the area within 0.5 mile of the affected rail lines in Cowlitz County.

3.2.5.1 Proposed Action

This section describes potential impacts that could occur in the study areas as a result of construction and operation of the Proposed Action.

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action would result in direct impacts as described below.

Social and Community Cohesion and Public Services

Construction of the Proposed Action would not directly affect social and community cohesion or public services because construction activities would be limited to the project area and there are no public service facilities in the direct impacts study area.

Utilities

Construction of the Proposed Action is not anticipated to result in direct impacts on water and sewer service. Construction activities would use groundwater for dust suppression and would not affect water utility service. Construction practices would ensure that the water supply and sewer connections are not disrupted for surrounding users.

Affect BPA-Owned Parcels

As described in *Chapter 2, Project Objectives, Proposed Action, and Alternatives*, if the Applicant obtains easements from BPA, construction of the Proposed Action would affect two BPA-owned parcels in the project area.[3] The Applicant would coordinate with BPA on potential impacts on BPA infrastructure to minimize adverse impacts.

Minority and Low-Income Populations

Direct impacts resulting from construction of the Proposed Action would be temporary and limited to the project area and the immediate vicinity (for example, construction noise directly affecting nearby residences). As discussed above, the nearest residences in minority or low-income communities in the direct impacts study area are located approximately 1 mile from the project area. Because of the distance between the project area and identified minority and low-income communities, the direct construction impacts of the Proposed Action would not affect minority or low-income communities at a rate that would appreciably exceed the rate to the general population. Therefore, the analysis concluded that the direct impacts resulting from construction of the Proposed Action would not have a disproportionately high and adverse effect on minority and low-income communities.

Construction—Indirect Impacts

Construction-related activities associated with the Proposed Action would result in indirect impacts as described below.

Social and Community Cohesion and Public Services

As described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, construction materials would be delivered to the project area by truck or rail (truck delivery and rail delivery scenarios). As described in Chapter 5, Section 5.3, *Vehicle Transportation*, construction activities would not adversely affect vehicle delay at at-grade crossings on the Reynolds Lead, BNSF Spur, and BNSF main line because average vehicle delay would not substantially change during construction, except during the peak traffic hour at two public at-grade crossings on the Reynolds Lead under the rail delivery scenario. This vehicle delay impact would only occur if a Proposed Action-related construction train (average of 1.3 train trips per day) passes during the peak traffic hour. If a public

[3] This impact would occur if BPA grants an easement to the Applicant prior to construction of the Proposed Action. The impact would not occur if BPA sells the land to the Applicant prior to construction.

service vehicle arrives at the same time as a Proposed Action-related train along the Reynolds Lead, it would experience an approximate 9-minute delay. Therefore, vehicle delay during construction of the Proposed Action would have negligible impacts on social and community cohesion and access to public services.

Construction of the Proposed Action under the rail delivery scenario would increase delay for pedestrians and bicyclists as described below.

Affect Pedestrian and Bicyclist Travel

Proposed Action-related construction trains under the rail delivery scenario would cause pedestrian and bicyclist delay at at-grade crossings if pedestrians or bicyclists are blocked by a Proposed Action-related construction train. Alternative routes would require out-of-direction travel. The amount of delay would depend on when a pedestrian or bicyclist arrives at the crossing. If a pedestrian or bicyclist arrives at the same time as a Proposed Action-related construction train, they could experience approximately 9 minutes of delay at the public at-grade crossings along the Reynolds Lead. Pedestrians and bicyclists could also be affected by motor vehicle congestion and queuing at intersections adjacent to the at-grade crossings. Vehicle queuing at at-grade crossings could spill into the adjacent intersections and reduce or block sight distance for pedestrians and bicyclists. There would be no change in delay to pedestrian and bicycle travel at at-grade crossings on the Reynolds Lead if construction materials are delivered by truck (truck delivery scenario).

Utilities

Demand for water and sewer utility services during construction of the Proposed Action would be confined to activities in the project area. Construction of the Proposed Action would not result in new indirect demands on water supply, sewer utility services, or wastewater treatment. Therefore, construction of the Proposed Action would not result in indirect impacts on utilities.

Minority and Low-Income Populations

As noted above, the assessment of disproportionately high and adverse effects on minority and low-income communities focused on potential impacts related to aesthetics, light, and glare; air quality; tribal resources; cultural resources; fish; geology and soils; groundwater; noise and vibration; and vehicle transportation. The Proposed Action would not result in indirect construction impacts in any of these resource areas except vehicle transportation. As described in Chapter 5, Section 5.3, *Vehicle Transportation*, construction of the Proposed Action would result in an indirect impact related to increased vehicle delay from construction rail traffic during the peak traffic hour at two public at-grade crossings on the Reynolds Lead under the rail delivery scenario. The vehicle delay impacts would only occur if a Proposed Action-related construction train (average of 1.3 train trips per day) travels during the peak traffic hour and would be temporary (limited to the peak traffic hour during the construction period). Therefore, the analysis concluded that the indirect impacts resulting from construction of the Proposed Action would not have a disproportionately high and adverse effect on minority and low-income populations.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Social and Community Cohesion and Public Services

Operation of the Proposed Action would not divide or isolate neighborhoods because operations would be confined to the project area, nor would it lead to the displacement of substantial portions of the existing community. Operations also would not physically displace or alter any public service facility, but it would place new demands on fire protection services, as discussed below.

Place New Demands on Fire Protection Services

The Proposed Action would place new demands on Cowlitz 2 Fire & Rescue protection services. Required fire and life safety systems would be installed in the project area according to fire code standards. These systems would be regularly inspected and maintained. The Applicant would also maintain a surface water storage pond with a reserve of 0.36 million gallons for fire suppression.

Utilities

The Proposed Action would directly affect water and sewer utilities and electrical utilities. Operation of the Proposed Action would result in the following direct impacts.

Affect BPA-Owned Parcels

As described in *Chapter 2, Project Objectives, Proposed Action, and Alternatives*, if the Applicant obtains an easement from BPA, operation of the Proposed Action would be located on two BPA-owned parcels within the project area. The Applicant would coordinate with BPA to minimize adverse impacts.[4]

Create New Sanitary Sewage Flows

As described in Section 3.2.4.3, *Utilities,* the project area and the Applicant's leased area are served by a sanitary sewer collection system and connection to the Longview sewer system. A new sanitary sewer conveyance system and connection to the Longview sewer system would be developed under the Proposed Action. New sanitary sewer flows from the Proposed Action would be small. The Three Rivers Wastewater Treatment Plant has sufficient capacity to treat additional wastewater flows generated by the Proposed Action. The Applicant would be required to obtain a permit to discharge wastewater, as described in Section 3.2.6, *Required Permits*.

The Proposed Action would not convey industrial process wastewater to the Longview sewer system or the Three Rivers Wastewater Treatment Plant. Industrial process wastewater would be treated in the on-site water treatment facility, used on site, and would not add new demands to public sewer and wastewater utilities.

Create New Water Demand

The Proposed Action would use potable municipal water supplies for domestic uses such as drinking, sinks, and toilets. The Proposed Action would not use potable water supplies for

[4] This impact would occur if BPA grants an easement to the Applicant prior to construction of the Proposed Action. The impact would not occur if BPA sells the land to the Applicant prior to construction.

industrial needs. Therefore, the Proposed Action would result in a small increase in demand for potable water.

Non-potable water would be used for industrial processes such as dust control, stockpile sprays, wash down, clean up, and fire protection. This water would be supplied by treated water from the proposed water management system and storage ponds and supplemented by wells during dry seasons. Therefore, the industrial water use would not place new demands on the Longview water supply.

Minority and Low-Income Populations

Direct impacts resulting from operation of the Proposed Action would be limited to the project area and the immediate vicinity (for example, operational noise directly affecting adjacent residences). As discussed above, the nearest residences in minority or low-income communities within the direct impacts study area are located approximately 1 mile from the project area. Because of the distance between the project area and identified minority and low-income communities, the direct impacts of the Proposed Action during operations would not likely have the potential to affect minority or low-income communities at a rate that would appreciably exceed the rate to the general population. Therefore, the analysis concluded that the direct impacts resulting from operation of the Proposed Action would not likely have a disproportionately high and adverse effect on minority and low-income populations.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts.

Social and Community Cohesion and Public Services

Operation of the Proposed Action would result in the following indirect impacts on social and community cohesion, and public services.

Affect Accessibility to Community Resources and Public Services

As described in Chapter 5, Section 5.3, *Vehicle Transportation*, Proposed Action-related trains would not adversely impact daily average vehicle delay at public at-grade crossings on the Reynolds Lead, BNSF Spur, and BNSF main line because average vehicle delay would not change substantially. Peak traffic hour vehicle delay would also not be adversely affected if track improvements are made to the Reynolds Lead and BNSF Lead (as described in Chapter 5, Section 5.1, *Rail Transportation*)[5] and only one Proposed Action-related train travels during the peak traffic hour. Therefore, under these scenarios, accessibility to social and community resources and public services would not change substantially under the Proposed Action.

However, if two Proposed-Action trains travel during the peak traffic hour, or infrastructure improvements are not made to the Reynolds Lead and BNSF Spur (as described in Chapter 5, Section 5.1, *Rail Transportation*), vehicle delay would substantially change at six public at-grade

[5] The owner of the Reynolds Lead and BNSF Spur has indicated that track improvements would be made, but these plans have not been submitted or permitted.

crossings along the Reynolds Lead and BNSF main line during the peak traffic hour.[6] These vehicle delay impacts would be temporary (limited to the peak traffic hour), and the probability for two trains to pass during the peak vehicle traffic hour would be low. Under these scenarios, Proposed Action-related trains would adversely affect the accessibility to community resources and public services at selected public at-grade crossings on the Reynolds Lead, BNSF Spur, and BNSF main line.

Affect Pedestrian and Bicyclist Travel

Proposed Action-related trains would cause pedestrian and bicyclist delay at at-grade crossings if pedestrians or bicyclists are blocked by a Proposed Action-related train. Alternative routes would require out-of-direction travel. The amount of delay would depend on when a pedestrian or bicyclist arrives at the crossing. If a pedestrian or bicyclist arrives at the same time as a Proposed Action-related train, they could experience approximately 10 minutes of delay at the public at-grade crossings along the Reynolds Lead with current track infrastructure. Pedestrians and bicyclists could also be affected by motor vehicle congestion and queuing at intersections adjacent to the at-grade crossings. Vehicle queuing at at-grade crossings could spill into the adjacent intersections and reduce or block sight distance for pedestrians and bicyclists.

Increase Noise Levels in Archie Anderson Park, Highlands Trail, and Gerhart Gardens Park

Proposed Action-related trains would increase rail traffic-related noise levels in Archie Anderson Park, along the Highlands Trail, and in Gerhart Gardens Park, all of which are located within 1,000 feet of the Reynolds Lead or BNSF Spur. The increased noise levels could reduce the attractiveness of the features in these parks that are more sensitive to increased noise levels, such as picnic facilities and sitting areas. Archie Anderson Park, the Highlands Trail, and Gerhart Gardens also include features that are not particularly sensitive to increased noise levels (e.g., facilities that are used for sports, exercise, or active play), such as walking and running trails, baseball fields, and basketball courts.

Increased noise levels would occur because Proposed Action-related trains would be required to sound their horns for public safety at at-grade crossings per Federal Railroad Administration (FRA) regulations.

Utilities

Operation of the Proposed Action would not result in indirect impacts on water and sewer utilities because demand for these utilities would be limited to the project area.

Minority and Low-Income Populations

The Proposed Action's indirect impacts during operations were evaluated for their potential to result in disproportionately high and adverse effects on minority and low-income communities in the *SEPA Social and Community Resources Technical Report*. The assessment concluded the indirect impacts related to noise, vehicle delay along the Reynolds Lead, and diesel particulate matter

[6] The public at-grade crossings are Industrial Way, Oregon Way, California Way, and 3rd Avenue on the Reynolds Lead, and Mill Street and S River Road on the BNSF main line. See Chapter 5, Section 5.3, *Vehicle Transportation*, for additional information.

inhalation risk would affect minority or low-income communities at a rate that would appreciably exceed the rate to the general population. Each of these potential disproportionate impacts is discussed below.

Noise

The analysis concluded that horn noise from Proposed Action-related trains on the Reynolds Lead during operations would have a disproportionately high and adverse effect on minority and low-income populations. Proposed mitigation measures are discussed in the mitigation section below. Indirect noise impacts would occur because Proposed Action-related trains would be required to sound their horns for public safety at at-grade crossings per FRA regulations, and noise levels would exceed applicable criteria at adjacent land uses near four at-grade crossings on the Reynolds Lead (Chapter 5, Section 5.5, *Noise and Vibration*). Because there are minority and low-income communities adjacent to the Reynolds Lead (Figure 3.2-4),[7] the Proposed Action would have a disproportionately high and adverse effect on minority and low-income populations if no measures were implemented to mitigate this indirect noise impact. As described in Chapter 5, Section 5.5, *Noise and Vibration*, indirect noise impacts from Proposed Action-related trains on the BNSF main line in Cowlitz County would not be expected, and therefore, the Proposed Action would not likely have a disproportionately high and adverse effect on minority and low-income populations along the BNSF main line in Cowlitz County.

Vehicle Delay

With the current track infrastructure on the Reynolds Lead, a Proposed Action-related train traveling during the peak traffic hour would result in a vehicle delay impact at four public at-grade crossings—Industrial Way, Oregon Way, California Way, and 3rd Avenue—in minority and low-income areas in 2028 (Figure 3.2-4). These vehicle delay impacts would constitute a disproportionately high and adverse effect on minority and low-income populations. The disproportionate impacts related to vehicle delay would not occur if the planned improvements to the Reynolds Lead are completed.

Diesel Particulate Matter Inhalation Risk

Based on the inhalation-only health risk assessment described in Chapter 5, Section 5.6, *Air Quality*, diesel particulate matter emissions primarily from Proposed Action-related train locomotives traveling along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County would result in areas of increased cancer risk. The maximum modeled cancer risk increase in the City of Longview would be 50 cancers per million in the Highlands neighborhood, a low-income and minority community. This impact would constitute a disproportionately high and adverse effect on minority and low-income populations.

3.2.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses including an expanded bulk product

[7] There are approximately 242 residences in Census Tract 3 Block Group 1, Census Tract 5.02 Block Group 1, and Census Tract 5.02 Block Group 2. All of these census block groups have been identified as minority and/or low-income communities.

terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

Social/Community Cohesion and Public Services

Construction activity under the No-Action Alternative would not result in direct impacts on social and community cohesion or public services. Construction activities would be limited to the project area, and therefore, would not divide or isolate neighborhoods or disrupt community cohesion.

Operation of the No-Action Alternative would not divide or isolate neighborhoods because any new facilities would be constructed on an existing industrial site within a wide corridor of similar industrial uses, and operations would not physically displace or alter any public service facility. Therefore, operation of the No-Action Alternative would not result in direct impacts on social and community cohesion and public services.

Operation of the No-Action Alternative would not result in indirect impacts on social and community cohesion as a result of changes to property values or by generating substantial new development. The No-Action Alternative is located on an existing industrial site within a larger industrial area, and would use an existing freight rail line. Therefore, operation of the No-Action Alternative would not constitute a new land use with the potential to change property values substantially or induce new development in the surrounding area. In addition, the No-Action Alternative would not result in the introduction of a new population that could place demands on public service providers. The No-Action Alternative would not be expected to affect vehicle delay, and therefore, would not affect social and community cohesion and public services.

Utilities

Construction of the No-Action Alternative is not anticipated to result in direct impacts on water and sewer service. Operation of the No-Action Alternative could result in new sanitary sewage flows and new water demand from the project area. The Three Rivers Wastewater Treatment Plant has sufficient capacity to treat additional wastewater flows, and it is expected that any new demand for potable water would be small compared to the capacity of the Longview water supply. Water used for industrial purposes, such as dust control, would continue to be drawn from stormwater ponds and supplemented with groundwater well withdrawals during dry periods.

Minority and Low-Income Populations

The No-Action Alternative would increase rail operations along the Reynolds Lead as described in Chapter 2, Section 2.3, *No-Action Alternative.* Noise levels under the No-Action Alternative would be higher than under existing conditions, but would not result in noise impacts, as described in Section 5.5, *Noise and Vibration*. As described in Chapter 5, Section 5.3, *Vehicle Transportation*, and Section 5.6, *Air Quality*, the No-Action Alternative would not result in peak traffic hour vehicle delay impacts at the at-grade crossings on the Reynolds Lead, nor would it cause a substantial change in air quality or adversely affect nearby population areas. Effects on other environmental resource areas under the No-Action Alternative would generally be similar to or less than impacts under the Proposed Action. Therefore, the No-Action Alternative would not have disproportionately high and adverse effects on minority and low-income populations.

3.2.6 Required Permits

The Proposed Action would require the following permits.

- **Wastewater Discharge Permit—Three Rivers Regional Wastewater Authority**. This permit would be required to discharge wastewater to the Three River Regional Wastewater Treatment Plant. A survey form would be completed first to allow the Three Rivers Regional Wastewater Authority to determine whether a permit is required.
- **Utility Service Permit—City of Longview.** The project area receives potable water from the City of Longview through a connection on Industrial Way. This permit would be required to receive water service and to convey wastewater flows via the City of Longview's system.

3.2.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts on social and community resources from the construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

3.2.7.1 Voluntary Mitigation

The Applicant has committed to implementing the following measures to mitigate impacts on social and community resources.

- To reduce rail noise along the Reynolds Lead, the Applicant will work with Longview Switching Company and other stakeholders to convert the Oregon Way and Industrial Way crossings to "quiet crossings." The Applicant will fund additional electronics, barricades, and crossing gates to convert the crossings to "quiet crossings." A Quiet Zone is subject to FRA approval. If approved by FRA, this measure would reduce noise levels at Archie Anderson Park and along the Highlands Trail.
- Prior to beginning operations, the Applicant will prepare a fire response plan and submit the plan to the Cowlitz County Fire Marshal for review and approval.
- The Applicant will feed the firewater system from on-site wells, filling a 4-hour storage tank as recommended by Chapter 7 of the National Fire Protection Association 307 Standard for the Construction of Fire Protection of Marine Terminals, Piers, and Wharves.

3.2.7.2 Applicant Mitigation

The following proposed mitigation measures identified in Chapter 5, Sections 5.3, *Vehicle Transportation*, and 5.5, *Noise and Vibration*, to mitigate impacts on vehicle transportation and noise would also mitigate the disproportionately high and adverse noise effects on minority and low-income populations.

If approved by FRA, the following measure would reduce noise levels at Archie Anderson Park and along the Highlands Trail. It would also eliminate the disproportionately high and adverse noise effects on minority and low-income populations.

MM NV-2. Support Implementation of a Quiet Zone along the Reynolds Lead.

To address moderate and severe noise impacts along the Reynolds Lead due to rail traffic, before beginning full operations, the Applicant will coordinate with the City of Longview, Cowlitz County, Longview Switching Company, and the affected community to inform interested parties on the FRA process to implement a Quiet Zone that will include the 3rd Avenue and California Avenue crossings. Public outreach on the Quiet Zone process will include low-income and minority populations. The Applicant will assist interested parties in the preparation and submission of the Quiet Zone application to FRA. If the Quiet Zone is approved, the Applicant will fund the Quiet Zone improvements, which could include electronics, barricades, and crossing gates.

If FRA does not approve the Quiet Zone for the Reynolds Lead, the Applicant will implement the following measure.

MM NV-3. Explore Feasibility of Reducing Sound Levels.

If the Quiet Zone for the Reynolds Lead is not implemented, the Applicant will fund a sound reduction study to identify ways to mitigate the moderate and severe impacts from train noise from Proposed Action-related trains along the Reynolds Lead. The study methods will be discussed with Cowlitz County, Ecology, and Washington State Department of Health for approval.

The following proposed mitigation measure could reduce but would not eliminate the disproportionately high and adverse vehicle delay effects on minority and low-income populations.

MM VT-1. Notify Local Agencies about Operations on the Reynolds Lead and BNSF Spur.

To address vehicle delay impacts at grade crossings on the Reynolds Lead and BNSF Spur, the Applicant will notify Cowlitz County, City of Longview, Cowlitz Fire District, City of Rainier (Oregon), Port of Longview, and Cowlitz-Wahkiakum Council of Governments before each identified operational stage (Stage 1a, Stage 1b, and Stage 2) that will change average daily rail traffic on the Reynolds Lead and BNSF Spur. The Applicant will prepare a memorandum to document the changes to average daily rail traffic. The memorandum will be submitted to these agencies at least 6 months before the change in average daily rail traffic.

3.2.8 Unavoidable and Significant Adverse Environmental Effects

Implementation of the voluntary and applicant mitigation measures identified above would reduce impacts on social and community resources and minority and low-income populations. There would be no unavoidable and significant adverse environmental impacts on social and community cohesion and public services or utilities (two of the three elements of the social and community resources analysis).

Implementation of the Proposed Action would increase rail traffic that would increase noise levels along the Reynolds Lead and BNSF Spur in Cowlitz County. The increased noise levels from 16 Proposed Action-related train trips per day would exceed applicable criteria for noise impacts at noise-sensitive receptors. Noise impacts would occur near at-grade crossings on the Reynolds Lead (Industrial Way, Oregon Way, California Way, and 3rd Avenue) from train horn noise intended for public safety. These noise impacts would occur in areas with minority and low-income populations; therefore, the Proposed Action would have a disproportionately high and adverse effect on minority and low-income populations. If a Quiet Zone is implemented, it would eliminate the need for Proposed Action-related trains to sound horns as they approach the at-grade crossings, and it would eliminate the potential disproportionately high and adverse effect on minority and low-income populations. However, without approval and implementation of a Quiet Zone, the Proposed Action's disproportionately high and adverse noise effects on minority and low-income populations would be unavoidable and significant.

With the current track infrastructure on the Reynolds Lead, a Proposed Action-related train traveling during the peak traffic hour would result in a vehicle delay impact at four public at-grade crossings—Industrial Way, Oregon Way, California Way, and 3rd Avenue—in minority and low-income areas in 2028. This would constitute a disproportionately high and adverse effect on minority and low-income populations. The disproportionate impacts related to vehicle delay would not occur with planned improvements to the Reynolds Lead. Without the planned improvements to the Reynolds Lead, the Proposed Action's disproportionately high and adverse vehicle delay effects on minority and low-income populations would be unavoidable and significant.

Use of Tier 4[8] locomotives by BNSF and UP would reduce but not eliminate the disproportionately high and adverse effects in the Highlands neighborhood related to increased risk of greater than 10 cancers per million from diesel particulate matter inhalation. This impact would be unavoidable and significant.

3.2.9 Public Outreach and Participation Process

Cowlitz County and the Washington State Department of Ecology (Ecology) engaged in a robust public outreach effort. The primary components of this effort were two formal comment periods required by the State Environmental Policy Act (SEPA): 1) the scoping phase comment period, and 2) the Draft Environmental Impact Statement (Draft EIS) comment period. A public involvement plan developed for the SEPA process guided the public outreach effort.

Population demographics regarding minority status and limited English proficiency also informed the public outreach effort. Table 3.2-6 shows the percentage of the population over age 5 with limited English proficiency in the social and community cohesion direct impacts study area, Longview, and Cowlitz County. In all three areas, a low percentage of the population over age 5 has limited English proficiency; approximately 3% of the population of the direct impacts study area, the City of Longview, and Cowlitz County have limited English proficiency.

[8] Locomotives that are compliant with EPA locomotive emissions standards that went into effect in 2015.

Table 3.2-6. 2013 Limited English Proficiency

Area	Population Age 5 and Over	Population Age 5 and Over with Limited English Proficiency[a]	Percentage Population with Limited English Proficiency[a]
Social and Community Cohesion Direct Impacts Study Area[b]	2,754	90	3.3
Longview	34,354	1,194	3.5
Cowlitz County	95,579	2,939	3.1

Note:

[a] Limited English proficiency includes individuals who speak English less than very well (i.e. those identified as speaking English "well," "not well," or "not at all" in Census data).

[b] The project area and within 0.5 mile of the project area.

Source: U.S. Census Bureau 2013a.

Table 3.2-7 shows the minority percentage of the population in the minority and low-income direct and indirect impacts study areas, City of Longview, and Cowlitz County. As shown, both the direct and indirect impacts study areas and the City of Longview have higher percentages of minority population that Cowlitz County.

Prior to the scoping meeting, stakeholder interviews were conducted to guide planning for the scoping process. These interviews were conducted with stakeholders representing a diverse range of interests and demographics including city and county jurisdictions, environmental and conservation groups, landowner organizations, labor organizations, economic development and business organizations, port authorities, river pilots, and local community groups. A project website was also developed (www.millenniumbulkeiswa.gov) providing information in English and Spanish. This website serves as an information hub, a public-comment portal, and a document review and download repository throughout development of the EIS. The website was promoted in news releases, ads in local media, and printed project information.

Table 3.2-7. 2013 Minority Status

Census Block Group	2013 Total Population	Percent Minority[a]
Direct Impacts Study Area Census Block Groups[b]	6,782	18.7
Indirect Impacts Study Area Census Block Groups[c]	45,371	17.1
Longview	**36,656**	**18.4**
Cowlitz County	**102,110**	**14.6**

Notes:

[a] Minority status includes individuals defined in the census as any race or ethnicity other than white alone and not Hispanic or Latino.

[b] Census Block Groups within 1 mile of the project areas.

[c] Census Block Groups within 0.5 mile of affected rail lines in Cowlitz County.

Source: U.S. Census Bureau 2013a.

The public scoping meetings were announced in various publications. Notices were published in the *Federal Register* and Washington State Register, and the co-lead agencies also issued a press release. Display ads were placed in local newspapers where scoping meetings were held, including *The Spokane Spokesman-Review*, *The Tri-City Herald* (Pasco), *The Columbian* (Vancouver/Clark County), *The Longview Daily News*, and *The Tacoma News-Tribune*. Announcements were also sent to a listserv group consisting of parties who have requested to be informed about project activities, and an informational flyer was mailed to 6,000 residents in neighborhoods near the project area, including the Highlands neighborhood in Longview. A Spanish translation of the informational flyer was also distributed.

Cowlitz County and Ecology held five scoping meetings to receive SEPA-related scoping comments. Scoping meetings were held on the following dates and locations.

- September 17, 2013, in Longview
- September 25, 2013, in Spokane
- October 1, 2013, in Pasco
- October 9, 2013, in Ridgefield
- October 17, 2013, in Tacoma

All meetings used an open-house format to provide process information for the Draft EIS and details about the Proposed Action, and to receive comments on the scope of the Draft EIS. In total, the co-lead agencies received over 217,500 scoping comments. Spanish-language handouts and Spanish translation services were available at each meeting. All facilities were Americans with Disabilities Act-accessible.

Cowlitz County and Ecology held three public hearings to receive comments on the Draft EIS. The public hearings were held on the following dates and locations.

- May 24, 2016, in Longview
- May 26, 2016, in Spokane
- June 2, 2016, in Pasco

Each public hearing included an open house, which allowed the public to interact with agency representatives and to access information about the SEPA EIS process as well as details about the Proposed Action. Spanish-language handouts and Spanish translation services were available at each public hearing. All facilities were Americans with Disabilities Act-accessible. In total, the co-lead agencies received approximately 267,000 comments during the Draft EIS comment period. Volume IV of this Final EIS includes responses to comments on the Draft EIS.

More information about public outreach can be found in Chapter 7, *Public Involvement and Agency Coordination,* of this Final EIS.

3.3 Aesthetics, Light, and Glare

The aesthetic value of an area is based on the visual character and quality of the natural and human-made features of the site. It is also a function of viewers' perceptions of these features, which can vary according to how sensitive the viewer is and how much they are exposed to certain views. In a developed area, light and glare can also affect the visual landscape by detracting from the aesthetic quality and by interfering with adjacent land uses. For example, increased nighttime lighting can be a nuisance to adjacent residents if the lighting is bright enough.

This section describes the aesthetics, light, and glare in the study area. It then describes impacts on aesthetics that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

3.3.1 Regulatory Setting

No local, state, or federal laws or regulations pertaining to aesthetics, light, and glare apply to the Proposed Action.

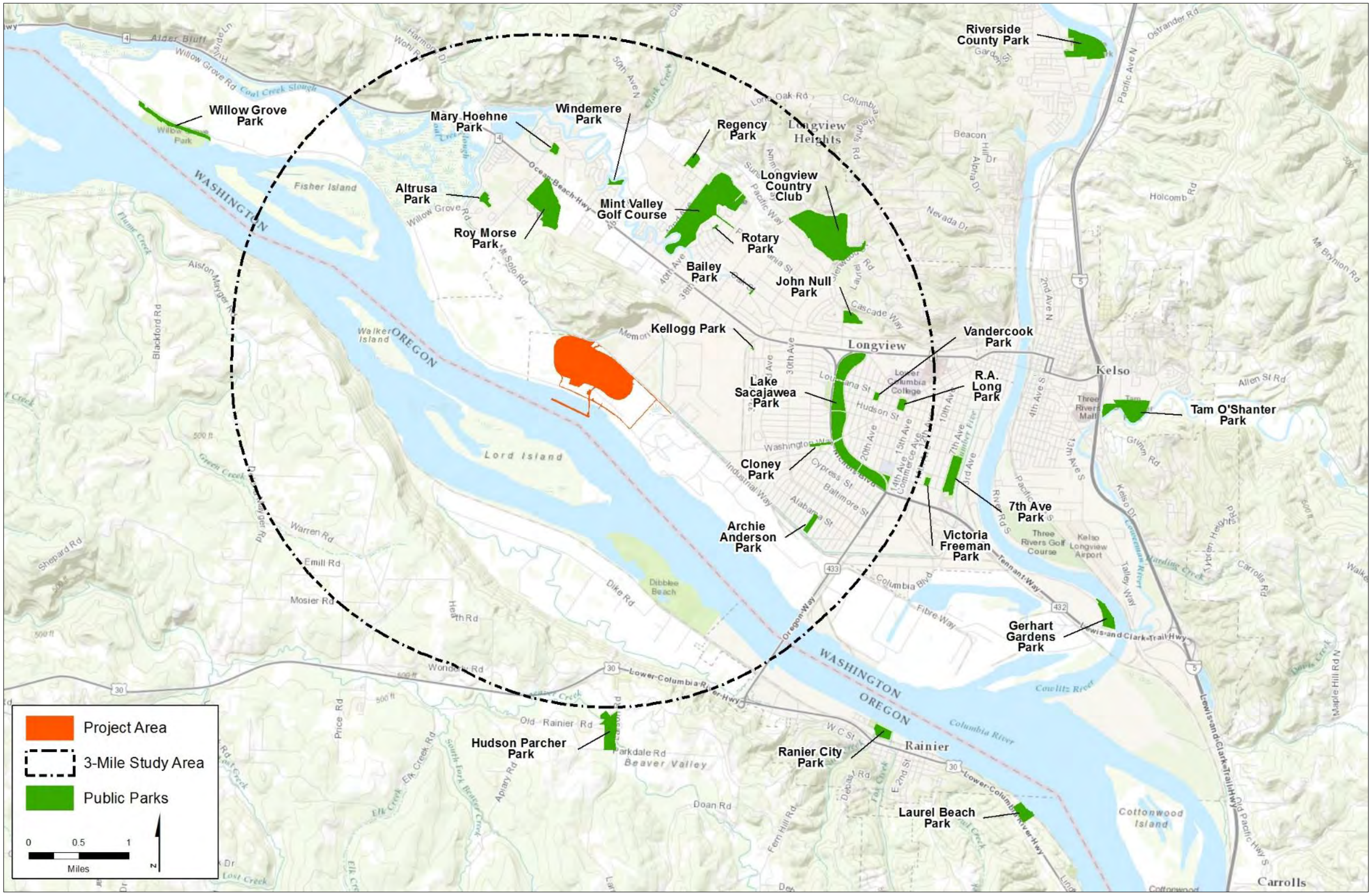
3.3.2 Study Area

The study area for aesthetics, light, and glare is the area within visual range of the project area for the Proposed Action. This study area encompasses ground-based locations from which the activities and structures on the project area could be observed in detail (Bureau of Land Management 1986). The Proposed Action would be observable by viewers at ground-based locations within approximately 3 miles of the project area. Beyond 3 miles, the Proposed Action would blend into the visual background and be obscured by the area's topography, vegetation, and built environment. The study area is, therefore, defined as the area within a 3-mile radius of the project area (Figure 3.3-1).

3.3.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on aesthetics associated with the construction and operation of the Proposed Action and No-Action Alternative.

Figure 3.3-1. Study Area for Aesthetics, Light, and Glare



3.3.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on aesthetics in the study area.

- *Landscape Aesthetics, A Handbook for Scenery Management* (U.S. Forest Service 1995)
- *Visual Impact Assessment for Highway Projects* (Federal Highway Administration 1988)
- *The Visual Resource Management System* (Bureau of Land Management 1986)

Although these agency guides are tailored to fit the general types of projects falling within each agency's jurisdiction and are not directly applicable to the Proposed Action, the visual impact assessment methods they contain were appropriate to inform the methods used in this section.

3.3.3.2 Impact Analysis

Visual impact assessments are based on evaluations of visual quality and viewer sensitivity. Viewer sensitivity is considered in the context of reasonable expectations for views of a heavily industrialized area. The following levels of impact were used to assess visual impacts.

- **High level of impact (H).** Operations, buildings, or other structures would be highly visible to a large number of sensitive viewers and would affect the visual quality of the landscape negatively.[1] Mitigation measures may or may not reduce this level of impact.
- **Moderate level of impact (M).** Operations, buildings, or other structures would be visible to a moderate number of sensitive viewers. Project elements may be generally consistent with adjacent land uses. Some mitigation may be required to reduce this level of impact.
- **Low level of impact (L).** Operations, buildings, or other structures would be minimally visible to a low number of viewers. Distance or visual compatibility with other existing land uses would make project elements difficult to perceive.
- **No impact (N)**. Operations, buildings, or other structures would not be visible or would have no impact on viewers.

The following process was used to evaluate the potential impacts of the Proposed Action and No-Action Alternative for aesthetics.

1. Define the viewshed area.
2. Determine the key viewpoints of the project area.
3. Determine the types of viewers or viewer groups with views of the project area and their relative sensitivity to the changes in aesthetic conditions.
4. Prepare visual simulations of the Proposed Action.

[1] The number of sensitive viewers is relative to the total potential viewers of the project area. In this case, the total potential viewers are the residents, workers, and travelers in the 3-mile study area. A *large* number of viewers applies to viewpoints where many of the total viewers would have views of the project area. A *low* number of viewers applies to viewpoints where very few of the total viewers would have views of the project area. A *moderate* number of viewers applies to viewpoints where a number of the total viewers would have views of the project area.

The methods for each step are summarized in this section. The *SEPA Aesthetics, Light, and Glare Technical Report* (ICF and BergerABAM 2017) provides a full discussion of each step.

Define the Viewshed

A viewshed is the area within visual range of a given viewpoint (i.e., the viewer's location) which is defined by the regional physiography, vegetation, and built environment. The viewshed from which aesthetic changes on the project area could be experienced was determined by consulting city and county maps, U.S. Geological Survey quadrangle maps, project maps, and aerial and project area photographs. These helped to show which large-scale physiographic features in the study area influence views of the project area and define the visual environment. A digital elevation model was then used to identify the viewshed of the project area for the Proposed Action based on topographic screening (excluding vegetation) (Figure 3.3-2). Viewpoints were selected within the viewshed. As shown in Figure 3.3-2, the viewshed encompasses most areas in the Columbia River floodplain to the west, south, and east of the project area. Views from the north are obstructed by the topography, of Mount Solo.

The viewshed determination is a screening-level assessment that accounts only for topography in determining which locations may have views of the project area. The selection of the viewpoints themselves accounts for vegetation and the built environment.

Determine Key Viewpoints

Eleven viewpoints were identified from which views of the project area could be altered by the Proposed Action (Figure 3.3-3).

The assessment involved verifying views at each viewpoint and using a high-resolution digital single-lens reflex camera with a 50-millimeter lens to take daytime and nighttime photographs. A sequence of photographs was taken at the height of an average viewer's eye (5 feet 5 inches above ground level) and digitally grouped together to form panoramas to approximate what the human eye would see at each viewpoint. Based on the existing land uses and environmental conditions at the viewpoints, the assessment classified views of the project area into three categories: urban and industrial, rural and residential, and natural views.

- **Urban and industrial views**. Viewers in this landscape view the project area in the context of existing urban and industrial areas.
- **Rural and residential views.** Viewers in this landscape view the project area in the context of a mixture of surrounding natural and human-made features and patterns, including land used for housing, farming, mineral extraction, or forestry.
- **Natural views**. Viewers in this landscape view the project area in the context of surrounding natural features and a largely undisturbed rural or open space setting. Few human-made developments or disturbances are present.

Figure 3.3-2. Viewshed Determination

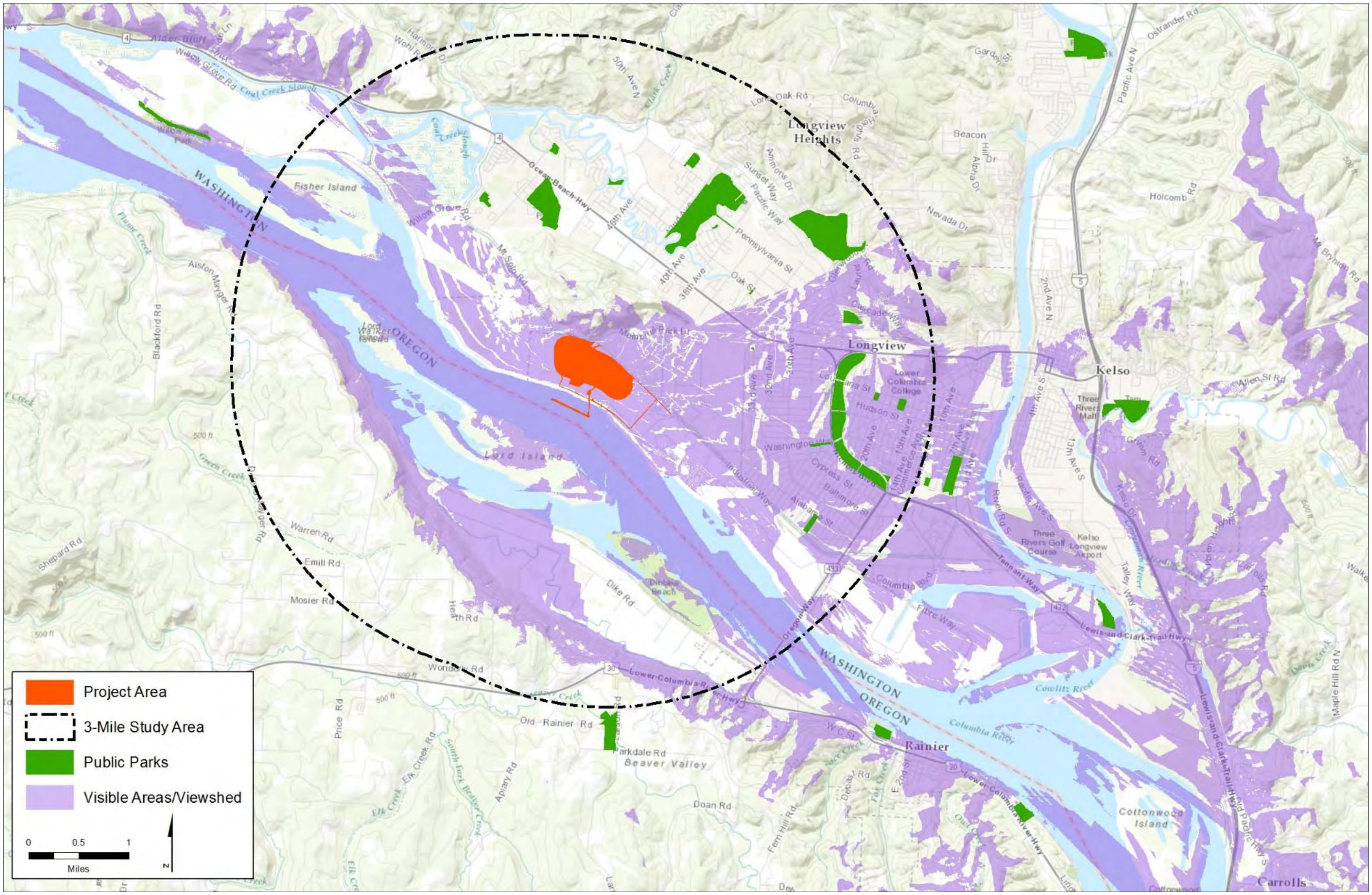
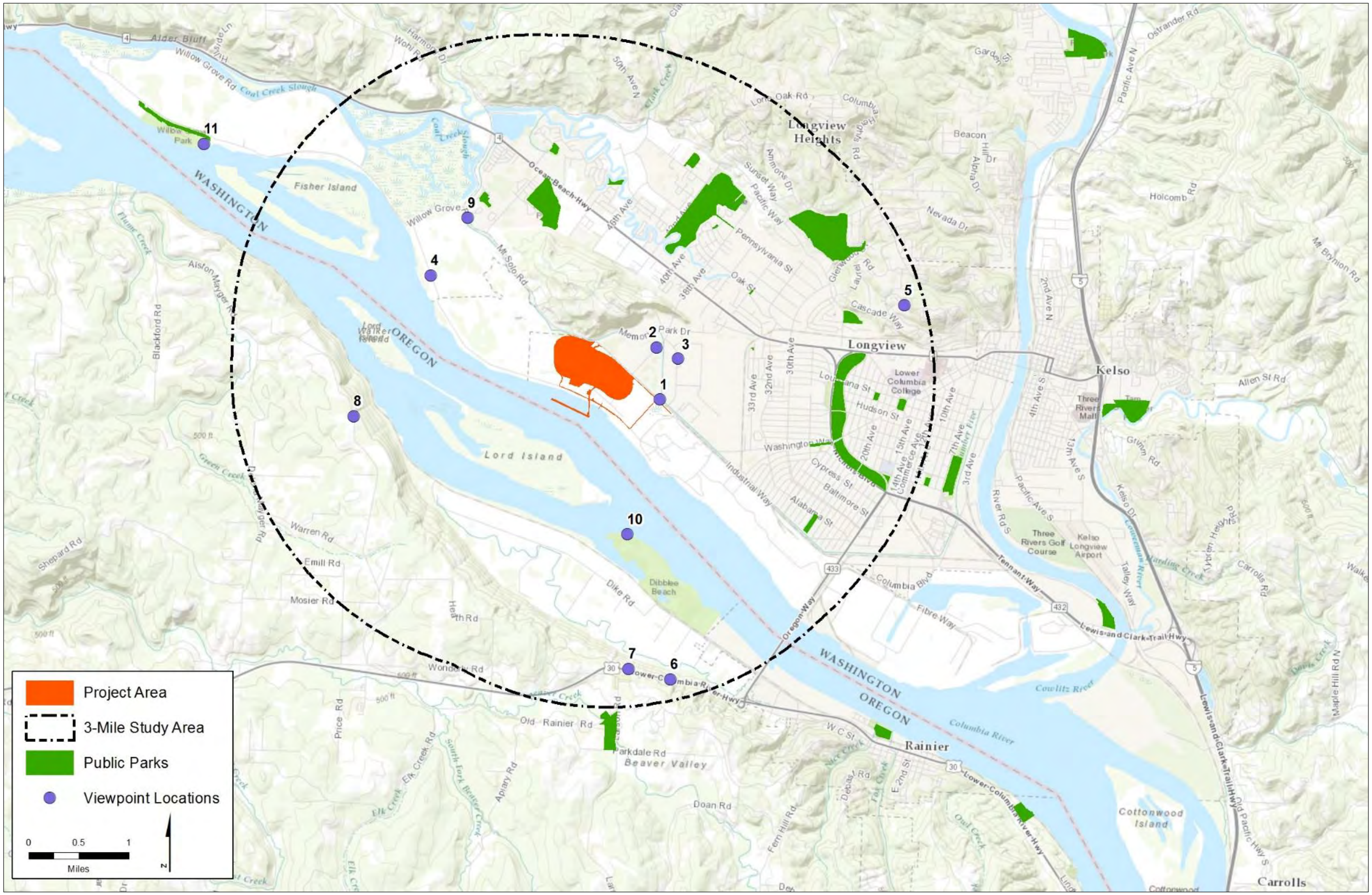


Figure 3.3-3. Viewpoint Locations



Determine Viewer Groups and Viewer Sensitivity

Viewer sensitivity is the measure of the concern for visual quality and the response to changes to the elements of the natural and constructed environments the viewer experiences through sight. Viewer sensitivity is related to changes in the available views of the landscape and buildings, the construction and demolition of structures, operational equipment, and emissions.

The effects of these changes on viewers depend on the types of users, the amount of use (number of viewers and view frequency), and adjacent land uses, as described as follows.

- **Types of users.** Based on the viewpoint locations, the types of viewers who see the project area can be generally characterized as residents, workers, travelers, and recreationalists. Visual perception and sensitivity vary between types of users. Residents or recreational sightseers could be highly sensitive to any changes, while those in a work setting, such as industrial, manufacturing, or warehouse workers, could have no to low sensitivity. A working viewer's activity, awareness, and sensitivity are typically limited to the visual setting immediately outside the workplace and do not extend to surrounding views.
- **Amount of use.** Areas used by large numbers of people are considered to have a higher exposure, or sensitivity, because more viewers could be affected. Protection of visual quality usually becomes more important as the number of viewers and the duration of views increase.
- **Adjacent land uses**. Proposed changes could affect the visual quality or other aspects of adjacent land uses. The visual elements of adjacent landscapes and natural areas, buildings, structures, and operations define a visual context with which the proposed uses and facilities could be compatible or in conflict.

Prepare Visual Simulations

To assess the impacts of the Proposed Action on aesthetics and visual quality, visual simulations were prepared to illustrate how it would appear if constructed. The visual simulations were developed using existing conditions photographs from each of the viewpoints and a three-dimensional model of the project area and surrounding area. The completed visual simulations show the visual change associated each action alternative through "before and after" images. No other photo editing or touch-up work was done to the simulations. The visual simulation task and analysis provided the basis for the visual assessment (*SEPA Aesthetics, Light, and Glare Technical Report*).

3.3.4 Existing Conditions

This section describes the existing environmental conditions in the study area related to aesthetics that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

The Applicant's leased area was originally a floodplain that supported wetland and shoreline habitats used by wildlife, birds, and people. Industrial use dates back to 1941. Today, the Applicant uses an area adjoining the project area (within the leased area) as a bulk product terminal to import, store, and transfer bulk alumina and coal. The project area includes upland facilities, a dock in the Columbia River capable of receiving Panamax-sized ships, and rail and road connections. While most of the existing project area is developed, the undeveloped western sections consist of open grasslands, wetlands, and a small forested area in the northwest corner.

Adjacent land uses include those in the leased area as well as various other industrial, utility, transportation, commercial, and residential uses. The 550-acre Weyerhaeuser Company lumber products manufacturing facility is located east of the project area and the 478-acre Port Industrial Marine property is located upriver of the Weyerhaeuser site. Port facilities include eight marine terminals that primarily handle commodities such as bulk goods, forest products, wind energy products, steel, and heavy-lift project cargo (Port of Longview 2011). Port properties also include the recently purchased Barlow Point property, located northwest of the project area within the city limits of Longview. The Barlow Point property is currently undeveloped, but the Cowlitz County Public Utility District and Bonneville Power Administration use this and adjacent properties for high-power utility lines and a power substation. The approximate 75-foot-tall, 47-acre Mount Solo Landfill is located west of the project area and adjacent to the northern boundary of the Barlow Point property. The 445-acre Mint Farm Industrial Park, another prominent adjacent industrial use, is located north of Industrial Way within city limits. Two single-family residences are located across Industrial Way from the project area. These residential uses are on wooded lots set back from the street. Overall, the project area is located in a wide corridor of industrial, transportation, and utility land uses along the Columbia River.

3.3.4.1 Viewshed

The project area and most of Longview and Kelso, along with rural areas south of the Columbia River, lie in the Columbia River floodplain. The floodplain affords wide views of the Columbia River and surrounding area because of its flat topography and limited landform interruptions, and is a defining feature of the affected viewshed. The extent of the flat floodplain varies based on the proximity of hillsides to the north and south of the river. At the project area, the floodplain extends approximately 4 miles perpendicular to the river. With the exception of Mount Solo (elevation 610 feet) directly north of the project area, the elevation of the floodplain varies little across the Longview and Kelso area, ranging from approximately 5 feet to 30 feet. The hillsides north and south of the floodplain rise steeply and are generally heavily forested and in a natural condition. The natural vegetation of the floodplain is composed of riparian and lowland deciduous forest vegetation, but in most areas, depending on the level of existing development, the vegetation has been highly modified. The built environment and existing vegetation block most views of the project area across the relatively flat floodplain.

From the project area, downtown Longview is approximately 3 miles east, Kelso is approximately 5 miles east along the Cowlitz River, and Rainier, Oregon, is approximately 4 miles upriver (southeast) along the south bank of the Columbia River. These cities contain a wide range of industrial, residential, commercial, recreation, and public facility land uses.

Industrial Way, which extends along the north side of the project area, is the nearest land transportation corridor. The project area includes multiple driveway access points and a short line rail connection to the main line rail operated by BNSF Railway Company (BNSF). The Lewis and Clark Bridge (State Route 433) is located approximately 3 miles upriver from the project area.

Except for the two single-family residences across Industrial Way from the project area, most residential areas are located within Longview city limits or unincorporated Cowlitz County and are at least 1 mile away from the project area.

There are numerous recreational opportunities and sites in the broader Longview, Kelso, and Rainier urban area. The Columbia River is a prominent recreational resource and supports boating, fishing, and other forms of water recreation. In addition, two major recreational trails pass through the study area: the 146-mile Lower Columbia River Water Trail, which extends from Bonneville Dam to the mouth of the Columbia River, and the Lewis and Clark National Historic Trail.

Cowlitz County owns 21 parks and boat launches within 10 miles of the project area and the City of Longview, which adjoins the project area, administers 33 recreational facilities including 17 public parks (URS Corporation 2014). Because of existing topography, vegetation, and urban development, none of the parks within the county and the city portions of the study area has a view of the project area. However, users of the Columbia River and Dibblee Beach in Oregon do have views of the project area. Dibblee Beach, an undeveloped recreational area, is located on the south shore of the Columbia River, directly southeast of the project area. Lord and Walker Islands are in Oregon, directly south across the Columbia River. The islands are undeveloped and have no land access, but are part of the water trail network, and are used for primitive camping (i.e., a campsite with no support facilities). Other areas in the Columbia River floodplain on the south side of the river in Oregon are primarily composed of undeveloped rural or agricultural land.

3.3.4.2 Viewer Groups and Key Viewpoints

The following sections describe viewer sensitivity and associated key viewpoints for the types of views identified: urban and industrial views, rural and residential views, and natural views. These types of views are described in more detail below. Eleven key viewpoints from which views of the Proposed Action project area could be affected were identified (Table 3.3-1).

Table 3.3-1. Viewpoints, Viewer Sensitivity, and Existing Visual Quality

View-point	View	Viewer Sensitivity	Viewer Description	Type
1	Looking west on Industrial Way	Low	Industrial workers and commuters traveling on Industrial Way and other local roads. Would experience frequent views of the project area from nearby industrial areas.	Urban/ Industrial
2	Looking south along 38th Avenue	Low	Industrial workers and commuters traveling on 38th Avenue and other local roads. Would experience frequent views of the project area from nearby industrial areas.	Urban/ Industrial/ Rural
3	Looking southwest from Mint Farm Industrial Area (from Prudential Boulevard)	Low	Industrial workers and commuters traveling Prudential Boulevard and other local roads. Would likely experience frequent views of the project area from nearby industrial areas.	Urban/ Industrial/ Commercial

Viewpoint	View	Viewer Sensitivity	Viewer Description	Type
4	Looking east from Barlow Point Road	High	Residents and agricultural workers looking east toward the project area. Would likely experience frequent views of the project area from rural areas located within the City of Longview and unincorporated Cowlitz County. Views could be of long duration and viewers could have a high sensitivity to change.	Rural/ Residential
5	Looking southwest from Hillside Residential (from Alexia Court)	High	Residents and travelers on local roads. Viewers would experience frequent dispersed views of the project area at various times of day and for long durations.	Rural/ Residential
6, 7	Looking north/ northwest from US 30 viewpoints	Moderate	Highway travelers looking northwest from US 30 and scenic pullouts. Viewers would experience views of the project area for short durations. Frequency could range from infrequent for visitors to daily for commuters.	Rural
8	Looking northeast from Alston Mayger Road	Moderate/ High	Residents and travelers looking northeast from rural residential areas along this road would experience frequent dispersed views of the project area at various times and for long durations.	Rural/ Residential
9	Looking southeast from West Longview Neighborhood	None	Residents looking southeast toward the project area. Views of the project area are obstructed by Mount Solo Landfill and existing vegetation.	Rural/ Residential
10	Looking north from Dibblee Beach	High	Public beach and on-water recreationalists looking north toward the project area. Infrequent, short-duration views of the project area, but viewers could be highly aware of change. Few night viewers.	Natural
11	Looking east from Willow Grove Park and Boat Launch	None	Boaters and recreationalists looking east toward project area. Views would be obstructed by vegetation on Fisher and Hump Islands in Columbia River. Boaters traveling upriver could experience varying views of the project area.	Natural

Urban and Industrial Views

The typical viewers in this area are assumed to be industrial workers and commuters traveling on Industrial Way. Visual sensitivity in the industrial use area along the Columbia River is expected to be low because of the existing industrial character of the landscape. Existing industrial facilities appear large in scale and dominate the landscape character. Artificial lighting is common throughout the industrial area and clearly defines the extent of the heavy industrial area at night. The concentration of similar facilities and land uses can make changes in nighttime lighting difficult to discern.

Rural and Residential Views

The typical viewers in this area are presumed to be residents of the city neighborhoods or of surrounding low-density unincorporated residential properties, including areas south of the river in Oregon. Some travelers on local and state transportation corridors, such as U.S. Route 30 (US 30) on the rural south side of the Columbia River, also have views of the project area.

The general landscape of the rural and residential area consists of natural and human-made features and patterns, often the result of an altered landscape that now supports rural farming or forestry development. The existing large-scale industrial facilities, high-voltage electrical transmission lines, electrical substations, and plumes of industrial emissions may or may not be clearly discernible.

Individual sites and uses are more difficult to discern within the surrounding industrial landscape when viewed from longer distances. For example, a viewer at the Hillside Residential viewpoint (Viewpoint 5) is located approximately 3 miles northeast of the project area; from this view, it would be difficult to identify changes to the existing area. Industrial emission plumes and artificial lighting are common throughout the industrial area along the Columbia River. Moreover, the concentration of emissions and light sources at similar facilities and land uses in this industrial area reduces the visual distinction of any single site or facility.

Natural Views

The typical viewers in natural areas are recreationalists using the Columbia River or public parks. As noted above, the Columbia River offers a variety of recreational opportunities such as boating, fishing, and other forms of water recreation, and two recreational trails pass through the study area. Dibblee Beach offers public beach and water access, fishing, swimming, picnicking, sunbathing, hiking and bird watching. The landscape character of natural areas is formed by distinctive and memorable natural features (e.g., landforms, rock, outcrops) and patterns (vegetation and open space) with few human-made features. Visual texture consists of rough natural surfaces and colors, including browns, yellows, and greens, and the smooth waters of the Columbia River. Views for a typical recreationalist are generally infrequent and of short to moderate duration; however, viewer sensitivity tends to be high due to interest in natural areas and the inconsistency of natural and industrial lands.

In addition to being used by recreationalists, the Columbia River is also navigable by commercial boat operators. Viewers from commercial boats are expected to have a low sensitivity to visual changes because of the infrequent and transitory nature of their views; it is unlikely that they would focus on changes to the project area.

Key Viewpoints

Table 3.3-1 lists the viewpoints and summarizes the levels of viewer sensitivity, and the existing visual quality of each viewpoint as they relate to the Proposed Action. The *SEPA Aesthetics, Light, and Glare Technical Report* provides a detailed discussion of each viewpoint. Appendix G, *Viewpoints for Aesthetics, Light, and Glare Analysis*, describes the viewpoints and show the existing views from each viewpoint.

3.3.5 Impacts

This section describes the potential direct and indirect impacts related to aesthetics, light, and glare that would result from construction and operation of the Proposed Action and the No-Action Alternative.

This section describes and illustrates the impacts associated with each viewpoint for the Proposed Action and the No-Action Alternative. Impacts on the visual quality of the study area would vary depending on the location of the viewer, the sensitivity of the viewer, the duration of the view, and the operational practices at each project area.

3.3.5.1 Proposed Action

The following sections describe the potential aesthetic impacts attributable to the construction and operation of the Proposed Action. The levels of impact for each viewpoint are identified as high, moderate, low, and no impact, as defined in Section 3.3.3*, Methods*.

Construction—Direct Impacts

As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Construction of the Proposed Action would begin with demolishing the existing cable plant and potline buildings and ancillary structures and facilities. Demolition activities also would include the removal of approximately 6 acres of forested wetland in the northwest corner of the project area. The existing trees are directly south of Mount Solo and east of the Mount Solo landfill along Industrial Way; their removal would mainly affect travelers along Industrial Way.

Following demolition and general area preparation, the project area would be preloaded to increase the strength of the underlying project area soils to accommodate the four future coal stockpiles. A rolling preload of material would be used to improve the load-bearing capacity of the soils (i.e., one stockpile pad at a time would be preloaded). Preloading material would be placed in a pile approximately 35 feet high covering the area of the berm and adjacent stockpile pads and would be left in place until soil consolidation is achieved. Following consolidation, preloading material would be moved to another berm and stockpile pad location, with supplementary import material added to achieve a pile approximately 35 feet high. The process would be repeated at each berm and stockpile location until soil consolidation is achieved across the entire stockpile area. Ground improvement would occur progressively and would take up to 7 years to complete. The preloading activities would be the longest phase of construction.

During construction, activities would include the use of heavy machinery such as cranes, wheel loaders, dozers, dump trucks, excavators, graders, rollers, compactors, drill rigs, pile driving equipment, portable ready-mix batch plant, ready-mix trucks, concrete pumps, elevated work platforms, forklifts, rail track laying equipment, welders, water pumps, river dredging barges, and other related equipment. Construction would also involve construction lighting and project area safety lighting or warning flashers as well as shoreline and in-water construction activities for the proposed docks.

Construction-related activities associated with the Proposed Action could result in direct impacts as described below.

Change Visual Features of Project Area

Construction activities in the project area would be visible to residents, workers, commuters, recreationalists, and boat operators, but these activities would be temporary and consistent with the general industrial context of the surrounding area. Although preloading berms could remain in place for up to 7 years, these would not be a prominent visual feature in the larger industrial waterfront. Furthermore, in this industrial context, it would be difficult for more distant viewers, particularly rural and residential viewers at Viewpoints 6, 7, and 8 (Appendix G, *Viewpoints for Aesthetics, Light, and Glare Analysis*) to perceive noticeable changes during construction. Construction of the Proposed Action would result in a low level of impact on visual quality.

The Applicant anticipates that construction activities would occur primarily during daylight hours. Therefore, construction of the Proposed Action would not result in adverse impacts related to light and glare.

Construction—Indirect Impacts

Construction of the Proposed Action would not result in indirect impacts on aesthetics and visual quality.

Operations—Direct Impacts

Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*. The Proposed Action would consist of one operating rail track, eight rail tracks for storing up to 8 unit trains, rail car unloading facilities, a stockpile area 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. Coal would be unloaded from rail cars, stockpiled, and loaded by conveyor onto ocean-going vessels at two new docks for export. Prominent new visual features and structures would include the coal stockpiles (approximately 85 feet high), eight transfer towers and two shiploaders (80 to 90 feet high), a surge bin (approximately 146 feet high), and vessels at the docks (approximately 190 feet high for Panamax vessels). Vehicles would access the project area from Industrial Way, and vessels 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.

Overall, the visual quality of the Proposed Action would be similar to the existing surrounding industrial development. The forms, lines, colors, and scale of existing and proposed buildings and elements would be similar to nearby heavy industrial developments and the facility would be visually compatible with the surrounding industrial uses.

The Proposed Action would introduce new light sources to the project area. The new artificial light would be partially offset by removing some outdoor lighting during the demolition of existing buildings and facilities. Lighting plans are preliminary and it is expected that the Proposed Action would require lighting ranging from low-level lighting for general area lighting (e.g., streetlights) to high-intensity, spot-level lighting (e.g., lighting on the docks at night).

- **Low-level lighting.** Low-level ambient light would be required for general area lighting. This level of lighting would be used along pedestrian and vehicular access roads, in the maintenance and storage areas, and at the water treatment and pump stations. Most ambient lights would be standard, pole-mounted streetlights (approximately 30 feet high) or structure-mounted lights. Typical access lighting in some areas, such as stairways and walkways on the stackers and reclaimers or conveyor transfer points, would be turned on with light and motion sensors as needed for operator safety. In addition, most conveyor lighting would be contained within the structures enclosing the conveyors and light spill would be limited.

- **Moderate-level lighting.** Moderate-level lighting would provide safety and operation lighting at key points such as the head or tail end of the conveyor system or indexers. Colored navigational lights on the docks and clearance lights at the top of tall structures are also considered a moderate-level light. In most instances, moderate-level lights would be directed sources.
- **High-intensity, spot-level lighting.** High-intensity, spot-level lighting would be required for vessel arrival and departure and for accessing equipment on the docks during nighttime operation. One or two ships would be moored at the terminal at a time and would be lit with suitable working and safety lighting. Stockpiles would not be lit except for some high-intensity, directed lighting to illuminate areas where stackers and reclaimers are working during periods of low light. Stackers and reclaimers would be unmanned but monitored with cameras; this lighting would be necessary for camera visibility. It is anticipated that only one stacker and one or two reclaimers and the associated lighting would operate at any given time.

Table 3.3-2 summarizes the proposed operational areas and light conditions. Figure 3.3-4 identifies the operational areas discussed in the table.

Table 3.3-2. Proposed Operational Areas and Lighting

Area	Function	Level of Lighting	Type of Lighting[a]
Rail Operations			
Train arrivals and departures	Lighting for areas for crew changes, switching points, etc.	Low	Area. Mounted on 30-foot poles.
Indexer	Lighting for placement and operation of indexer and sufficient for camera to monitor safety of work and equipment use	Moderate	Directed.
Stockyard			
Berm conveyors	Lighting for personnel access along length of conveyor; more lighting at tail and head ends of conveyors	Low/ Moderate	Area.
Conveyor transfer points	Pedestrian-level lighting; higher levels around head and tail ends of conveyors	Low	Directed. Mostly within enclosed structures.
Stackers and reclaimers	Pedestrian-level stair and walkway lighting; higher levels for work areas, operational equipment, and clearance lights at top of equipment masts	Low/ Moderate/ High	Directed. Illuminates stacking and reclaiming operation for camera visibility. Access lights would be motion/light-sensor controlled.

Area	Function	Level of Lighting	Type of Lighting[a]
Enclosure Conveyor			
Receiving and shipping	Lighting for pedestrian access along conveyor and through gallery	Low	Directed. Access lights would be motion/light-sensor controlled.
Dock			
Conveyors	Pedestrian-level lighting along length of conveyors	Low	Area.
Conveyor transfer points	Pedestrian-level lighting; higher levels around head and tail ends of conveyors	Moderate	Directed.
Mooring, deck	Lighting for vessel arrival/departure and for dock plant and equipment	High	Directed. As required to illuminate operations and to ensure edge of dock is clearly visible.
Navigation	Clearance lighting	Moderate	Point. Shows extent and height of facilities.
General Area			
Access road	Lighting for clear identification of roadways	Low	Area. Lighting for roadways. Mounted on 30-foot poles.
Maintenance area and storage	Maintenance/services/repair lighting for work and safety	Low	Area. Lighting for roadways. Mounted on 30-foot poles.
Water treatment and pump stations	Plant and equipment lighting for operation and maintenance	Low	Area. Lighting walkway and work areas.
Structures, towers, and docks	Air clearance lighting to warn of equipment proximity and potential interference	Moderate	Point. Shows extent and height of facilities.

Notes:
[a] Area Lighting: General illumination for pedestrian and vehicle travel, general task lighting, or security. Directed Lighting: Illumination for function purposes such as inspections, safe equipment operation and maintenance, and work areas. Point Lighting: Light sources identifying direction or navigational extents, height, or direction.
Source: Millennium Bulk Terminals—Longview 2014

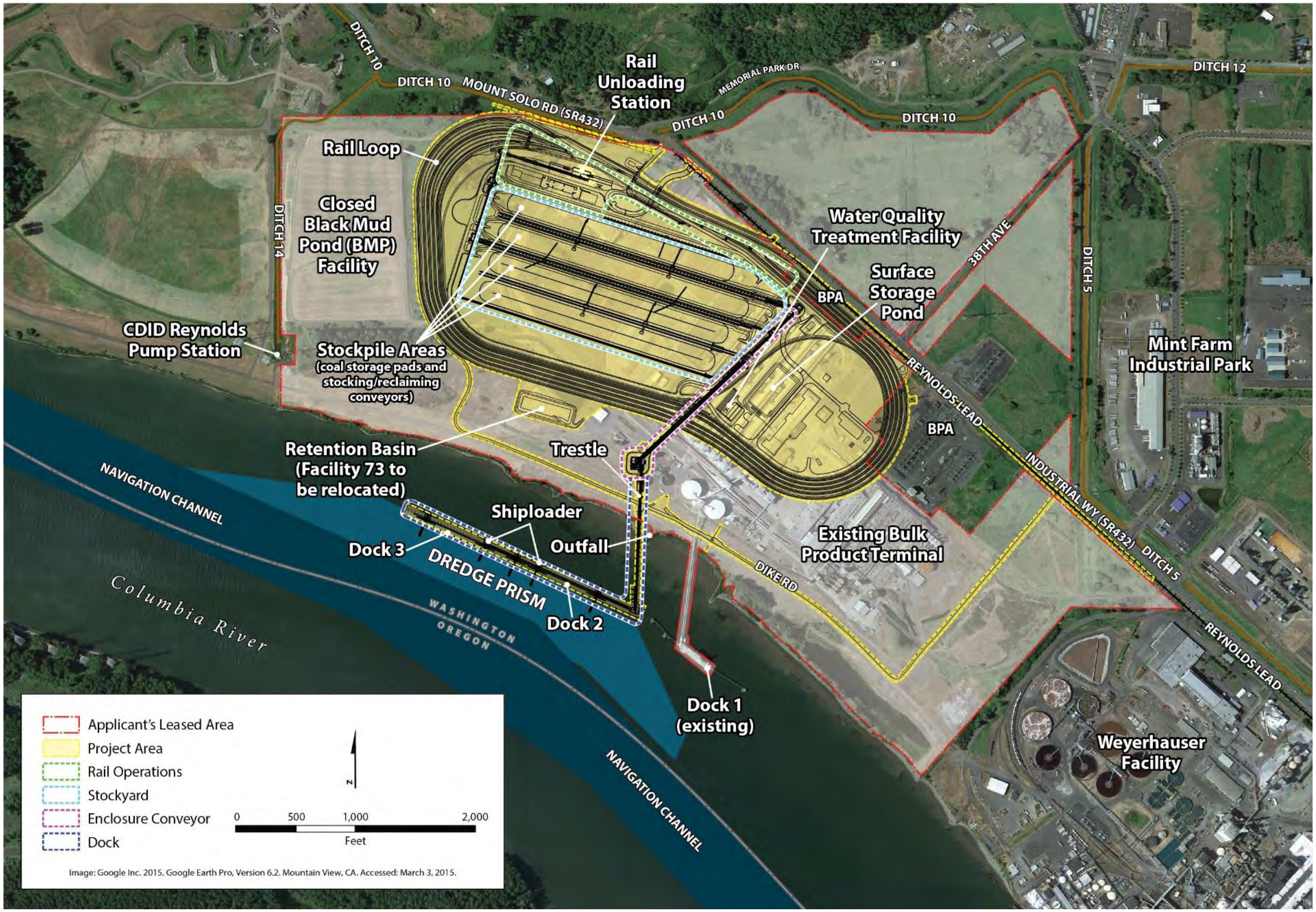
Operation of the Proposed Action would result in the following direct impacts.

Urban and Industrial Views

Change Visual Features of Project Area

Operation of the Proposed Action would introduce new visual features to the project area. The new visual features would include new structures and equipment, additional workers, and increased vehicle, train, and ship movements on and adjacent to the project area. It is also anticipated that at least one Panamax-sized vessel would be moored at the proposed dock facilities at any given time. These features would alter the aesthetics of the project area. The new activities would also result in new sources of light and glare. However, these changes would be consistent with the existing industrial aesthetics of the project area and the surrounding area.

Figure 3.3-4. Proposed Operational Areas



Viewpoints from urban and industrial areas are generally near the project area. Views are dominated by existing industrial facilities, operations, and activities. Large-scale buildings, heavy utility transmission lines, industrial plumes, and ancillary facilities and equipment define the existing visual character of the project area. The coal stockpiles and conveyor systems, rail lines, and other equipment and structures would be consistent with the overall visual character of the urban and industrial viewpoints. With the Proposed Action, the existing rectangular, straight-line potline and cable plant buildings would be replaced by coal stockpiles. The sizes and long, straight lines of the coal piles would be similar to the concrete and metal buildings, and the horizontal ground-level rail lines would be less visually dominant than the existing buildings. Vessels moored at the proposed docks are not expected to be visible from most urban and industrial viewpoints. Appendix G, *Viewpoints for Aesthetics, Light, and Glare Analysis*, of this Final EIS provides the photo simulations for Viewpoints 1 and 2. Overall, because the Proposed Action would be visually compatible with surrounding industrial uses and would affect a low number of sensitive viewers, the Proposed Action would have a low level of impact on views from urban and industrial viewpoints.

Introduce New Sources of Light and Glare to the Project Area

Artificial light is common throughout the Longview industrial area and along the Columbia River adjacent to the Port of Longview. The extent and concentration of similar heavy industrial operations facilities and land uses would make changes in nighttime lighting in a particular area difficult to discern. The new artificial light produced by the Proposed Action would be partially offset by the removal of some outdoor ambient lighting during demolition of existing buildings and facilities. Also, the Proposed Action would have considerably fewer reflective surfaces than the existing buildings. Glare impacts for urban and industrial viewers would be reduced because metal, concrete, and other reflective materials (including windows) would be demolished under the Proposed Action. Overall, the Proposed Action would result in no new light and glare impacts on views from urban and industrial areas.

Change Visual Perception by Viewers

The viewers in this area would be industrial workers and commuters traveling on Industrial Way. The visual perception of these viewers is limited because their attention is focused on work, construction, or commuting activities. Project area operations would occur 24 hours per day, similar to adjacent industrial areas. The general sensitivity of workers at adjacent facilities is considered low. The Proposed Action would result in a low level of impacts on viewers' visual perception from urban and industrial Viewpoints 1, 2, and 3.

Table 3.3-3 summarizes the visual, light and glare, and viewer impacts from Viewpoints 1, 2, and 3 for photo simulations of Viewpoints 1 and 2.

Table 3.3-3. Visual, Light and Glare, and Viewer Impacts (Viewpoints 1, 2, and 3)—Proposed Action

View-point	View	Distance (feet)[a]	Visual Impact	Light & Glare Impact	Viewer Impact
1	Looking west on Industrial Way. Primary view would be of rail lines and stockpile areas. Demolition of existing buildings and lighting and reduction of manmade materials would reduce visual impacts. Visual impact also would be reduced because views would be partially obscured by utility transmission lines and structures.	1,620	L	N	L
2	Looking south along 38th Street. Main views would be almost perpendicular to project area. Demolition of existing buildings and lighting and reduction of manmade materials would reduce visual impacts and resulting colors and textures would partially blend into background and natural environments.	2,050	L	N	L
3	Looking southwest from Mint Farm Industrial Area (from Prudential Boulevard). Most views would be screened by vegetation. Some structures and facilities could be seen more easily during winter months when vegetation is dormant.	2,680	L	N	L

Notes:
[a] Distance from project area.
L = low level of impact; N = no impact.

Rural and Residential Views

Change Visual Features of Project Area

Prominent views from the rural and residential viewpoints include the existing industrial area along the Columbia River and a broader context that includes Mount St. Helens, Mount Rainier, the Columbia River, surrounding hillsides, rural farmland, and continuous stands of native vegetation and other features that bring natural characteristics into the visual character.

Views from the upland viewpoints would change as the large, rectangular potline and cable plant buildings are demolished and replaced by large coal piles with the Proposed Action. The demolition of approximately 6 acres of forested wetland would change the visual character of the northwest corner of the project area. However, due to the proximity to Mount Solo and the Mount Solo Landfill, which obstruct views from many rural and residential areas, this part of the project area is seen by a limited number of viewers and commuters traveling along US 30 in Oregon. Overall, the project area would continue to appear in a larger context of existing vegetated and undeveloped areas. The Proposed Action would not obstruct views of Mount St. Helens, Mount Rainier, or the Columbia River from rural and residential viewpoints. Views of the shoreline would be obstructed by the proposed docks, which would be up to 2,300 feet long.

Appendix G, *Viewpoints for Aesthetics, Light, and Glare Analysis*, presents the photo simulations for Viewpoints 5, 6, and 8.

The scale of the proposed docks, vessels, shiploaders, coal piles, and related conveyors would be discernible from the more distant rural and residential viewpoints. However, these facilities would appear in the context of the existing upland industrial facilities and adjacent heavy industrial areas as a relatively continuous visual resource for viewers. Overall, visual impacts on rural and residential views due to the Proposed Action would be difficult to perceive because of the distance between the viewpoints and the project area, as well as the Proposed Action's visual compatibility with adjacent industrial uses. Therefore, the Proposed Action would result in a low level of impact on rural and residential views from Viewpoints 5, 6, 7, and 8. The Proposed Action would not be visible from Viewpoints 4 and 9 and would result in no impact on views from these viewpoints.

Introduce New Sources of Light and Glare to Project Area

New artificial light produced by the Proposed Action would be partially offset by the removal of some outdoor ambient lighting during demolition of existing buildings and facilities. In addition, glare would be reduced because most demolished facilities include extensive metal, concrete, or other reflective surfaces (including windows). In distant views from hillsides in Longview (Viewpoint 5), the Proposed Action's artificial lighting would likely be difficult to discern given the distance between the viewpoint and the project area and the existing context of lighted industrial uses along the Columbia River. Furthermore, the Proposed Action would not be visible from Viewpoint 4 on Barlow Point and Viewpoint 9 in West Longview because of the Mount Solo Landfill and existing vegetation. Therefore, the Proposed Action would result in a low level of impact on rural and residential views from Viewpoint 5 and no impact on rural and residential views from Viewpoints 4 and 9.

The proposed dock facilities would require prolonged moderate to high levels of light for operation at night while vessels are arriving, departing, or being loaded. Proposed lighting associated with the dock facilities would be reflected in the waters of the Columbia River and could be visible from some rural and residential viewpoints (Viewpoints 6, 7, and 8). However, the distance to these viewpoints and the existing concentration of similar facilities and land uses along the waterfront would make changes in nighttime lighting difficult to discern. Therefore, the Proposed Action would have a low level of impact on light and glare at these viewpoints. Overall, light and glare impacts for rural and residential views would range from no impact to low impact.

Change Visual Perception by Viewers

Viewers in the rural and residential area are presumed to be residents within the City of Longview neighborhoods or of surrounding low-density residential areas, including areas south of the Columbia River in Oregon. Some travelers on local and state transportation corridors such as US 30 south of the Columbia River would also have dispersed views of the project area. Visual sensitivity in the rural and residential area is assumed high because views are often prolonged and stationary and residential viewers are sensitive to change. However, most residents would not have direct views of the project area and the Proposed Action would be in keeping with the existing industrial character of the surrounding area. Therefore, the Proposed Action would result in a low level of impact on viewers' visual perceptions from Viewpoints 5, 6, 7, and 8, and no impact on views from Viewpoints 4 and 9.

Table 3.3-4 provides a summary of visual, light and glare, and viewer impacts from Viewpoints 4 through 9 (Appendix G, *Viewpoints for Aesthetics, Light, and Glare Analysis*).

Table 3.3-4. Visual, Light and Glare, and Viewer Impacts (Viewpoints 4 through 9)—Proposed Action

View-point	View	Distance (feet)[a]	Visual Impact	Light & Glare Impact	Viewer Impact
4	Looking east from Barlow Point Road. General visual character is agricultural with large tracts of farmland and dispersed housing. Views obstructed by small hill, broad row of trees, and Columbia River levee. Project area would not be visible from this location. Direct sources of light would not be seen.	7,500	N	N	N
5	Looking southwest from hillside residential areas (from Alexia Court). Views are elevated above the project area. Small portion of proposed facility would be visible in this view; other locations on hillside are expected to have views of project area. Areas are characterized by contiguous residential neighborhoods on winding hillsides. Most views partially or completely blocked by vegetation and Mount Solo. Light sources could be discerned but no single facility expected to dominate views.	14,875	L	L	L
6 & 7	Looking north/northwest from US 30. Views are from vehicles traveling along highway and from two scenic viewpoints. Views of Mount St. Helens, Mount Rainier, the Columbia River, rural farmland, and surrounding hillsides are prominent scenic focal points. Individual facilities and vessels can be discerned but no single facility expected to dominate views. Lighting for dock facilities could be visible and reflected by Columbia River while vessels are arriving, departing, or being loaded.	13,390–14,980	L	L	L

View-point	View	Distance (feet)[a]	Visual Impact	Light & Glare Impact	Viewer Impact
8	Looking northeast from Alston Mayger Road. Views of project area occur primarily from single-family residences. Viewpoint dominated by scenic views of Mount St. Helens, Columbia River, and Lord and Walker Islands. Individual facilities and vessels can be discerned but no single facility expected to dominate views. Lighting for dock facilities could be visible and reflected by Columbia River while vessels are arriving, departing, or being loaded.	10,930	L	L	L
9	Looking south from West Longview residential neighborhood. Project area is not be visible from this location.	8,000	N	N	N

Notes:
[a] Distance from project area.
L = low level of impact; N = no impact, US 30 = U.S. Route 30

Natural Views

Change Visual Features of Project Area

The proposed docks, shiploaders, coal stockpiles, trestles, and ancillary equipment associated with the Proposed Action would introduce new large-scale industrial uses along the Columbia River. The Proposed Action would introduce straight lines, geometric forms, hard visual textures, and human-made materials to the project area. It is also anticipated that at least one vessel would be moored at the proposed docks at any given time. The Panamax-sized vessels that would use the proposed docks would be approximately 950 feet in length, 106 feet wide (beam), and 190 feet high. These changes would be visible to on-water recreational users and viewers from Dibblee Beach on the south shore of the river (Viewpoint 10). However, the new facilities would be contiguous and visually consistent with existing industrial facilities, and vessels are commonly traveling up river, anchored, or moored along the Port of Longview shoreline. Therefore, the Proposed Action would have a moderate level of impact on views from Viewpoint 10 because it would introduce operations, buildings, and structures that would be visible to sensitive viewers, but would be consistent with adjacent land uses.

Appendix G, *Viewpoints for Aesthetics, Light, and Glare Analysis*, presents the photo simulation for Viewpoint 10. The Proposed Action would not be visible from Viewpoint 11 and would not result in impacts on views from Viewpoint 11. Proposed mitigation (Section 3.3.7.2, *Applicant Mitigation*) would minimize the moderate level of impacts on views from Viewpoint 10.

Introduce New Sources of Light and Glare to Project Area

New lighting associated with the dock facilities would result in a moderate level of light impacts on views from Dibblee Beach (Viewpoint 10) where the Proposed Action's lighting would be visible and would be reflected in the waters of the Columbia River. For distant viewers, artificial lighting is common throughout the Port of Longview industrial area on the Columbia River, and the concentration of similar facilities and land uses would make changes in nighttime lighting difficult to discern. The Proposed Action would result in moderate impacts related to light and glare because most recreational viewers in natural areas view the project area during daylight conditions. Proposed mitigation (Section 3.3.7.2, *Applicant Mitigation*) would minimize the moderate level of impacts on viewers from Viewpoint 10.

Change Visual Perception by Viewers

The views from natural areas are presumed to be from on-water recreational viewers (e.g., anglers, water trail users, cruisers) and viewers from Dibblee Beach on the south bank of the Columbia River. For a typical recreationalist, views would be infrequent and of short to moderate duration. However, viewer sensitivity tends to be high because of viewers' expectation of natural views, the public nature of and interest in some natural areas, and the contrast between natural and industrial lands. Moreover, the movement of ships, trains, and equipment introduces additional visual impacts on viewers from natural areas.

The Columbia River is also navigated by commercial boat operators. Viewers from commercial boats are expected to have a low sensitivity to changes in aesthetics. Because of low sensitivity, infrequent views, and the transitory nature of boat operator views, it is unlikely that viewers would experience negative visual impacts based on changes to the existing project area. Overall, the Proposed Action would not result in impacts on viewers' visual perceptions from Viewpoint 11 and would result in a moderate level of impact on viewers' visual perceptions from Viewpoint 10. Proposed mitigation (Section 3.3.7.2, *Applicant Mitigation*) would minimize would minimize the moderate level of impacts on viewers from Viewpoint 10.

Table 3.3-5 summarizes the visual, light and glare, and viewer impacts from Viewpoints 10 and 11. Appendix G, *Viewpoints for Aesthetics, Light, and Glare Analysis*, provides a photo simulation of Viewpoint 10.

Table 3.3-5. Visual, Light and Glare, and Viewer Impacts (Viewpoints 10 and 11)—Proposed Action

View-point	View	Distance (feet)[a]	Visual Impact	Light & Glare Impact	Viewer Impact
10[b]	Looking north/northwest from Dibblee Beach. Views are of wide flat-water channel with Lord and Walker Islands to west. Heavy industrial uses and facilities characterize north riverbank. Light sources could be discerned and glare impacts are increased by water; however, no single facility expected to dominate views and recreational viewers are limited at night. Lighting for dock facilities could be visible and reflected by Columbia River while vessels are arriving, departing, or being loaded.	6,500	M	M	M

View-point	View	Distance (feet)[a]	Visual Impact	Light & Glare Impact	Viewer Impact
11	Looking east from Willow Point Boat Launch. Views of project area are obstructed by vegetation on two islands in Columbia River and light sources would have no impact. Located outside the study area, approximately 4.5 miles northwest of Longview on Columbia River, but allows river access from which public could travel upriver and into study area, where views of project area could be affected as for Viewpoint 9.	21,375	N	N	N

Notes:
[a] Distance from project area.
[b] This viewpoint also represents the potential impacts of the Proposed Action for on-water viewers. Views would be comparable from Dibblee Beach and an on-water location.
M = moderate level of impact; N = no impact

Operations—Indirect Impacts

Operation of the Proposed Action would not result in indirect impacts on aesthetics and visual quality.

3.3.5.2 No-Action Alternative

The following sections describe the potential aesthetic impacts attributable to the construction and operation of the No-Action Alternative.

Construction—Direct Impacts

Operation of the No-Action Alternative would result in the following direct impact on aesthetics and visual quality.

Change Visual Features of Project Area

Construction of the No-Action Alternative could involve the demolition and replacement of some existing buildings on the project area to facilitate the expansion of current operations and the development of an expanded bulk product terminal. As with the Proposed Action, construction activities under the No-Action Alternative would be visible to residents, workers, commuters, recreationalists, and boat operators, but these activities would be temporary and consistent with the general industrial context of the surrounding area. Furthermore, given the more limited physical changes to the project area under the No-Action Alternative compared to the Proposed Action, construction activities would be expected to be of shorter duration and intensity. Like the Proposed Action, it would be difficult for more distant viewers (particularly rural and residential viewers at Viewpoints 6, 7 and 8) to perceive noticeable changes during construction under the No-Action Alternative. The No-Action Alternative would not involve physical changes to the existing dock (Dock 1) nor construction of new docks; therefore, recreational viewers on the Columbia River (Viewpoint 10) would not be affected. It is expected that construction of the

No-Action Alternative would occur primarily during daylight hours. Therefore, construction of the No-Action Alternative would not result in impacts related to light and glare.

Overall, construction of the No-Action Alternative would have a low level of impact on aesthetics and visual quality.

Construction—Indirect Impacts

Construction of the No-Action Alternative would not result in indirect impacts on aesthetics and visual quality.

Operations—Direct Impacts

Operation of the No-Action Alternative would result in the following direct impacts on aesthetics and visual quality.

Change Visual Features of Project Area and Introduce New Sources of Light and Glare

As allowed under existing zoning, the No-Action Alternative could result in new buildings or structures on the project area, an expanded bulk product terminal, and increased bulk product transfer activities. Changes to aesthetic and visual conditions would occur as a result of these new structures and changes to operations, which would include the increased movements of people, equipment, vehicles, trains and ships as bulk product transfer activities increase. These activities would alter the aesthetics of the project area. However, the changes would be consistent with the existing industrial aesthetics of the project area and the surrounding area, and would therefore result in a low level of impact.

New activities and structures under the No-Action Alternative would be visible to viewers at industrial viewpoints (Viewpoints 1, 2, and 3) but, as noted above, these viewers tend to have low sensitivity to changes in visual conditions. Furthermore, the facilities and activities under this alternative would not change the project area's existing visual attributes substantially, and new industrial forms would be compatible with the existing visual character of the surrounding industrial area. Therefore, the No-Action Alternative would result in a low level of impacts on views from industrial viewpoints.

From more distant viewpoints (Viewpoints 4, 5, 6, 7, 8, and 10), changes to project area operations would become more difficult to perceive, and new or changed buildings or facilities would appear as a relatively continuous industrial waterfront for viewers. Therefore, the No-Action Alternative would result in a low level of impacts on views from more distant viewpoints (Viewpoints 4, 5, 6, 7, and 8). The No-Action Alternative would not be visible from Viewpoints 9 and 11 and would therefore result in no impact on views from these viewpoints.

As with the Proposed Action, the No-Action Alternative would be visible to viewers at Dibblee Beach (Viewpoint 10) and on the Columbia River. However, new or changed facilities would be located among existing industrial facilities on the project area and would remain contiguous and visually consistent with existing industrial facilities along the Longview shoreline. No additional docks would be built under the No-Action Alternative; therefore, the No-Action Alternative would have a low level of impact on views from Viewpoint 10.

The No-Action Alternative would not change the existing dock, but there could be an increase in the volume or timing of material transport operations and lighting on the dock. Light and glare impacts on recreational viewers on the Columbia River (Viewpoint 10) would be low because most recreational viewers access the river during daylight hours and would not experience increased light and glare impacts. Furthermore, potential changes to nighttime lighting under the No-Action Alternative would be seen within the industrial visual context of this section of the Columbia River waterfront. Additional lighting under the No-Action Alternative would not dramatically increase ambient or point source light sources in the industrial area. Therefore, the No-Action Alternative would have a low level of light and glare impacts.

Operations—Indirect Impacts

Operation of the No-Action Alternative would not result in indirect impacts on aesthetics and visual quality.

3.3.6 Required Permits

No permits related to aesthetics, light, and glare would be required for the Proposed Action.

3.3.7 Proposed Mitigation Measures

This section describes the mitigation measures that would reduce impacts related to aesthetics, light, and glare from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

3.3.7.1 Voluntary Mitigation

The Applicant has committed to implementing the following measures to mitigate impacts on aesthetics.

- Typical industrial lighting would be provided and installed in a manner to prevent light and glare from spilling from the site.
- Night lighting would be restricted to the minimum required for operational and safety requirements and would directed away from roads and sensitive viewpoints, where practicable.
- Light shields would be used to limit the spill of lighting where practicable.

3.3.7.2 Applicant Mitigation

Implementing the following mitigation measure would reduce aesthetics impacts associated with the Proposed Action.

MM ALG-1. Modify Lighting and Appearance of Facility Surfaces to Minimize Visual Impacts

To minimize the aesthetic, light, and glare impacts, the Applicant will do the following.

- Use directional lighting with full box cut-off fixtures, or equivalent, and use motion- or user-controlled light systems, where practicable and feasible.

- Use neutral colors to blend with or complement surrounding environment for non-safety-related structures and equipment, and use nonreflecting materials and finishes, where practicable and feasible.

3.3.8 Unavoidable and Significant Adverse Environmental Impacts

Implementation of mitigation measures identified above would reduce impacts on aesthetics. There would be no unavoidable and significant adverse environmental impacts on aesthetics.

3.4 Cultural Resources

The term *cultural resources* refers to the broad range of resources that represent or convey a place's heritage or help tell the story of a region's past. These resources are considered important to a community and worth preserving. A cultural resource can be any building, structure, object, site, landscape, or district associated with human manipulation of the environment. These resources are often valued (monetarily, aesthetically, or religiously) by a particular group of people and can be historic in character or date to the prehistoric past (i.e., prior to written records).

Three categories of cultural resources are discussed in this section: archaeological resources, historical resources, and culturally significant properties. Archaeological resources encompass features and deposits located on or below the ground surface that are evidence of prior human occupation or use in a particular area. Historical resources are elements of the built environment, such as buildings or structures, or human-made objects or landscapes. Finally, culturally significant properties are sites or locations considered culturally important to the history of a group of people, or are locations where culturally important events or practices are known to have occurred. In contrast, tribal resources refers to the collective rights and resources associated with a tribe's sovereignty and/or formal treaty rights. Tribal resources are addressed in Section 3.5, *Tribal Resources*.

This section describes cultural resources in the study area. It then describes impacts on cultural resources that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action and any remaining unavoidable and significant adverse impacts.

The analyses and findings from this section are based on research prepared by the Applicant pursuant to Section 106 of the National Historic Preservation Act of 1966 (NHPA) (Section 106). The U.S. Army Corps of Engineers (Corps) is carrying out the Section 106 review concurrent to the Proposed Action's compliance with the Washington State Environmental Policy Act (SEPA) and National Environmental Policy Act (NEPA). As a result, cultural resources studies prepared for the Proposed Action are being used to support each of these review processes and the SEPA process will reflect the outcomes of the Section 106 and NEPA reviews, as they are available.

3.4.1 Regulatory Setting

Laws and regulations relevant to cultural resources are summarized in Table 3.4-1.

Table 3.4-1. Regulations, Statutes, and Guidelines for Cultural Resources

Regulation, Statute, Guideline	Description
Federal	
National Register of Historic Places (54 USC 3021)	The NRHP is the official list of the nation's historic places worthy of preservation and is administered by the National Park Service as part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historical and archaeological resources.
National Historic Preservation Act, Protection of Historic Properties (54 USC 300101) (36 CFR 800)	Stipulates the protection of historic properties and outlines the Section 106 process of the NHPA.
Archaeological Resources Protection Act (16 USC 470aa)	Provides for the protection of archaeological resources and sites on public lands and Indian lands, and seeks to foster cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals.
Native American Graves Protection and Repatriation Act (25 USC 3001)	Describes the rights of Native American descendants, Indian tribes, and Native Hawaiian organizations with respect to the treatment, repatriation, and disposition of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony.
American Indian Religious Freedom Act (42 USC 1996)	Protects and preserves the traditional religious rights and cultural practices of American Indians, Eskimos, Aleuts, and Native Hawaiians.
State	
Indian Graves and Records (RCW 27.44)	Protects Native American graves and burial grounds, encourages voluntary reporting of said sites when they are discovered, and mandates a penalty for disturbance or desecration of such sites.
Archaeological Sites and Resources (RCW 27.53)	Governs the protection and preservation of archaeological sites and resources and establishes DAHP as the administering agency for these regulations.
Abandoned and Historic Cemeteries and Historic Graves (RCW 68.60)	Protects and preserves abandoned and historic cemeteries and historic graves.
Shoreline Management Act (RCW 90.58)	Provides a statewide framework for managing, accessing, and protecting the Washington's significant shorelines including rivers, lakes, and coastal waters, including the consideration of significant cultural resources in these areas.

Regulation, Statute, Guideline	Description
Local	
Historic Preservation Ordinance of Cowlitz County (CCC 18.80)	Provides for the identification, evaluation, designation, and protection of designated historic and prehistoric resources within Cowlitz County. Maintains a local register of historic places.
Longview Historic Preservation Ordinance (LMC 16.12)	Safeguards the heritage of the City of Longview by the identification, evaluation, designation, and protection of historic properties. Maintains a local register of historic places in each jurisdiction.

Notes:
USC = United States Code; NRHP = National Register of Historic Places; RCW = Revised Code of Washington; DAHP = Washington State Department of Archaeology and Historic Preservation; LMC = Longview Municipal Code; NHPA = National Historic Preservation Act; CCC = Cowlitz County Code

3.4.2 Study Area

The study area for cultural resources consists of the project area, the areas of the Columbia River that would be directly affected by overwater structures and dredging, and surrounding areas that would be affected by the construction of the Proposed Action (Figure 3.4-1). The study area also includes vantage points on the Oregon side of the Columbia River along U.S. Route 30 (US 30) to account for potential visual effects.

3.4.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on cultural resources associated with the construction and operation of the Proposed Action and No-Action Alternative. This section also addresses how Cowlitz County and the Corps have initiated consultation with the Washington State Department of Archaeology and Historic Preservation (DAHP), City of Longview, Bonneville Power Administration (BPA), National Park Service, potentially affected Native American tribes, and the Applicant regarding the Proposed Action and potential impacts on cultural resources.

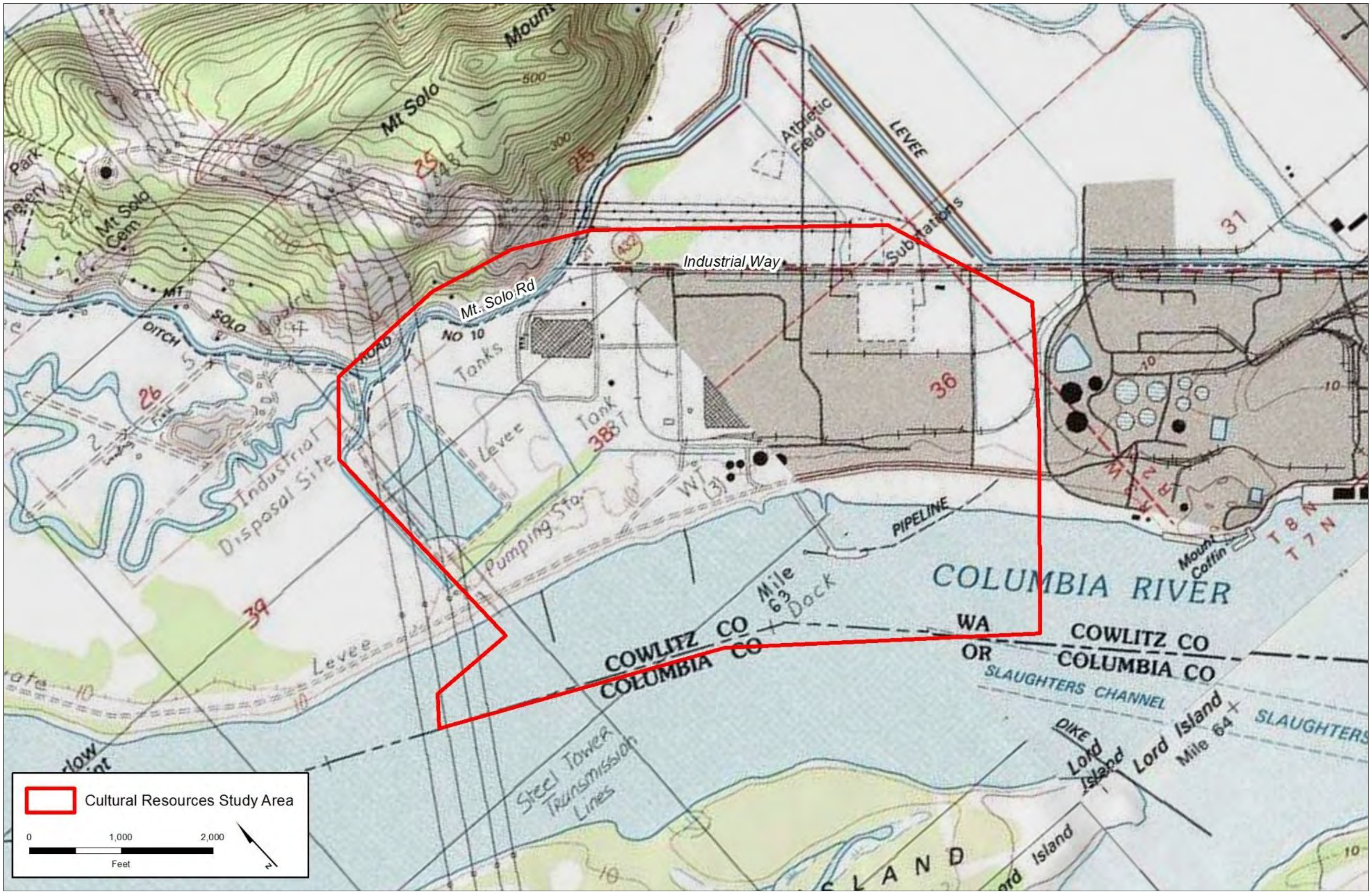
3.4.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on cultural resources in the study area.

Data Sources

A literature review and records search was conducted to establish prehistoric and historic contexts and to identify previously recorded cultural resources in the study area.

Figure 3.4-1. Cultural Resources Study Area—U.S. Geological Survey Map



These efforts used the following sources of information.

- A search of DAHP's Washington Information System for Architectural and Archaeological Records Database (WISAARD) for previously completed cultural resources studies and previously documented archaeological, ethnographic, and historical resources within a 1-mile radius of the project area. An initial DAHP file search was conducted in November 2011. Updated searches of data at DAHP were completed in November 2013 and again in November 2014.
- Primary and secondary resources from local repositories, including the Cowlitz County Historical Museum.
- Historic maps, including General Land Office plat maps and topographic quadrangle maps from the U.S. Geological Survey (USGS).
- Geological and historical documents and prior geotechnical studies that characterize the local geology and landform development history.
- Aerial photographs from the 1960s obtained from the Applicant and additional aerial photographs from the Cowlitz County Historical Museum.
- Interviews with former employees of the former Reynolds Metal Company facility (Reynolds facility), currently employed by the Applicant, conducted in November 2014.
- Outreach efforts and consultation with affected tribes.

Information for this section was also extracted from the following technical reports. These documents contain confidential historic and archaeological information and access to this information is restricted by the National Historic Preservation Act of 1966, as amended, and the Archaeological Resources Protection Act of 1979, as amended. These documents are only available to agencies with jurisdiction.

- *Identification of Historic Properties: Existing Information and Proposed Research, Millennium Coal Export Terminal, Cowlitz County, Washington—June 19, 2015* (AECOM 2015)
- *Identification of Historic Properties: Existing Information and Proposed Research, Millennium Coal Export Terminal, Cowlitz County, Washington—August 18, 2015* (AECOM 2015)
- *Historic and Cultural Resources Assessment, Millennium Coal Export Terminal, Cowlitz County, Washington—October 1, 2015* (AECOM 2015)

Fieldwork

Field investigations were conducted between 2011 and 2015 to identify cultural resources in the study area. These investigations considered the archaeological and historical resources and the landform development of the project area.

- Windshield survey and walkthrough of the study area in November 2011 to assess existing conditions.
- Historic resource surveys conducted in April 2014 and January 2015 to prepare a historic property inventory of resources associated with the former Reynolds facility, which is part of the Applicant's leased area. The architectural inventory included photographic documentation, resource descriptions, and statements of significance for buildings, structures, and landscape

features. Individual resources were recorded on Washington Historic Property Inventory forms in WISAARD. In addition, a nomination form for the National Register of Historic Places (NRHP) was prepared for the former Reynolds facility for evaluation as a historic district.

- Pedestrian survey of the study area in January 2015, to document landscape features associated with the former Reynolds facility such as several former landfills and surface impoundments. These features were documented as individual resources on Washington Archaeological Site forms, per guidance from DAHP and the Corps. Building foundations associated with the South Plant portion of the former Reynolds facility were likewise documented as an archaeological site, consistent with protocols established through consultation with DAHP and the Corps.
- Geotechnical investigations of upland soils in the project area using two sampling methods: geoprobing[1] and mud rotary coring. Geoprobe sampling was used to recover 21 intact, sediment cores to anticipated maximum depths of 25 feet (the maximum depth of the Proposed Action's anticipated compression effects). A maximum total volume of 1.23 cubic feet was recovered from each geoprobe sample. Seven geotechnical borings were drilled to a minimum depth of 70 feet (the maximum depth of proposed support piles). The 70-foot cores were drilled using a mud rotary method and sediment samples were obtained using split-spoon samplers and Shelby tubes. A maximum total soil volume of 2.03 cubic foot was recovered from each geotechnical boring. Soil samples were collected from two cores for radiocarbon dating and from three cores for tephra[2] identification. These efforts helped determine the chronology of the landform creation in the project area and the area's potential to contain archaeological resources.

Research Design

Research and field data described above were collected, compiled, and analyzed by qualified cultural resources professionals. A research design for the identification and evaluation of cultural resources was prepared for the Proposed Action in June 2015 (McDaniel et al. 2015 cited in AECOM 2015). This document provided the following information used to refine identification of resources.

- A definition of the affected environment.
- A photographic inventory of former buildings at the South Plant portion of the former Reynolds facility.
- An archaeological work plan.
- An analysis of potential impacts on shorelines caused by increases in marine vessel traffic.
- A comprehensive study of historical channel migration at the study area. The latter addressed the potential for cultural resources to be present in the proposed in-water dredge prism (the extent of the area to be dredged).

3.4.3.2 Impacts Analysis

The following methods were used to identify and evaluate the potential impacts of the Proposed Action and No-Action Alternative on cultural resources.

[1] A geoprobe is a tubular tool driven into the ground to sample soil.
[2] Tephra is fragmental material produced by a volcanic eruption.

The shoreline analysis included a desktop review of information sources and the development of a geographic information system (GIS) model. The GIS model helped identify previously documented archaeological sites as the most at risk for shoreline erosion. These sites were then inspected at a reconnaissance level. The historical channel analysis included an assessment of historical bathymetric and channel migration data to address in-water conditions in the study area and the potential for eroded cultural materials to be present in the proposed dredging prism.

Historic Resources

For historic resources, buildings and structures at least 45 years old in the study area were evaluated to determine their eligibility for listing in the NRHP and the Washington Heritage Register (WHR). An NRHP nomination form was prepared for the former Reynolds facility, so the many elements of the property could be evaluated as a possible historic district. The nomination form comprehensively accounted for all buildings, structures, and landscape features situated on the former Reynolds facility.

Archaeological Resources

For archaeological resources, field investigators were precluded from using traditional methods of subsurface archaeological investigation, such as exploratory shovel probing or trenching, due to existing development and the depths of fill materials within the study area. Instead, prior geotechnical studies and over 100 previous geotechnical bore logs were reviewed to address the extent of fill within the study area and the potential existence of buried archaeological remains (Anchor QEA 2011; GRI 2012, both cited in AECOM 2015). These data were used to help guide the placement of additional deep test borings (Bundy 2010; Anchor QEA 2012, both cited in AECOM 2015), as described in Section 3.4.3.1, *Information Sources, Fieldwork*. The prior studies and the soil samples indicated a potential for direct impacts on cultural resources in the study area. Impacts were determined by evaluating if construction and operations would alter any characteristic of a cultural resource that qualifies the resource for inclusion in the NRHP or the WHR, or affect a recorded archaeological site.

3.4.3.3 Agency and Tribal Consultation

The Corps has initiated consultation with Cowlitz County, DAHP, the City of Longview, BPA, National Park Service, potentially affected Native American tribes, and the Applicant regarding the Proposed Action and potential impacts on cultural resources. In addition, the Corps has conducted a review of what it defines as the Proposed Action in compliance with Section 106 of the NHPA. The Corps is currently consulting under Section 106. The Corps expects a Memorandum of Agreement will be signed by the Corps and consulting parties and will stipulate measures to help mitigate the Proposed Action's impacts on cultural resources in the study area.

3.4.4 Existing Conditions

This section describes the existing environmental conditions in the study area related to cultural resources that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

3.4.4.1 Setting

This section provides the context and setting for cultural resources in the study area.

Precontact Context

Studies of the archaeology and prehistory of the Pacific Northwest divide the prehistory of the region into multiple phases or periods from about 6,000 years Before the Common Era (BCE) to the 1850s. These periods are delineated by changes in regional patterns of land use, subsistence, and tool types over time. These periods are academic constructs and do not necessarily reflect Native American viewpoints. A generally accepted cultural sequence for the prehistory of the lower Columbia River region consists of four periods (Minor 1983 cited in AECOM 2015). These periods include the Youngs River complex (6000 to 4000 years BCE), the Seal Island phase (4000 BCE to the Common Era [CE] 0), the Ilwaco phase (CE 0 to 1775), and the Ethnographic period (CE 1775 to 1851).

The Youngs River complex corresponds to the end of the Archaic period. It is defined by sites with lanceolate and shouldered-lanceolate points, stemmed scrapers, and bola stones (Pettigrew 1990 cited in AECOM 2015). The later Seal Island phase is characterized by broad-necked stemmed points, cobble flake tools, harpoon darts, adzes, netsinkers, and atlatl weights, as well as the emergence of large shell middens along the coast. Intensive fishing activities are indicated by these material items. During the Ilwaco phase, a generally more diverse artifact assemblage emerged, indicative of bow and arrow technology and the use of composite toggling harpoons, and permanent villages with large houses were present. The Ethnographic period is distinguished from the earlier Ilwaco phase by the introduction of nonaboriginal artifacts and an increase in exotic personal items including shell, glass, and copper beads.

Ethnographic Context

The study area falls within the territory principally used by two groups. The Cathlamet, an Upper Chinookan-speaking people, resided along the Columbia River, east of the Lower Chinook and west of the Multnomah groups. The Cowlitz, a Salish-speaking group, resided in the Cowlitz River drainage from its mouth to below Mayfield Dam, along segments of the Toutle, Newaukum, and South Fork of the Chehalis Rivers (Curtis 1913; Hajda 1990; Silverstein 1990, all cited in AECOM 2015). During the early 19th century, the Skilloot, a subset of the Chinookan Cathlamet, resided along both sides of the Columbia River near the study area (Lewis 2013 cited in AECOM 2015). These peoples were prolific traders who transported goods between coastal groups and interior tribes (Kinkade 1997; Thorsgard et al. 2013 cited in AECOM 2015).

Native groups subsisted primarily on salmon and supplemented their diet with seasonal plant and animal resources, including berries, camas, wapato, deer, elk, bear, and waterfowl. Tribes seasonally fished and gathered roots along the Longview waterfront (Nisbet 2003:127 cited in AECOM 2015) and fishing camps were temporarily inhabited along the Columbia River (Minor 1983:72–73 cited in AECOM 2015). Houses and longhouses constructed from cedar planks were built along the Columbia River and its tributaries. Funeral customs along the lower Columbia River included the placement of the deceased in canoes elevated on trees or posts (Boyd 2013:196 cited in AECOM 2015). Graveyards were commonly located on islands or plots located near the river (Ray 1938:75 cited in AECOM 2015).

One such burial location in the vicinity of the study area was Mount Coffin. Called *Yee-eh-mas-tee*, Mount Coffin was a 240-foot-high knoll composed of volcanic rock situated on the north bank of the Columbia River approximately 0.7 mile southeast of the project area (Thorsgard et al. 2013; Moulton 1990:29-30). The site is commonly confused with Coffin Rock, a physically similar landform located about 7 miles upriver. Mount Coffin was a prominent navigational feature on the Columbia River and even more significant as a distinctive burial site, which remains important to Native American tribes in the region. Beginning circa 1906 and continuing through the 1950s, quarrying of Mount Coffin's volcanic rock gradually reduced the landform in size until it was removed.

Contact with European Americans prompted rapid change to traditional life among Native Americans. Disease devastated native populations and large groups of European-American settlers and homesteaders entering the region supplanted the local indigenous communities. The U.S. government entered into treaties with local Native Americans during the 1850s. Chinookan Cathlamet peoples, including the Skilloot, were signatories to a treaty that ceded their lands in 1851. Along with several other Lower and Middle Chinook groups, many eventually relocated to the Grand Ronde Reservation (Lewis 2013; Ruby and Brown 1992:12, 25, 208, both cited in AECOM 2015). Nonreservation Cathlamets combined with other tribes into the Chinook Nation in 1951 to file a claim with the Indian Claims Commission; the Chinook Nation continues to apply for federal recognition (Fisher and Jette 2013; Ruby and Brown 1992:2, both cited in AECOM 2015). The Cowlitz Tribe attended the Chehalis River Treaty Council in 1855 but did not sign a treaty because a reservation in their territory was not offered (Ruby and Brown 1992:70-71 cited in AECOM 2015). Some removed to the Chehalis Reservation after 1864, and others continued to reside in the Longview area (Weber, Denni, and Maxey 2012:25 cited in AECOM 2015). Local Cowlitz maintained an independent organization that became federally recognized as an Indian tribal government in 2000 (Hajda 1990:514–515 cited in AECOM 2015).

Historic Context

The first nonnative group to visit the region was a 1792 British expedition led by Lieutenant Broughton under the command of George Vancouver. This group explored the Columbia River from its mouth to the Sandy River (Mockford 2005:552 cited in AECOM 2015). Other later explorers included Hudson's Bay Company fur traders and members of the 1805–1806 Lewis and Clark expedition (Nisbet 2003 cited in AECOM 2015). Intensive settlement of the territory by European Americans began following passage of the Donation Land Act of 1850. During this period, Oregon Trail emigrants settled along the Columbia River near what later became the City of Longview. These early pioneers established the communities of Monticello (or Mount Solo) on the present site of Longview in 1850, the town of Mount Coffin (named after the prominent landform on the Columbia River; later renamed LaDu), and a settlement near what is now Barlow Point.

The property in the study area was eventually acquired and developed for industrial uses beginning in the early 20th century. The Star Sand and Gravel Company of Portland began quarrying rock from Mount Coffin east of the study area in 1906 and the Long-Bell Lumber Company established a large lumber mill in this same area in the 1920s. North of the study area, the Long-Bell Lumber Company also established the town of Longview as a planned community to support its operations. Considered the world's largest mill at the time, construction of the 2,000-acre mill changed the character of the Columbia River waterway by replacing its agricultural farms with a new industrial setting (Ramsey 1978:169-171, 196 cited in AECOM 2015).

As part of this construction, the Long-Bell Lumber Company built 15 miles of levee to protect its operations from flooding (McClary 2008 cited in AECOM 2015). Settlers had previously constructed dikes to protect the Columbia River's low-lying valley lands as early as the 1890s. In 1894, a record-setting flood led to the passage of legislation enabling the formation of diking and drainage districts. Diking District No.1 was created in 1911 to minimize seasonal and event-level floods and was the first flood management district in Cowlitz County (Erlich 2008:10-11 cited in AECOM 2015). The district constructed a levee near the study area in 1913 (Wilt 1972 cited in AECOM 2015).

Rapidly increasing industrial, commercial, and residential growth generated the need for a uniform stormwater management and flood-protection program in the early 1920s. As a result, six diking districts were combined to form the Consolidated Diking Improvement District (CDID) #1 in 1923. The Long-Bell Lumber Company worked with CDID #1 to enlarge and expand the area's existing system of dikes to protect the company's mill and town sites (Erlich 2008:11; McClelland 1976:20 both cited in AECOM 2015). CDID #1 and the Corps raised the levees in 1949 with additional improvements in later years to better facilitate stormwater removal and accommodate new developments (Consolidated Diking Improvement District #1 2013 cited in AECOM 2015).

No development is known to have occurred within the study area prior to the 1940s, except for the levees and diking improvements. In 1929, the Weyerhaeuser Timber Company built its sawmill on a 700-acre site east of the study area, between it and the Long-Bell Company mill. However, the study area itself remained primarily agricultural until the construction of the former Reynolds facility in the study area, beginning in the early 1940s.

In 1941, the Reynolds Metals Company established a new aluminum reduction plant on 400 acres of riverfront property west of the Long-Bell Lumber Company, acquired from the Long-Bell Lumber Company. The new facility benefited from rail and water transportation access, an abundance of wood for fuel and facility construction, and major hydroelectric power provided by BPA along the Columbia River (McClary 2008; Donovan and Associates 2013:2, both cited in AECOM 2015). The Reynolds Metal Company entered into a 20-year contract with BPA for 40,000 kilowatts of power to serve the facility (Bonneville Power Administration 1953:3 cited in AECOM 2015).

The Reynolds Metals Company completed construction of its Longview plant in November 1942. The plant was designed as a duplicate of the company's older aluminum plant in Listerhill, Alabama, and primarily consisted of those structures built in the South Plant area. The consulting engineer for the plant's construction was the J. E. Sirrine & Company of Granville, South Carolina and the builder was Austin & Company of Seattle, Washington. To prepare the property for construction of the new plant, the Reynolds Metals Company placed extensive amounts of fill behind the existing river levees to raise the property's elevation from between 5 and 10 feet to a level surface across the site (Bechtel Engineering 1968 cited in AECOM 2015).

The now-former Reynolds facility was one of five Pacific Northwest aluminum plants constructed before and during World War II. Aluminum was an important component of shipbuilding during World War II, and these plants supplied large quantities of the metal to the Kaiser Shipyards in Portland, Oregon, and Vancouver, Washington, in addition to many other wartime production facilities throughout the region (Oregon Blue Book 2014 cited in AECOM 2015). Four additional aluminum-reduction plants were built in the Pacific Northwest during the postwar period. Only two plants are still actively used for aluminum reduction today.

Following World War II, the aluminum industry grew rapidly in the 1950s and 1960s with the introduction of innovative new products and rising consumer demand. To accommodate this growth, the Reynolds Metals Company “modernized” its Longview plant. The company expanded its existing production lines in the South Plant in the early 1950s and further increased the plant’s capacity in the late 1960s by expanding and altering the existing plant and constructing additional facilities at the property's western end. These improvements more than doubled the Longview plant’s production capacity by 1969, making it the third largest employer in Cowlitz County and one of the largest aluminum manufacturers in the Pacific Northwest (Weber, Denni, and Maxey 2012:84 cited in AECOM 2015).

Over the next 30 years, the aluminum industry gradually declined in the Pacific Northwest. The Reynolds Metals Company continued operations at its Longview plant until 2000, when it was purchased by Alcoa, Inc. as a wholly owned subsidiary. Alcoa operated the plant through 2001. Thereafter, the property was owned and operated by several companies and investment groups until it was fully decommissioned by Chinook Ventures, Inc. in 2005. The property is currently owned by Northwest Alloys who sold the plant’s assets to the Applicant in January 2011 (Donovan and Associates 2013:3 cited in AECOM 2015).

3.4.4.2 Archaeological Resources

This section describes the results of archaeological investigations within the study area, including previous and current archaeological surveys and geotechnical monitoring conducted for the Proposed Action.

Archaeological Surveys

No previously recorded archaeological sites are known to exist within or in the immediate vicinity of the study area. The pedestrian archaeological surveys conducted in January 2015 identified eight landscape features in the study area, which were newly documented as archaeological sites. These eight documented sites consist of three landfills, four fill deposits, and the area of the former South Plant. All eight sites were associated with the former Reynolds facility. Seven were determined to be 45 years of age or older. Of these, six were found to retain good integrity. These six sites were determined eligible for listing in the NRHP as contributing elements of a NRHP-eligible historic district encompassing the former Reynolds facility.

The South Plant area and one landfill were determined not eligible for listing in the NRHP. The landfill was found to be less than 45 years of age. The South Plant area consists of recently demolished resources that no longer retained sufficient integrity to convey historical significance. Demolition of the resources in the South Plant area had previously occurred as a separate, unrelated project.

Geotechnical Investigations

No precontact archaeological resources were identified as a result of the geotechnical investigations. Observations made during the investigations generally correlated with the results of previous geotechnical work in the study area. These studies indicated that much of the study area was likely a stable, low-lying wetland prior to the relatively recent filling and industrial development, and possibly had been in this condition for thousands of years. The results were also consistent with historical General Land Office and USGS maps showing past landforms in the study area.

Fill materials were found to extend across the study area in depths of about 5 to 10 feet on average, except in the portions of the study area farthest from the Columbia River, where fill depths may be 1 to 2 feet. Fill materials are overlying native alluvial sediments. Most or all of the alluvium observed during the geotechnical investigations was determined to be from the Holocene Epoch with no substantial soil development, reaching depths of up to 70 feet. The Holocene alluvium was interpreted to have accumulated in channel, near-channel, or floodplain environments that would have been perennially or seasonally saturated, such as in a low-lying wetland. This conclusion was substantiated by the characteristic features of the soils.

Five samples of organic debris and tephra recovered during the geotechnical investigations were submitted for chronological dating to better understand landform formation in the study area. The chronological dates of these samples helped establish the overall pattern of depth, character, and thickness of alluvial sediments within the study area.

No potential archaeological resources were identified in the proposed dredge prism for the Proposed Action based on historical data and recent in-water surveys. Dredging of the Columbia River began in the late 1800s and has continued up to the present (Grette and Associates and Coast Harbor Engineering 2015 cited in AECOM 2015). Below-water surveys conducted for the Northwest Alloys remedial investigation and feasibility study indicate that this section of the Columbia River is subjected to fast-moving currents. A recent below-water hydrogeographic survey did not indicate the presence of anomalies (e.g., shipwrecks, piers, or canoes) in the proposed dredge prism for the Proposed Action (David Evans and Associates 2009 cited in AECOM 2015). Near-surface submerged deposits may have been subjected to substantial historic to modern disturbance via erosion (Grette and Associates and Coast Harbor Engineering 2015 cited in AECOM 2015).

3.4.4.3 Historic Resources

The historic resources survey identified four built environment resources in the study area. These resources are the former Reynolds facility, the CDID #1 levee, the BPA Longview Substation, and the Reynolds Federal Credit Union. The Lewis and Clark National Historic Trail, which is a nationally significant trail that traverses the study area, was also considered.

Reynolds Metals Reduction Plant Historic District

The former Reynolds facility was evaluated as a historic district and documented on an NRHP nomination form as part of the concurrent Section 106 review undertaken by the Corps (Gratreak et al. 2015). Referred to as the Reynolds Metals Reduction Plant Historic District, the property was determined eligible for listing in the NRHP through this process as a historic district under NRHP Criteria A and C.[3] Under Criterion A, the historic district's buildings and structures are associated with the aluminum industry's major growth periods during World War II and through the 1960s.

[3] The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
B. That are associated with the lives of significant persons in our past; or
C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. That have yielded or may be likely to yield, information important in history or prehistory.

Under Criterion C, the former Reynolds facility represents the aluminum industry's development in the Pacific Northwest and conveys its trend toward functional integration that occurred between World War II and the 1960s, which led to combining the reduction process with product manufacturing. The Reynolds Metals Reduction Plant Historic District consists of 53 separate resources, including 33 buildings, 12 structures, and eight landscape features (recorded as the aforementioned archaeological sites). Of these 53 identified resources, 39 were determined to contribute to the historic district's significance. Fourteen resources were determined to be noncontributing elements to the historic district because their construction postdates the historic district's period of significance or they have been heavily altered.

CDID #1 Levee and the BPA Longview Substation

The CDID #1 levee and the BPA Longview Substation were both determined to be contributors to the Reynolds Metals Reduction Plant Historic District and individually eligible for listing in the NRHP.

Lewis and Clark National Historic Trail

The portion of the Lewis and Clark National Historic Trail that traverses the study area is known as the Lower Columbia River Water Trail. No individual sites associated with the Lewis and Clark National Historic Trail were identified in the study area. The National Park Service is currently identifying high potential historic sites and high potential route segments along the trail; however, this list has not been released to the public (Gladstone 2014 cited in AECOM 2015). Because of the significant industrial development along on the north side of the Columbia River, it is unlikely that landscape features in or near the study area would contribute to the significance of the Lewis and Clark National Historic Trail.

Other Historic Resources

The Reynolds Federal Credit Union building was evaluated as not eligible for listing in the NRHP. Outside the study area, the nearest recorded historic property is the J.D. Tennant house, or Rutherglen Mansion, which is listed in the NRHP. This property is located approximately 0.5 mile north of the study area at the base of Mount Solo. Two cemeteries are also located on Mount Solo about 1.2 miles north of the study area: Longview Memorial Park Cemetery and Mount Solo Cemetery.

3.4.4.4 Culturally Significant Properties

No culturally significant properties were identified within the study area. Outside the study area, four ethnographic sites are known to exist within several miles of the study area close to the Columbia River: three Native American village locations and the site of Mount Coffin. The latter is significant to the Confederated Tribes of the Grand Ronde Community of Oregon and has been identified as a traditional cultural property eligible for listing in the NRHP. Although other areas of ethnographic significance may be located near the study area, they are not documented in the available literature.

3.4.4.5 Rail and Vessel Corridors in Washington State

While not part of the stated study area, this section considers presence of cultural resources along the rail and vessel transportation corridors associated with the Proposed Action in Washington State. These corridors extend beyond the study area considered by the Section 106 review process led by the Corps and were not included as part of that undertaking. WISAARD and the aforementioned information sources were used to identify previously recorded cultural resources outside the study area in the vicinity of the rail and vessel transportation corridors and to establish possible resource types in these areas.

Rail Transportation Corridor

Archaeological Resources

Several types of archaeological resources may occur along the rail transportation corridor. The precontact and ethnographic contexts of the Columbia River basin indicate that the river and its many tributaries were important for habitation and resource gathering, and as an inland travel corridor. Previously recorded archaeological sites and isolated finds are known to exist along the rail corridor, and there likely many more that have not been discovered. The types of precontact archaeological sites that might exist within the rail transportation corridor include village sites, camps, lithic scatters, cairns, rock alignments, house pits, petroglyphs, pictographs, shell middens, talus pits, burials, fishing stations, and trails. Historic-era archaeological sites are also present. The most common of these include historical agriculture, homestead, logging, and railroad-related properties.

The rail transportation corridor passes through seven known archaeological districts. The Plymouth District, Sk'in Village Cultural District, and Vancouver Lakes Archaeological District contain precontact and historic components. The Crow Butte Island District, Columbia Hills Archaeological District, Miller Island District, and Wishram Indian Village Site all contain precontact features and sites. The highest concentration of previously recorded archaeological resources along the Columbia River are situated near the Celilo Falls area at the confluence with the Deschutes River, The Dalles, and Portland Basin. The quantity and distribution of archaeological sites depends on the types of activities that occurred in the different geographic regions through which the rail transportation corridor passes and the level of archaeological inquiry that has occurred in these areas.

Historic Resources

Railroads were important to the development of Washington and several types of historic resources may occur along the Proposed Action's rail transportation corridor. These resources include previously recorded NRHP and WHR-eligible properties, as well as historically significant resources that have not yet been identified. Rail transportation has taken place along the banks of the Columbia River and contributed to the development of communities in this vicinity since the 1850s. As a result, historic resources are known to exist throughout this area with the highest concentration occurring in urbanized areas near Spokane and Vancouver. The types of historic resources typically found along the rail transportation corridor include railroad-related structures, single-family and multifamily residences, and commercial and industrial properties.

NRHP and WHR-eligible historic districts contain high concentrations of resources that are linked by their period of development and significance in American history. Several historic districts exist along the rail transportation corridor. These districts includes the Millwood Historic District, West Downtown Historic District, and Riverside Avenue Historic District in Spokane, the Ritzville Historic District and Cheney Historic District in Ritzville and Cheney, respectively, and the Fort Vancouver National Historic District in Vancouver. The latter is also a designated National Historic Landmark.

Vessel Transportation Corridor

Archaeological Resources

Precontact peoples used the upland shorelines of the Columbia River and its tributaries for habitation, plant gathering, and hunting; and the river itself for fishing and resource harvesting. Previously recorded archaeological sites and isolated finds are known to exist along the vessel transportation corridor, and there are likely many more that have not been discovered. The types of precontact archaeological sites and culturally significant properties that might exist within the vessel transportation corridor are similar to those that might occur in the rail transportation corridor. The highest concentration of previously recorded archaeological resources occurs near the Columbia River mouth. However, the quantity and distribution of archaeological sites depends on the types of activities that occurred in the different geographic regions through which the vessel transportation corridor passes and the level of archaeological inquiry that has occurred in these areas.

Historic Resources

The vessel transportation corridor contains concentrations of historic resources. The types of historic resources in these areas are similar to those found along the rail transportation corridor.

3.4.5 Impacts

This section describes the potential direct and indirect impacts related to cultural resources that would result from construction and operation of the Proposed Action and the No-Action Alternative.

3.4.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area as a result of construction and operation of the Proposed Action.

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Construction of the Proposed Action would occur adjacent to the current shoreline and include dredging and in-water construction of two docks in the Columbia River. This work would demolish 30 of the 39 identified resources in the study area that contribute to the historical significance of the Reynolds Metals Reduction Plant Historic District. The Proposed Action would adversely affect cultural resources through the demolition of buildings and structures that contribute to the Reynolds Metals Reduction Plant Historic District. The anticipated adverse impacts on these resources would diminish the integrity of design, setting, materials, workmanship, feeling, and association that make the historic district eligible for listing in the NRHP. If the Proposed Action is constructed, the Reynolds Metals Reduction Plant Historic District would no longer be eligible for listing in the NRHP.

The demolition of buildings and structures associated with the former Reynolds facility could affect the CDID #1 levee and the BPA Longview Substation. Both resources have been determined eligible for listing in the NRHP individually and as contributing elements of the Reynolds Metals Reduction Plant Historic District. The resources' integrity of setting and association would be diminished by the demolition of buildings and structures that contribute to the Reynolds Metals Reduction Plant Historic District, because the historic district would no longer be eligible for listing in the NRHP. Despite these impacts, the CDID #1 and BPA Longview Substation would remain individually eligible for listing in the NRHP.

The J. D. Tennant House is located on a terrace of Mount Solo about 0.5 mile north of the study area. This property is listed in the NRHP. The J. D. Tennant House, however, was oriented to face the former Long-Bell Lumber Mill (now Weyerhaeuser property), and is most closely associated with the lumber mill. The former Reynolds facility did not exist when the house was constructed. Although the J. D. Tennant House may have a view of the southeast corner of the project area, no adverse impacts are anticipated.

The Proposed Action would also involve the extension of dock supports and/or conveyors over the CDID #1 levee and the construction of support structure on either side of the resource. Impacts from these activities are expected to be minimal and would not diminish the levee's integrity as a flood control structure. Construction activities near the BPA Longview Substation would not affect its physical integrity and it would remain functional.

Because the upland areas of the project area landward of the levee consist largely of fill material that deeply covers a historic low-lying wetland, there is limited potential to encounter undocumented archaeological sites. However, as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, construction of the Proposed Action would require surface grading, compaction to a depth of approximately 25 feet, and pile driving to a depth of approximately 70 feet. Based on the results of the geotechnical investigations conducted in and near the project area, archaeological resources could exist in native soil below the existing fill. Geotechnical investigations indicated that the depths of fill in the study area typically range from 5 to 10 feet on average below the existing surface. The only impacts expected to extend below this depth are the compaction/displacement impacts and installation of deep piles associated with the coal stockpiling development area; neither activity would yield sediment for observation.

An Inadvertent Discovery Plan would address the discovery of any previously unidentified archaeological resources during construction.[4]

Construction—Indirect Impacts

Construction of the Proposed Action would not result in any indirect impacts on cultural resources because construction would be limited to the project area.

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[4] An Inadvertent Discovery Plan (also referred to as an Unanticipated Discovery Plan) outlines procedures to be followed if previously unknown archaeological or historical resources are discovered during project activities.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

Routine operation and maintenance of the coal export terminal are not expected to affect cultural resources in the study area. Remaining portions of the Reynolds Metals Reduction Plant Historic District would no longer be eligible for listing in the NRHP, due to a loss of integrity caused by the removal. The CDID #1 levee and BPA Longview Substation, meanwhile, would remain individually eligible for listing in the NRHP.

Archaeological resources in the project area discovered during construction could be vulnerable to inadvertent disturbance during routine operations and maintenance. If previously undocumented archaeological resources are encountered in the project area during routine operations, they would be addressed through implementation of an Inadvertent Discovery Plan.

Increased vessel transport could also affect the Lewis and Clark National Historic Trail. However, due to the industrial development near the study area, these impacts are anticipated to be minimal. The portion of the trail in the study area does not retain historic integrity. The features present during the Lewis and Clark expedition have been significantly modified by existing industrial development.

Operations—Indirect Impacts

Operation of the Proposed Action would not result in any indirect impacts on cultural resources in the study area.

Outside the study area within the rail and vessel transportation corridors, impacts on cultural resources were assessed qualitatively based on an expectation of the types of resources likely to be present and an assessment of how they could be affected by routine operations. Impacts were determined by evaluating if operations would alter any characteristic of a cultural resource (archaeological, historical, or culturally significant) that qualifies the resource for inclusion in the NRHP or WHR, or affect a recorded archaeological site.

Rail Transportation Corridor

Archaeological Resources

An increase in the duration of noise and visual interruptions from trains associated with the Proposed Action could impact the setting of archaeological resources along the rail transportation corridor. Increased dirt and dust from passing trains could affect the setting of these resources. These resources are currently subjected to existing rail traffic along existing rail lines.

Rail transport of coal under the Proposed Action would occur along existing railroad lines along the rail transportation corridor. Increased rail traffic along these railroad lines under the Proposed Action could affect resources located nearby as a result of visual and audible intrusions or vibrations. The setting of archaeological resources along the rail transportation corridor could be impacted.

As discussed in Chapter 5, Section 5.5, *Noise and Vibration*, the Proposed Action would result in noise impacts due to train's sounding their horns. However, increased noise from locomotive or car traffic alone (without horn sounding) would not result in noise impacts that would adversely affect cultural resources. Moreover, if resources along the line contain prominent and distinctive character-defining visual features, the alteration of the views from increased traffic would not affect these resources to the extent that they would no longer be considered historically significant (Section 3.3, *Aesthetics, Light, and Glare*). Therefore, impacts on archaeological resources as a result of routine rail transport under the Proposed Action are not considered significant.

Historic Resources

Similar to archaeological resources, historic resources could be impacted by increased rail traffic under the Proposed Action along the rail transportation corridor. Visual and audible intrusions or vibrations could affect resources located in the vicinity of the railroad lines. These impacts would be the same as those described above for archaeological resources. In addition, some historic resources along the rail transportation corridor, such as bridges, tunnels, and other features, associated with the existing rail system, could be impacted by increased usage that would degrade these rail facilities, necessitating more frequent repairs and limitations on use during repairs. Physical access to some historic resources could also be obstructed as a result of increased gate closures due to passing trains associated with the Proposed Action.

Vessel Transportation Corridor

Archaeological Resources

Vessel transport would occur within the existing navigation channel on the Columbia River. Increased vessel traffic under the Proposed Action could result in an incremental increase in shoreline erosion. The shoreline analysis concluded that impacts on archaeological sites along the lower Columbia River were not likely to result from an increase in Proposed Action-related vessel traffic because individual site conditions would inhibit, reduce, and or minimize vessel wake energy, thus minimizing the potential for measurable erosion from vessel wakes (McDaniel et al. 2015:88 cited in AECOM 2015).

Historic Resources

Visual and audible intrusions or vibrations could affect historic resources located in the vicinity of the vessel transportation corridor. These impacts would be the similar to those described above for the rail transportation corridor. Impacts on historic resources along the vessel corridor could include more frequent noise from increases in the number of vessels passing such resources. Historic resources along the vessel transportation corridor are subject to existing vessel traffic.

3.4.5.2 No-Action Alternative

Under the No Action Alternative, the Applicant would not construct the coal export terminal and impacts on cultural resources related to construction and operation of the Proposed Action would not occur. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses, including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

This new industrial development would be subject to environmental review under SEPA and/or NEPA and substantive regulatory approvals, including building demolition, and/or expanded industrial operations and the construction of upland facilities related to such potential operations. Such development could result in impacts similar to those described above for the Proposed Action.

3.4.6 Required Permits

Federal permits would be required from the Corps for what the Corps has defined as the Proposed Action. A decision by the Corps on whether to issue or deny a Department of the Army permit would be considered a federal undertaking subject to the requirements of NEPA and Section 106 of the NHPA. In compliance with Section 106 of the NHPA, the Corps has initiated consultation as described in Section 3.4.3.3, *Agency and Tribal Consultation.*

Based on the outcome of the Section 106 consultation process, the Applicant would be required to comply with the provisions of the Memorandum of Agreement to resolve adverse effects of the Proposed Action.

An Inadvertent Discovery Plan would be required to address any discovery of previously unidentified archaeological resources during construction. The Applicant would submit the plan to DAHP for review and would not begin construction until approval of the plan. The Inadvertent Discovery Plan would require work to immediately stop in the vicinity of a discovery and would require the Corps, Cowlitz County, DAHP, and potentially affected Native American tribes be notified. If archaeological resources are discovered, construction could be halted in the area until the Corps, in consultation with DAHP and tribes, determines the appropriate course of action.

3.4.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to cultural resources from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and environmental compliance that are assumed as part of the Proposed Action.

3.4.7.1 Applicant Mitigation

The Applicant would implement the following measure to mitigate impacts on cultural resources.

MM CR-1. Monitor Ground-Disturbing Activities

To protect archaeological resources that may occur in subsurface deposits, the Applicant will have a qualified professional archaeologist monitor ground-disturbing activities. If archaeological resources are discovered, construction could be halted in the area until the Corps, in consultation with DAHP and tribes, determines the appropriate course of action.

3.4.8 Unavoidable and Significant Adverse Environmental Impacts

Demolition of the Reynolds Metals Reduction Plant Historic District is an unavoidable and significant adverse environmental impact. The Memorandum of Agreement is currently being negotiated among the Corps, Cowlitz County, DAHP, City of Longview, BPA, National Park Service, potentially affected Native American tribes, and the Applicant. The Memorandum of Agreement may resolve this impact in compliance with Section 106 of the NHPA.

3.5 Tribal Resources

For the purposes of this EIS, the term *tribal resources* refers to tribal fishing and gathering practices and treaty rights, specifically, the collective rights and access to traditional areas associated with a tribe's sovereignty or formal treaty rights. These resources may include plants or fish used for commercial, subsistence, and ceremonial purposes.

This section describes tribal resources in the study area, including resources important to the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of Warm Springs, Cowlitz Indian Tribe, and Nez Perce Tribe as identified by the tribes, Columbia River Inter-Tribal Fish Commission and Bureau of Indian Affairs. It then describes impacts on tribal resources that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action and any remaining unavoidable and significant adverse impacts.

3.5.1 Regulatory Setting

Laws and regulations relevant to tribal resources are summarized in Table 3.5-1.

Table 3.5-1. Laws, Regulations, and Treaty Rights for Tribal Resources

Laws, Regulations, Court Cases, and Treaties	Description
Federal	
Treaty With The Yakama (1855)	Set aside reservation land and reserve fishing, gathering and hunting rights for the Confederated Tribes and Bands of the Yakama Nation.
Treaty with the Walla Walla, Cayuse, etc. (1855)	Set aside reservation land and reserve fishing, gathering and hunting, and pasturing rights for the Confederated Tribes of the Umatilla Indian Reservation.
Treaty with the Nez Perce (1855)	Set aside reservation land and reserve fishing, gathering and hunting rights for the Nez Perce Tribe.
Treaty with the Tribes of Middle Oregon (1855)	Set aside reservation land and reserve fishing, gathering and hunting for the Confederated Tribes of Warm Springs
United States v. Winans, 198 U.S. 371 (1905)	U.S. Supreme Court held that the Treaty with the Yakama of 1855, and similar treaties, protects tribal access rights to fishing, hunting, and other privileges on off-reservation lands.
United States v. Oregon 302 F. Supp. 899 (D. Or. 1969)	Ongoing federal court case that protects and implements the reserved fishing rights of Columbia River treaty tribes. The federal court continues to oversee the management of the Columbia River through the United States v. Oregon proceedings. Fisheries in the Columbia River and its tributaries are co-managed by the states of Washington, Oregon, and Idaho as well as four treaty tribes and other tribe's traditional fishing areas.

Laws, Regulations, Court Cases, and Treaties	Description
Endangered Species Act of 1973 (16 USC 1531 et seq.)	NMFS is responsible for managing, conserving, and protecting ESA-listed marine and anadromous species. All state and treaty fisheries are subject to review by NOAA Fisheries for compliance with the Endangered Species Act.
United States v. Washington, 384 F. Supp. 312 (W.D. Wash. 1974) "Boldt Decision"	Federal district court interpreted the rights of treaty tribes to take fish in their "usual and accustomed places in common with all citizens" to mean that treaty tribes have a treaty-reserved right to harvest 50% of the harvestable portion of fish.
Lower Snake River Compensation Plan (1975)	Compensation plan for loss of downstream-migrating juvenile salmon and steelhead at each of the four federal dams on the Snake River.
John Day Mitigation (1978)	Authorized by Congress is 1978 to mitigate the losses in salmonid spawning and rearing habitat caused by the construction of The Dalles Dam and John Day Dam with hatchery facilities.
Pacific Salmon Treaty (1985)	Agreement between Canada and the United States to prevent overfishing and optimize production with fisheries and enhancement programs. Ensures both countries receive benefits commensurate to the salmon production originating in their waters. Treaty was renewed in 1999 and 2009.
Secretarial Order 3206 (1997)	Clarifies the responsibilities of the Department of the Interior and Department of Commerce to ensure that Indian tribes do not bear a disproportionate burden for the conservation of listed species.
Final Determination to Acknowledge the Cowlitz Indian Tribe (2000)	Notice given that the Cowlitz Indian Tribe exists as an Indian tribe within the meaning of Federal Law – i.e., a Federally recognized Indian tribe (Final Determination, Federal Register Notice, 2000.02.18, 65 FR 8436-8438)
Executive Order 13175; Consultation and Coordination with Indian Tribal Governments (2000)	Establishes regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications
Reconsidered Final Determination to Affirm Decision to Acknowledge the Cowlitz Indian Tribe (2001)	Notice given to affirm the final determination that the Cowlitz Indian Tribe exists as an Indian tribe within the meaning of Federal Law – i.e., a Federally recognized Indian tribe (Reconsidered Final Determination, Federal Register Notice, 2002.01.04, 67 FR 607-608)
Columbia Basin Fish Accords (2008–2018) (2008)	Agreement between BPA, the Corps, Reclamation, the Confederated Tribes of Require adaptive management of dam operations to meet survival and passage needs of salmon.
Commerce Department Administrative Order (DAO 218-8) (2012)	Implements Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, and describes the actions to be followed by the Department of Commerce concerning tribal self-government, trust resources, treaty, and other rights.
Federal Columbia River Power System Biological Opinion (Supp. 2014)	As a supplemental biological opinion to the 2008 BiOp, verifies improvements at federal dams on the Columbia and Snake Rivers, habitat restoration, and other actions were in fact benefiting affected salmon and steelhead.

Laws, Regulations, Court Cases, and Treaties	Description
Grand Ronde v. Jewell (2014)	Reaffirmed the Federal Government's decision to acquire and hold in trust 152 acres in Clark County in the Cowlitz watershed for the Cowlitz Indian Tribe.
Public Law 100-581 – Nov. 1, 1988; Title IV – Columbia River Treaty Fishing Access Sites	Federal lands acquired by the Secretary of the Army and transferred to the Secretary of the Interior to be administered to provide access to usual and accustomed fishing areas and ancillary fishing facilities on the Columbia River for treaty tribes.
State	
Washington Department of Fish and Wildlife Hatchery and Fishery Reform (Policy C-3619) (2009)	Advances the conservation and recovery of wild salmon and steelhead by promoting and guiding the implementation of hatchery reform. Treaty fisheries are not subject to this policy, but this policy influences negotiations between the treaty tribes and Washington State on number of fish produced from hatcheries in the Columbia River, number of fish available for harvest, and fishing gear types.
Local	
No local laws, regulations, or treaties apply to tribal resources.	

Notes:
NMFS = National Marine Fisheries Service; ESA = Endangered Species Act; NOAA = National Oceanic and Atmospheric Administration; v = versus; BPA = Bonneville Power Administration; Corps = U.S. Army Corps of Engineers, Reclamation = U.S. Bureau of Reclamation; BiOp = Biological Opinion

3.5.2 Study Area

The study area for direct impacts on tribal resources consists of tribal resources in and near the project area that could be affected by construction and operation of the Proposed Action.

The study area for indirect impacts includes tribal resources and access to those resources that could be affected during rail transport along the expected rail routes for Proposed Action-related trains in Washington State. The study area for indirect impacts from Proposed Action-related vessel transport is the route for Proposed Action-related vessels in the Columbia River from the project area to 3 nautical miles offshore. The indirect study area also includes the Columbia River upriver to McNary Dam, including the tribal commercial, subsistence, and ceremonial fishing zone on the Columbia River known as Zone 6 (Figure 3.5-1).

3.5.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on tribal resources associated with the construction and operation of the Proposed Action and No-Action Alternative.

Figure 3.5-1. Tribal Resources Study Area

3.5.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on tribal fishing in the study areas. These sources focus on tribal fishing locations, times, and catch specifically to treaty harvest of salmon, steelhead and sturgeon.

- *SEPA Rail Transportation Technical Report* (ICF and Hellerworx 2017)
- *Final Environmental Impact Statement to Inform Columbia River Basin Hatchery Operations and the Funding of Mitchell Act Hatchery Programs* (National Marine Fisheries Service 2014)
- Information about Columbia River Treaty Tribes and Columbia River fishing sites (Columbia River Inter-Tribal Fish Commission 2015)
- Information about the Confederated Tribes of Warm Springs (Confederated Tribes of Warm Springs 2015)
- Columbia River treaties (U.S. Fish and Wildlife Service 2015)
- Information about Cowlitz Indian Tribe and fisheries (Cowlitz Indian Tribe 2015)
- Information about stock status and fisheries for chinook, coho, steelhead, and sturgeon (Washington Department of Fish and Wildlife and Oregon Department of Fish and Wildlife 2014, 2015)
- Conversation with Michael Broncheau, Columbia Treaty Fishing Site Manager, Columbia River Inter-Tribal Fish Commission, December 18, 2015

3.5.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on tribal resources.

Impacts on tribal resources were assessed by evaluating how the Proposed Action and No-Action Alternative could affect access to tribal resources in the study areas. The analysis considered information about fishing, gathering, gear and tools, and traditional areas provided by the tribes and agencies, including practices and areas used by the four treaty tribes (Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of Warm Springs, and Nez Perce Tribe) west of Bonneville Dam to McNary Dam. Salmon are central to the spiritual and cultural identity of the four treaty tribes.

The impact analysis evaluated how construction and operation of the Proposed Action could reduce the amount of time available to fish, change the time when fishers could deploy gear, or exclude members from fishing areas typically fished by tribal members.

3.5.4 Existing Conditions

This section describes the tribes and tribal resources in the study areas that could be affected by construction and operation of the Proposed Action and No-Action Alternative. This section provides the general context for tribal resources in the study areas.

As stated in Section 3.5.2, *Study Area,* the study areas include a tribal commercial, subsistence, and ceremonial fishing zone known as Zone 6. Zone 6 is a 147-mile section of the river that stretches from west of Bonneville Dam to McNary Dam, including tributaries (Columbia River Inter-Tribal Fish Commission 2015). Figure 3.5-2 presents an overview of Zone 6 and the five other zones along the Columbia River. Zone 6 is closed to non-treaty commercial fishing, but is open to sport fishers.

The Columbia River west of the Bonneville Dam is open to non-treaty commercial fishers and sport fishers. Tribal members may occasionally fish in the mainstem or tributaries west of Bonneville Dam to better access certain species or runs (*United States v. Oregon* 2008).

Salmon are central to the spiritual and cultural identity of the four Columbia River treaty tribes. Tribal members gather and camp at multiple sites along the Columbia River beginning in May and many stay until fall to harvest salmon and steelhead from the Columbia River and its tributaries (Broncheau pers. comm.). Thirty-one sites were established by Congress (Public Law 100-581 – Nov. 1, 1988; Title IV – Columbia river Treaty Fishing Access Sites) along the Columbia River in Zone 6 on the Washington and Oregon sides of the river to replace traditional sites inundated by the three Columbia River dams (Bonneville Dam, The Dalles Dam, and John Day Dam). The sites are near historical fishing villages and sites used by the tribes.

3.5.4.1 Tribes

The federally recognized tribes in the study area are the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of Warm Springs, Cowlitz Indian Tribe, and Nez Perce Tribe. The four treaty tribes that have reserved treaty rights for commercial, subsistence and ceremonial fishing are the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of Warm Springs, and Nez Perce Tribe.

Columbia River Tribal Fisheries

The Columbia River Inter-Tribal Fish Commission (CRITFC) consists of the four treaty tribes (Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of Warm Springs, and Nez Perce Tribe) with reserved rights to fish in the Columbia River and its tributaries. The CRITFC mission is to “coordinate management policy and provide fisheries technical services” to the treaty tribes (Columbia River Inter-Tribal Fish Commission 2015).

All fisheries in the Columbia River are co-managed by the states of Washington, Oregon, and Idaho, the four treaty tribes, and other non-treaty tribes that traditionally fished in the Columbia River, such as the Cowlitz Indian Tribe. Fisheries are managed by the states and treaty tribes subject to the terms of the *2008–2017 United States v. Oregon Management Agreement*.

This agreement establishes tribal treaty harvest allocations and upholds the right of tribes to fish for salmon in their usual and accustomed fishing grounds. Non-treaty commercial fisheries in these waters are managed under the Columbia River Compact, a congressionally mandated process that adopts seasons and rules for Columbia River commercial fisheries. All fisheries are subject to review by NOAA Fisheries for compliance with the Endangered Species Act. Enforcement of treaty fisheries is handled by CRITFC. This arrangement was established in 1972 as a method to recover the damaged fisheries of the Columbia River (Columbia River Inter-Tribal Fish Commission 2015).

Figure 3.5-2. Columbia River Fishing Zones

Source: Oregon Department of Fish and Wildlife no date.

The Columbia River downstream of McNary Dam is divided into six zones for fisheries management. Zones 1 through 5 are west of Bonneville Dam (western extent is Beacon Rock west of Bonneville Dam) and are managed for non-treaty commercial and sport fisheries. Zone 6 is a 147-mile section of the river that stretches from west of Bonneville Dam to McNary Dam, including tributaries (Columbia River Inter-Tribal Fish Commission 2015). Zone 6 also includes a short section west of Bonneville Dam. Zone 6 is set aside for the exclusive use by treaty commercial fishers, meaning it is closed to non-treaty commercial harvest; however, it is open to non-treaty sport fishers. Treaty tribe fishers may fish in the mainstem Columbia River or tributaries west of Bonneville Dam by special agreement to better access certain species or runs for commercial, subsistence, or ceremonial harvest (*United States v. Oregon* 2008). The Cowlitz Indian Tribe may schedule subsistence and ceremonial fisheries in coordination with Washington Department of Fish and Wildlife (WDFW) (e.g., eulachon/smelt fishery in the Cowlitz River).

Treaty catch of salmon, steelhead, sturgeon in commercial, ceremonial, and subsistence fisheries in Zone 6 of the Columbia River are reported in Table 3.5-2. Chinook salmon is the most abundant species in the reported catch. The largest portion being summer and fall run Chinook. Reported catch does not include salmon and steelhead harvested in tributaries entering the Columbia River in Zone 6, on the Columbia River upstream of McNary Dam, and on the lower Snake River. Catch in those fisheries are recorded by the tribes, but not centrally reported. Catch in the tributaries varies considerably across tributaries and the number of hatchery adults returning to the tributary. All tributaries entering the Columbia River between Bonneville Dam and McNary Dam have some tribal fishing.

Table 3.5-2. Annual Catch of Salmon, Steelhead, and White Sturgeon in Treaty Commercial, Ceremonial, and Subsistence Fisheries in Zone 6 of the Columbia River

Year	Chinook Catch (# fish)	Coho Catch (# fish)	Steelhead Catch (# fish)	White Sturgeon Catch (# fish)
2002	164,464	1,649	19,217	1,829
2003	147,344	5,670	20,553	1,539
2004	151,890	10,287	20,518	1,812
2005	128,509	5,413	17,413	2,052
2006	101,557	7,577	22,646	1,061
2007	54,380	8,035	22,416	1,285
2008	137,287	21,625	31,593	1,814
2009	137,602	15,675	38,255	1,837
2010	186,026	11,485	37,985	3,176
2011	169,819	25,998	31,848	3,818
2012	113,995	7,070	16,893	4,505
2013	255,815	8,850	21,418	3,051
2014	308,320	40,480	34,582	2,263
2015	333,040	2,956	19,781	1,368
Average	**170,718**	**12,341**	**25,366**	**2,244**

Notes:
Source: National Marine Fisheries Service 2014; Washington Department of Fish and Wildlife and Oregon Department of Fish and Wildlife 2014, 2015.

The Department of Interior through the Bureau of Indian Affairs has established 31 fishing access sites on the Columbia River between Bonneville Dam and McNary Dam for the exclusive use of the treaty tribal fishers (Public Law 100-581 – Nov. 1, 1988; Title IV – Columbia River Treaty Fishing Access Sites). The sites are managed by CRITFC for fishers from the four CRITFC member tribes. Three sites have shared-use facilities for the general public. These sites were set aside by U.S. Congress to provide fishing access to tribal fishers whose traditional fishing grounds were inundated by the Columbia River dams. The sites are culturally significant to the treaty tribes in that they are at or near traditional villages or fishing locations on the Columbia River. Of the 31 sites, 20 are located on the Washington side of the Columbia River. Many of the access points on the Washington side include a variety of amenities such as camping facilities, showers, and fish-cleaning stations. Four of the access sites are unimproved with no facilities. The sites are fenced, gated, and have signs stating they are not open to the general public. The general public may only enter a site to buy fish. Figure 3.5-3 provides a general overview of these access site locations.

Tribal fishers use the access sites to gather, camp, and to access fishing sites along the river by boat. Fishing sites are located along the entire 147-mile section of river on both sides of the river. Fishers also access fishing sites from the highway via unimproved dirt tracks at many other locations along the river (Broncheau pers. comm.).

The fishing access sites are heavily used by tribal fishers from May to October. In the last decade salmon and steelhead populations in the Columbia River have increased to levels that allow a commercial treaty fishery during this period. Treaty fishers set up residence at the sites in May take part in commercial, subsistence, and ceremonial fisheries and will stay there into October (Broncheau pers. comm.). At times during this period there may be as many as 80 tribal members camping at a site.

Commercial sales to the public can be directly from the bank at one of the access sites, be from tribal members, who purchase fish from the fishers, who then sell along the highway or from a nearby town, or by delivery to a fish processing station for distribution to other markets.

Fish gear used by tribal fishers to harvest salmon and steelhead from the Columbia River mainstem and its tributaries are a combination of set gillnets, bank and platform hook and line, and platform dip net gear (Columbia River Inter-Tribal Fish Commission 2015). The platform and hook-and-line subsistence fisheries are open all year to provide harvest opportunities to the tribal members. Gillnet commercial fisheries are managed by season and fish entering the river. Fisheries are set by month long to several day openings to manage total catch by species and run. The spring Chinook fishery is typically from mid-May to mid-June. Summer fisheries are targeting summer Chinook, sockeye, and summer Steelhead. Fall fisheries are targeting fall Chinook, steelhead, and coho salmon.

Treaty harvest of sturgeon in Zone 6 is by hook and line, setlines (line of hooks anchored to the bottom), and gillnets (set gillnets anchored to the bank) (Washington Department of Fish and Wildlife 2014). Most sturgeon are harvested during the winter season (January to March). The length of time a fishery is open is adjusted depending on the number of fish available for harvest and cumulative catch. Fishing can occur all seven days in the week when the fishery is open. Depending on number of fish available for harvest there may be an additional commercial fishery in the fall on sturgeon with a fixed duration of days. Subsistence fisheries on sturgeon are open all year.

Figure 3.5-3. Zone 6 Access Locations

Source: Columbia River Inter-Tribal Fish Commission 2015.

Eulachon (also known as Pacific or Columbia River smelt; scientific name *Thaleichthys pacificus*) return to the Columbia River to spawn in the mainstem Columbia River and its tributaries west of Bonneville Dam. Eulachon return every year to the lower Cowlitz River to spawn. Their harvest is a culturally important part of the tribe's subsistence and ceremonial fisheries and in some years tribal fishers from the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of Warm Springs, and Cowlitz Indian Tribe harvest this species from the lower Cowlitz River. Eulachon are harvested by dip net from the bank or from a boat.

Confederated Tribes and Bands of the Yakama Nation

The Confederated Tribes and Bands of the Yakama Nation (Yakama Nation) is a federally recognized tribe that consists of 14 bands and tribes including Kah-milt-pah, Klickitat, Klinquit, Kow-was-say-ee, Li-ay-was, Oche-chotes, Palouse, Pisquose, Se-ap-cat, Shyiks, Skinpah, Wenatshapam, Wishram, and Yakama. The Yakama Nation reservation is located in south central Washington State and spans across 1.2 million acres. The number of enrolled members as of 2011 was 10,200 (Columbia River Inter-Tribal Fish Commission 2015).

The Yakama Nation signed a treaty with the United States called the Treaty with the Yakama on June 9, 1855. This treaty reserved their inherent right to fish, hunt, and gather traditional foods and medicines throughout the ceded lands.

The Yakama Nation maintains a strong connection to salmon and the Columbia River. The tribes treaty "usual and accustomed lands" include the Columbia River and its tributaries and areas outside of the Columbia River Basin. Celilo Falls on the Columbia River near The Dalles, Oregon was an important gathering, fishing, and trading place for the tribe.

The Yakama Nation operates a fisheries program to protect their rights that were reserved by the 1855 Treaty, and to restore the Columbia River corresponding to their culture and traditions. The Yakama Nation Fisheries program includes over 11 subbasins, extending from the Willamette River upstream to the Methow River in the upper Columbia. The Yakama Nation people fish for salmon, steelhead, lamprey, and sturgeon for commercial, subsistence, and ceremonial purposes. Fishing locations include the mainstem Columbia River from west of Bonneville Dam to McNary Dam (Zone 6) and the tributaries flowing into the Columbia River on the Washington State side of the river. The Yakama Nation also maintains their right to hunt, gather roots and berries, and pasture their horses on open and unclaimed land on and off reservation.

The Yakama Nation is a participant in the Cowlitz River Hydroelectric Project license held by Tacoma Power (Tacoma Power 2000). The Yakama Nation has an interest in the protection and restoration of salmon and steelhead in the upper Cowlitz River. Yakama Nation fishers are not known to fish for salmon in the Cowlitz River. The Yakama Nation Fish and Wildlife Commission does authorize limited fishery openings for smelt for ceremonial or subsistence harvest by tribal members (Yakama Nation 2016).

Confederated Tribes of the Umatilla Indian Reservation

The Confederated Tribes of the Umatilla Indian Reservation are a federally recognized tribe that consists of three tribes. These tribes include the Umatilla, Cayuse, and the Walla Walla tribes (Columbia River Inter-Tribal Fish Commission 2015). They are located in northeastern Oregon and have a reservation that spans 172,000 acres. The enrolled population in 2011 was approximately 2,800 tribal members.

The Confederated Tribes of the Umatilla Indian Reservation and United States signed the Treaty with the Walla Walla, Cayuse, etc., 1855 on June 9, 1855. This treaty reserved their inherent rights to fish, hunt, and gather traditional foods and medicines throughout the ceded lands. The tribes still protect and exercise those rights within the 6.4 million acres of land in what is now northeastern Oregon and southeastern Washington (Columbia River Inter-Tribal Fish Commission 2015).

Traditionally the Confederated Tribes of the Umatilla Indian Reservation used the land for grazing their horses. They also gathered at hunting camps and to fishing sites to celebrate and trade. Traditional activities included travel to different areas to fish for salmon, to gather roots and berries at higher elevations in the summer and move to the lowlands to hunt in the fall and reside through the winter (Confederated Tribes of the Umatilla Indian Reservation 2015). Celilo Falls was an important fishing and trading area for the tribe.

They retain their rights to hunt and fish on “usual and accustomed” lands and work cooperatively with the WDFW to manage fisheries and wildlife. The tribe has focused their fish restoration activities on the Umatilla and Grande Ronde tributaries. In addition to the Columbia River, the tribe has co-management responsibilities for the Snake, Walla Walla, Tucannon, Grande Ronde, John Day, and Imnaha tributaries.

Confederated Tribes of Warm Springs

The Confederated Tribes of Warm Springs is a federally recognized confederation of tribes in Oregon (Columbia River Inter-Tribal Fish Commission 2015). It consists of the Warm Springs, Wasco, and Paiute tribes, and in 2011, the enrolled population was approximately 5,000 tribal members. The reservation is in Central Oregon and encompasses 640,000 acres. The Confederated Tribes of Warm Springs signed the Treaty with the Tribes of Middle Oregon, 1855 with the United States on June 9, 1855. The treaty reserved the confederation’s rights to fish, hunt, and gather traditional foods and medicines throughout the ceded lands.

In addition to fishing the mainstem Columbia River, tribal members fish with dip nets and nets set with wooden scaffolding on the Deschutes River, a major tributary of the Columbia River, at the falls near Sherar’s Bridge (Columbia River Inter-Tribal Fish Commission 2015). The economy of the confederation is based on natural resources, including hydropower, forest products, and ranching, as well as tourism and recreation (Confederated Tribes of Warm Springs 2015). In addition to the Columbia River, the Confederated Tribes of Warm Springs co-manages the Deschutes, Fifteenmile Creek, John Day and Hood River tributaries which are located in Oregon.

Cowlitz Indian Tribe

The Cowlitz Indian Tribe[1] was officially granted a reservation in Clark County in 2014 following a court decision issued by United States District Court on December 12, 2014. This decision dismissed an appeal by an opponent of the reservation and reaffirmed the Federal Government’s decision to

[1] The Cowlitz Indian Tribe became a federally recognized tribe on February 14, 2000 (Final Determination, Federal Register Notice, 2000.02.18, 65 FR 8436-8438 and Reconsidered Final Determination, Federal Register Notice, 2002.01.04, 67 FR 607-608).

take 152 acres in Clark County into trust for the Cowlitz Indian Tribe. The reservation is located approximately 20 miles south of Longview near the Lewis River.

The Cowlitz Indian Tribe does not have treaty reserved fishing rights on the Columbia River or in the Cowlitz River. However, the Cowlitz Indian Tribe has an active interest in protecting and restoring fish, wildlife, plants, and habitat on their ancestral lands. The Cowlitz Indian Tribe signed a Memorandum of Understanding (MOU) with WDFW to maintain healthy populations of fish and wildlife in southwest Washington as a common interest for both parties (Washington Department of Fish and Wildlife and Cowlitz Tribe n.d.).

In 2014, the Cowlitz Indian Tribe was awarded a grant from the National Oceanic and Atmospheric Administration (NOAA) for a eulachon species recovery program in the Cowlitz River (National Oceanic and Atmospheric Administration 2010). The Cowlitz Indian Tribe holds smelt, salmon, and river ceremonies on the Cowlitz River and participates with other tribes in canoe journeys on major waterways (Cowlitz Indian Tribe 2015).

Nez Perce Tribe

The Nez Perce Tribe is a federally recognized tribe that inhabits North Central Idaho (Columbia River Inter-Tribal Fish Commission 2015). Its reservation is 750,000 acres, and the enrolled population in 2011 was approximately 3,500 tribal members. The Nez Perce Tribe call themselves Nimi'ipuu - The People (Columbia River Inter-Tribal Fish Commission 2015). On June 11, 1855, the Nez Perce Tribe signed the Nez Perce Treaty with the United States. This treaty ensured the tribe's exclusive right of taking fish in all the streams that run through or border the reservation and the right for taking fish in usual and accustomed lands.

The Nez Perce Tribe was historically nomadic and traveled from the Great Plains to hunt buffalo, to Celilo Falls in the Columbia River Gorge to fish for salmon. Although its reservation is located outside of Washington State, the Nez Perce Tribe retains its reserved right to hunt within the state and work cooperatively with WDFW to manage fish and wildlife resources. The Nez Perce Tribe has established the Nez Perce Fish and Wildlife Commission and the Nez Perce Department of Fisheries Resources Management to conserve, enhance, and manage the tribe's natural resources. In addition to the Columbia River, the Nez Perce Tribe has co-management responsibilities for the Snake, Tucannon, Grande Ronde, Imnaha, Clearwater, and Salmon tributaries.

3.5.4.2 Tribal Resources in the Study Areas

The direct impacts study area consists of tribal resources in and near the project area. There are no known tribal resources in this study area. Adjacent aquatic or terrestrial habitat support culturally important species to tribes such as salmon, eulachon, and Columbian white-tailed deer. Lord Island is adjacent to the study area and is designated by WDFW as important Columbian white-tailed deer habitat.

Treaty tribal fishers access the Columbia River Zone 6 fishery at 31 established fishing sites in the section of river between west of Bonneville Dam and McNary Dam (Figure 3.5-3). Of the 31 sites, 20 are located on the Washington side of the Columbia River.

In addition to these managed sites, tribal fishers also access the river at many other unimproved points along the Zone 6 fishing area on the Columbia River (Broncheau pers. comm.).

3.5.5 Impacts

This section describes the potential direct and indirect impacts related to tribal resources that could result from the construction and operation of the Proposed Action and No-Action Alternative.

3.5.5.1 Proposed Action

This section describes the potential impacts that could occur in the study areas as a result of construction and operation of the Proposed Action.

Construction—Direct Impacts

As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include removing vegetation from the site, filling 24 acres of wetlands, demolishing existing structures and preparing the site, constructing the rail loop, driving piles and constructing docks, dredging Columbia River sediments, and constructing supporting infrastructure (i.e., conveyors and transfer towers). No tribal resource areas are in the direct impacts study area; therefore, construction of the coal export terminal including dock construction would not result in direct impacts on tribal resources. As described in Chapter 4, Sections 4.5, *Water Quality*, and 4.7, *Fish*, in-water construction-related activities such as dredging, pile-driving and dock construction could cause physical or behavioral responses in fish and would also affect and remove aquatic habitat. These impacts could reduce the number of fish surviving to adulthood and returning to areas east of Bonneville Dam as described below.

Construction—Indirect Impacts

Construction-related activities that could result in impacts on fish habitat, behavior, or survival are described in Chapter 4, Sections 4.5, *Water Quality*, and 4.7, *Fish*. As discussed in Section 4.7, *Fish*, underwater sound generated by impact pile-driving could affect fish in several ways, ranging from alteration of behavior to physical injury or mortality. However, pile-driving activities during construction would be conducted within an approved in-water work window, which would be defined as part of the permitting process for the Proposed Action. Adherence to the approved in-water work window would be protective of the most vulnerable life-history stages for affected fish and, thus, would minimize but not eliminate impacts on juvenile Chinook salmon, particularly subyearling fish. In addition, proposed mitigation measures presented in Section 4.7, *Fish*, would minimize but not eliminate impacts on fish, including injury as a result of pile-driving. Behavioral effects would likely occur to some individual fish if they were present in the area of effect. Construction-related activities could cause physical or behavioral responses in fish and would affect aquatic habitat, which could reduce the number of fish surviving to adulthood and returning to Zone 6, and could affect the number of fish available for harvest by the tribes.

Operations—Direct Impacts

Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*. Operation of the coal export terminal including dock operations would not result in direct impacts on tribal resources because tribal resource areas are outside the direct impacts study area.

Operations—Indirect Impacts

Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*. Operation of the Proposed Action would result in the following indirect impacts.

Potential to Affect Access to Columbia River Tribal Fishing Areas

Proposed Action-related trains would travel along the BNSF Railway Company (BNSF) main line adjacent to the Columbia River. Proposed Action-related trains could result in delays to tribal fishers' access to traditional fishing sites and delivery of fish to buyers. As described in Chapter 5, Section 5.1, *Rail Transportation*, approximately 34 trains per day traveled this route in 2015. By 2028, the number of trains is projected to increase to approximately 48 trains per day without Proposed Action-related trains. The Proposed Action would add 8 loaded trains per day by 2028, or an approximately 17% increase.[2]

Proposed Action-related trains would be approximately 1.3 miles long. The time for each Proposed Action-related train to pass at grade crossings would range from approximately 8.5 minutes at 10 miles per hour to 2.25 minutes if the train is traveling at 50 miles per hour. Proposed Action-related trains could increase delay of tribal fishers' access to the 20 managed fishing sites on the Washington side of the river as compared to conditions under the No-Action Alternative. While most of the access road crossings are not at-grade with the rail line, or the rail line is inland from the highway and river access site, trains could increase delay, which would affect tribal fishers' access to the established access sites managed by CRITFC.

In addition, tribal fishers access the Columbia River at multiple unmapped locations using unimproved, at-grade crossings (Broncheau pers. comm.). Proposed Action-related rail traffic could delay tribal fishers' ability to access these unmapped traditional fishing locations. The heaviest use of these sites is from May to October during summer salmon and steelhead season (Broncheau pers. comm.).

Potential to Affect Columbia River Fish Habitat and Fish Available for Harvest by Tribes

Potential impacts on aquatic habitat affecting fish behavior or resulting in physical injury from operations of the Proposed Action are described in Chapter 4, Sections 4.5, *Water Quality*, and 4.7, *Fish*. Fish stranding associated with wakes from Proposed Action-related vessels would likely occur, as discussed in Section 4.7, *Fish*. This potential impact is based on the understanding of the timing of outmigration of juvenile salmonids and genetic data that suggest the majority of the fish in the nearshore, shallow-water areas of the lower Columbia River (within the study area) tend to be subyearling Chinook salmon from the Lower Columbia River Evolutionarily Significant Unit, most of which likely originate below Hood River, mainly outside Zone 6. Nonetheless, operation of the Proposed Action could result in indirect impacts on tribal resources through Proposed Action-related activities causing physical or behavioral responses and by affecting aquatic and upland habitat. These impacts could reduce the number of fish surviving to adulthood and returning to Zone 6, and could affect the number of fish available for harvest by the tribes.

[2] Empty Proposed Action-related trains are expected to return via Stampede Pass and not through the Columbia River Gorge.

Potential to Affect Columbian White-Tailed Deer

Patches of potentially suitable, but mostly degraded, upland and wetland habitat in the undeveloped areas in the western portion of the project area, which could support foraging and cover for Columbian white-tailed deer, would be removed with construction of the Proposed Action. Because existing conditions currently hinder and create impediments for Columbian white-tailed deer movement along the Columbia River, construction of the Proposed Action would not have an impact on migration or movement of the species. During construction, project area noise levels would increase above ambient levels. Because wildlife in the terrestrial study area are likely habituated to noise levels associated with industrial areas and are generally mobile, construction-related noise could affect individuals of a species, but would not affect a species' whole population or the overall fitness of a population.

Mitigation would be required to compensate for the loss of wetlands and their habitat functions as part of the Clean Water Act Section 401 and Section 404 permit process. Columbian white-tailed deer and habitat are described in Chapter 4, Section 4.8, *Wildlife*. Habitat functions of wetlands in the project area are described in Chapter 4, Section 4.3, *Wetlands*.

Generate and Disperse Coal Dust in the Environment

Fugitive coal dust particles would be generated by the Proposed Action through the dispersal of coal dust during rail transport (Chapter 5, Section 5.7, *Coal Dust*). Maximum coal dust concentrations would occur within approximately 100 feet from the rail line, but total concentrations would not exceed applicable air quality standards, as described in Chapter 5, Section 5.7, *Coal Dust*. A review of the chemical composition of coal dust (U.S. Geological Survey 2007) suggests that the risk of exposure to concentrations of toxic materials (e.g., polycyclic aromatic hydrocarbons and trace metals) from coal dust are low because the concentrations are low and toxic materials are bound to coal and not easily leached.

As described in Chapter 4, Section 4.7, *Fish*, fugitive coal dust particles generated by the coal export terminal and Proposed Action-related trains would enter the aquatic environment through movement of coal into and around the project area and during rail transport. Fugitive coal dust and potential coal spills are not expected to significantly affect fish because the potential risk for exposure to toxic chemicals contained in coal would be relatively low (ranging from 1.99 grams per square meter per year adjacent to the project area to less than 0.01 gram per square meter per year approximately 2.4 miles from the project area). Fugitive coal dust entering the aquatic environment would be unavoidable, but would not be expected to affect behavior or survival of fish. Fugitive coal dust from operations of the Proposed Action would increase suspended solids in the Columbia River but is not expected to be at a level where there would be a demonstrable effect on fish distribution, abundance, or survival, or acute physical effects. Additionally, the potential risk for exposure to toxic chemicals contained in coal (e.g., polyaromatic hydrocarbons and trace metals) is expected to be relatively low because these chemicals tend to bind with coal and not quickly or easily leach. Coal particles would be transported downstream by river flow and either carried out to sea or distributed over a broad area.

3.5.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement. The Applicant's planned growth under the No-Action Alternative would require approximately two trains per day. If No-Action Alternative-related trains travel along the BNSF main line adjacent to the Columbia River in Washington State, access to tribal fishing areas along the Columbia River could be affected.

3.5.6 Required Permits

No permits related to tribal resources would be required for the Proposed Action.

Concurrent with the Washington State Environmental Policy Act (SEPA) review process, the Corps, as federal lead agency, is conducting a review of the Proposed Action under the National Environmental Policy Act (NEPA). Pursuant to NEPA, the Corps is assessing potential impacts of the Proposed Action on tribal resources, including potential impacts related to tribal sovereignty and treaty rights. The Corps published the NEPA Draft EIS on September 30, 2016. In addition, the Corps is consulting under Section 7 of the federal Endangered Species Act with the U.S. Fish and Wildlife Service and National Marine Fisheries Service. Additional measures may be identified under one or both of these processes that could further reduce potential impacts on fish, and therefore reduce potential impacts on tribal resources.

The Corps is also consulting under Section 106 of the National Historic Preservation Act. The Corps has initiated consultation with Cowlitz County, the Washington State Department of Archaeology and Historic Preservation, the City of Longview, the Bonneville Power Administration, National Park Service, potentially affected Native American tribes, and the Applicant regarding the Proposed Action and potential impacts on cultural resources. The Corps expects to sign a Memorandum of Agreement along with consulting parties, which will stipulate measures to help mitigate the Proposed Action's impacts on cultural resources.

3.5.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to tribal resources from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

3.5.7.1 Applicant Mitigation

The proposed mitigation measures identified in Chapter 4, Sections 4.5, *Water Quality*, and 4.7, *Fish*, to mitigate impacts on water quality and fish would also mitigate potential impacts on tribal fishing.

MM WQ-2. Develop and Implement a Coal Spill Containment and Cleanup Plan.

To limit the exposure of spilled coal to the terrestrial, aquatic, and built environments during coal handling, the Applicant will develop a containment and cleanup plan. The plan will be reviewed by Cowlitz County and Ecology and implemented prior to beginning export terminal operations. In the event of a coal spill in the aquatic environment by the Applicant during export terminal operations, action will be taken based on the specific coal spill, and the Applicant will develop a cleanup and monitoring plan consistent with the approved containment and cleanup plan. This plan will include water quality and sediment monitoring to determine the potential impact of the coal spill on the aquatic habitat and aquatic species. The Applicant will develop the cleanup and monitoring plan in coordination with Cowlitz County, Ecology, and the Corps. The cleanup and monitoring will be similar in scope to the monitoring completed for the Aquatic Impact Assessment (Borealis 2015) associated with a coal spill in British Columbia, Canada in 2014.

MM FISH-1. Implement Best Available Noise Attenuation Method for Pile-Driving.

To minimize underwater noise impacts on fish during pile-driving, the Applicant will employ the best available noise attenuation methods during pile-driving. These methods may include, but are not limited to, confined bubble curtain, temporary noise attenuation pile, double-walled noise attenuation pile, or other similar technology. The Applicant is currently proposing use of a confined bubble curtain, but other methods may be found to be better at attenuating noise impacts during the Endangered Species Act Section 7 consultation or by the time construction begins. Should other methods in the future prove to attenuate underwater noise better than a confined bubble curtain, those methods will be employed.

MM FISH-2. Implement a “Soft-Start” Method during Pile-Driving.

To minimize underwater noise impacts on fish during pile-driving, the Applicant will commence impact pile-driving using a “soft-start,” or other similar method. The “soft-start” method is a method of slowly building energy of the pile driver over the course of several pile strikes until full energy is reached. This “soft-start” method cues fish and wildlife to pile-driving commencing and allows them to move away from the pile-driving activity.

MM FISH-3. Monitor Pile-Driving and Dredging Activities for Distress to Fish and Wildlife.

To minimize the potential harm to marine mammals, diving birds, or fish, a professional biologist will observe the waters near pile-driving and dredging activities for signs of distress from fish and wildlife during these activities. If any fish or wildlife species were to show signs of distress during pile-driving, the biologist will issue a stop work order until the species are recovered, moved, or relocated from the area. The Applicant will immediately report any distressed fish or wildlife observed to the appropriate agencies (i.e., Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and National Marine Fisheries Service) and determine the appropriate course of action.

MM FISH-4. Conduct Eulachon Surveys.

Should in-water work be permitted to occur between December and May, the Applicant will conduct advance underwater surveys at least 1 year before in-water work would occur for eulachon (adult, eggs, and larvae) in those areas where in-water work would occur (i.e., Docks 2 and 3 and the dredge prism). Surveys would be conducted starting in December when water temperatures are near 40 degrees Fahrenheit (°F) in the lower Columbia River, which appears to trigger river entry for adults, and continue through May, when larval eulachon have generally hatched and drifted out of the system. Survey design and results would be provided to WDFW and National Marine Fisheries Service. If adult or larval eulachon or eulachon eggs are observed and in-water work is proposed, the Applicant would coordinate with the fish and wildlife agencies on the appropriate measures to avoid and minimize impacts on eulachon and implement those measures.

MM FISH-5. Conduct Fish Monitoring During Hydraulic Dredging Operations.

The Applicant will develop and implement fish community monitoring in coordination with WDFW, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. Fish community monitoring will include surveys conducted prior to dredging to identify fish species and life-stages present in the area to be dredged. As part of the coordination with WDFW, U.S. Fish and Wildlife Service, and National Marine Fisheries Service, measures to reduce the entrainment of fish anticipated to be present during dredging will also be developed, which may include timing restrictions for hydraulic dredging.

The Applicant will also develop and implement dredge entrainment monitoring for hydraulic dredging, in coordination with WDFW, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. Dredge entrainment monitoring will involve screening the dredge output at the point of discharge (i.e., barge) to determine the number, life-stage, and species of fish entrained by hydraulic dredging. The information gathered during dredge monitoring will be provided to WDFW, U.S. Fish and Wildlife Service, and National Marine Fisheries Service.

3.5.7.2 Other Measures to Be Considered

Other measures that could be implemented to mitigate impacts on tribal include the following.

- Proposed Action-related trains would travel along the Columbia River and could restrict use and access to tribal fishing areas in the river. To mitigate impacts on access to tribal treaty fishing areas, the Applicant could initiate a process with CRITFC officials to discuss and identify mitigation measures prior to beginning operations.
- BNSF and other stakeholders (such as the Federal Highway Administration, Federal Railroad Administration, Washington State Department of Transportation, Washington Utilities and Transportation Commission, and local jurisdictions) could coordinate with CRITFC to identify at-grade crossings or unimproved access points that are of particular concern to the treaty tribes and prioritize those crossings for potential improvements. Improvements at these locations could include tunneling under or bridging rail crossings for vehicle or foot access to sites. Improved access points could reduce the length of delays to tribal fishers attempting to access the Columbia River.
- As part of the federal consultation process, the Corps could continue consultations with treaty tribes to identify potential impacts and resolve conflicts related to the Proposed Action.

3.5.8 Unavoidable and Significant Adverse Environmental Impacts

Construction and operation of the Proposed Action could result in indirect impacts on tribal resources through Proposed Action-related activities causing physical or behavioral responses and by affecting aquatic habitat. These impacts could reduce the number of fish surviving to adulthood and returning to areas east of Bonneville Dam, which could affect the number of fish available for harvest by Native American tribes. Proposed Action-related trains would travel through areas adjacent to and within the usual and accustomed fishing areas of Native American tribes and could restrict access to tribal fishing areas in the Columbia River. Because other factors besides rail operations affect fishing opportunities, such as the number of fishers, fish distribution, timing, and duration of fish migration periods and seasons, the extent to which rail operations related to the Proposed Action would affect tribal fishing is difficult to quantify. Making a determination of significance related to treaty reserved rights is not part of this EIS.

3.6 Hazardous Materials

Hazardous materials are substances that could affect the safety of the natural environment. There are risks in using, storing, and transporting hazardous materials. If a hazardous material is released into the environment, it can contaminate the surrounding area and expose people and the environment to harm.

This section describes hazardous materials in the study area. Impacts related to hazardous materials that could occur as a result of construction and operation of the Proposed Action or under the No-Action Alternative are also discussed, as well as measures identified to mitigate impacts resulting from the Proposed Action.

3.6.1 Regulatory Setting

Laws and regulations relevant to hazardous materials are summarized in Table 3.6-1.

Table 3.6-1. Regulations, Statutes, and Guidelines for Hazardous Materials

Regulation, Statute, Guideline	Description
Federal	
Comprehensive Environmental Response, Compensation, and Liability Act (42 USC 103)	Regulates former and newly discovered uncontrolled waste disposal and spill sites identified on the National Priority List of contaminated sites and under the Superfund cleanup program.
Superfund Amendment and Reauthorization Act (40 CFR 302)	Amended CERCLA and requires reporting for emergency response, emergency release, and hazardous and toxic chemical releases.
Federal Resource Conservation and Recovery Act (42 USC 6901 et seq.)	Governs the generation, storage, and transportation of hazardous waste and waste management activities for hazardous waste treatment, storage, and disposal facilities. This is a delegated Washington State program under the Washington Hazardous Waste Management Act.
Toxic Substances Control Act (15 USC 2601–2629)	Tracks industrial chemicals in the United States and regulates intrastate and interstate commerce.
Clean Water Act (33 USC 1342, 1344; 40 CFR 230)	Regulates the placement of fill material in waters of the United States, including fill placement below ordinary high water elevation or within navigable waters or wetlands.
Department of Transportation Hazardous Materials Regulations (49 CFR 100–185)	Protect against the risks to life, property, and the environment and apply to all interstate, intrastate, and foreign transport of hazardous materials in commerce.
National Emission Standards for Hazardous Air Pollutants (40 CFR 61–71)	Set standards regulating the emission of these pollutants with EPA and the state implementing and enforcing them. Hazardous air pollutants are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.
Safe Drinking Water Act (42 USC 300f et seq.)	Requires the protection of groundwater and groundwater sources used for drinking water. Requires every state to develop a wellhead protection program.

Regulation, Statute, Guideline	Description
Occupational Safety and Health Act (29 USC 651 et seq.)	Enacted to "assure safe and healthful working conditions for working men and women." Sets standards and enforces inspections to ensure that employers are providing safe and healthful workplaces.
State	
Washington Water Pollution Control Permit Program	Requires that all releases to waters of the state of a reportable quantity must be reported to Ecology as soon as possible, but no later than 24 hours after discovery.
Model Toxics Control Act and its implementing regulations (RCW 70.105D and WAC 173-340)	Requires potentially liable persons to assume responsibility for cleaning up contaminated sites. Requires reporting hazardous substance releases if they constitute a threat to human health or the environment.
State Water Pollution Control Law (RCW 90.48)	Provides Ecology with the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland water, salt waters, watercourses, and other surface and groundwater in the state.
Oil and Hazardous Substance Spill Prevention and Response (RCW 90.56)	Established to prevent the release of oil and other hazardous substances to the navigable waters of the state. Intended to prevent spills and promote programs that reduce the risk of spills.
Underground Storage Tank Regulations (RCW 90.76 and WAC 173-360)	Ensure that underground storage tanks are installed, managed, and monitored in a manner that prevents releases to the environment.
Water Quality Standard for Surface Waters of the State of Washington (WAC 173-201A)	Establishes water quality standards for surface waters in Washington State. Ecology is the responsible agency.
Sediment Management Standards (WAC 173–204)	Establish numerical standards for the protection of benthic invertebrates in marine sediments.
Washington Hazardous Waste Management Act (RCW 70.105, and WAC 173–303)	State equivalent of RCRA; requires designation of dangerous and extremely hazardous waste, and proper handling, storage, transport, and disposal of such wastes. Governs and establishes regulations for hazardous waste treatment, storage, and disposal facilities.
Washington Administrative Code (WAC 173-340-300)	Requires reporting hazardous substance releases if they constitute a threat to human health or the environment.
Washington Solid Waste Handling Standards (WAC 173–350)	Set standards for the proper handling and disposal of solid waste originating from residences, commercial, agricultural, and industrial operations and other sources.
General Occupational Health Standards (WAC 296–62)	Protect the health of employees and help create a healthy work place by establishing requirements to control health hazards including chemical hazard communication and exposure programs.
Hazardous Waste Operations (WAC 296–843)	Applies to facilities that have workers handling hazardous waste at a treatment, storage, or disposal facility and are required to have a permit under RCRA.

Regulation, Statute, Guideline	Description
Safety Standards for Construction Work (WAC 296–155)	Apply to work places where construction, alteration, demolition, related inspection, and/or maintenance and repair work, including painting and decorating, is performed. Set minimum safety requirements with which all industries must comply when engaged in these types of work.

Notes:
USC = United States Code; CFR = Code of Federal Regulations; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; EPA = U.S. Environmental Protection Agency; WAC = Washington Administrative Code; Ecology = Washington State Department of Ecology; RCW = Revised Code of Washington; RCRA = Resource Conservation and Recovery Act

3.6.2 Study Area

The study area for direct impacts related to hazardous materials is the project area, which includes a portion of the former Reynolds Metals Company facility (Reynolds facility).

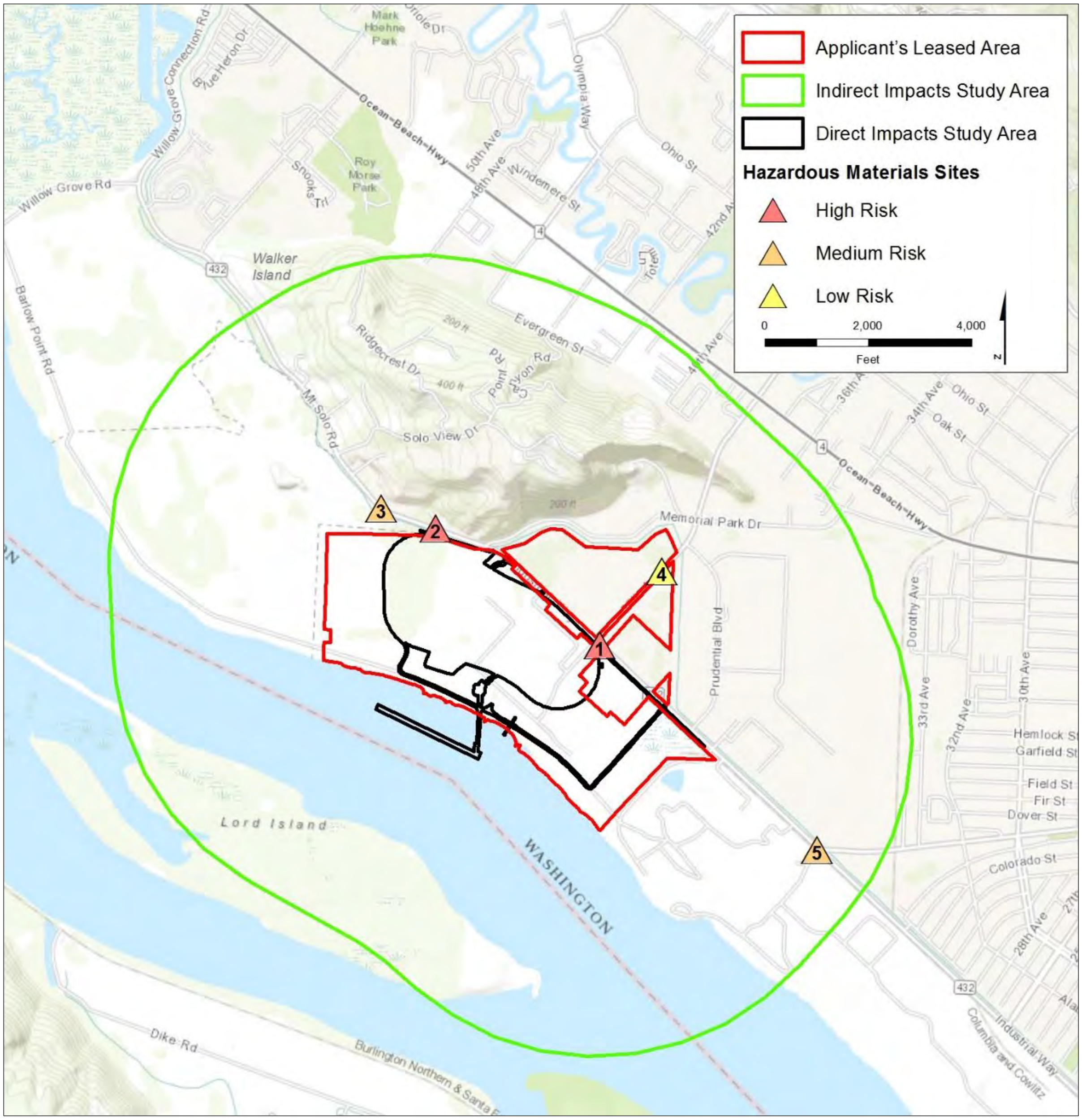
The study area for indirect impacts related to hazardous materials is the area within 1 mile of the project area. This area includes the rail line within 1 mile of the project area and the former Reynolds facility and the existing bulk product terminal in the Applicant's leased area.

Additionally, the nearest hazardous materials sites with a high potential to cause environmental impacts, such as Superfund sites, landfills, or large-quantity generators of hazardous waste, were identified and evaluated, even if located outside the study area. The nearest federal Superfund site is the Hamilton-Labree Roads site, which is 33 miles north of the study area. Due to its distance from the study area, this site was not further evaluated and is not included in this EIS. In addition, the nearest landfill was identified as the Cowlitz County Landfill, which is approximately 4 miles east of the study area. This site was not further evaluated in this EIS due to its distance from the project area and because groundwater at this site flows away from the project area. Furthermore, a no further action (NFA) has been issued for the landfill site, further reducing its potential to affect or be affected by construction or operation of the Proposed Action.

Figure 3.6-1 shows the study areas for direct and indirect impacts, as well as the hazardous materials sites identified in the study area. Sites in the study area were ranked as being high-, medium-, or low-risk[1] regarding whether hazardous materials could affect or be affected by construction or operation of the Proposed Action (Section 3.6.3.3, *Data Screening*).

[1] *High-risk sites* include sites where both soil and groundwater have been affected by hazardous materials releases, and groundwater flow is predominantly toward the project area; the site is partially closed (e.g., soil cleanup has been completed) but has ongoing groundwater-focused remedial or monitoring activities planned; and the site is located within 500 feet of the project area. *Medium-risk sites* include sites where both soil and groundwater have been affected by hazardous materials releases and groundwater flow is predominantly toward the project area; the site is partially closed (e.g., soil cleanup has been completed) but has ongoing remedial or monitoring activities planned; and the site is located within 500 to 1,000 feet of the project area. *Low-risk sites* include sites where only soil has been affected by hazardous materials releases and groundwater has not been affected; the site has been closed by an oversight agency with a status of NFA or no further remedial action is planned; and the site is located more than 1,000 feet from the project area but within the study area.

Figure 3.6-1. Hazardous Materials Sites and Study Area



3.6.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts related to hazardous materials associated with the construction and operation of the Proposed Action and No-Action Alternative.

3.6.3.1 Hazardous Materials Definition

In this EIS, *hazardous materials* refers to various types of contaminated or hazardous media, including contaminated environmental media, dangerous waste, solid waste, hazardous substances, and petroleum products.

- Contaminated environmental media includes soil, sediment, groundwater, surface water, or vadose zone air that have been contaminated by a release of a hazardous material, hazardous or dangerous waste, or hazardous substance. Sites with contaminated environmental media could be regulated under the federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) or Resource Conservation and Recovery Act (RCRA), or under the state Model Toxics Control Act (MTCA).
- Dangerous waste is solid waste designated in Washington Administrative Code (WAC) 173-303-070 through 173-303-100 as dangerous, or extremely hazardous or mixed waste. Dangerous waste includes all federal hazardous waste, plus certain wastes exhibiting specific criteria based on toxicity and persistence.
- Solid waste is defined slightly differently in state and federal regulations. State regulations define solid waste as solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, and recyclable materials. Federal regulations define solid waste as any garbage, refuse, or sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material that includes solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities. Solid waste includes hazardous and problem wastes.
- Hazardous substances are defined under CERCLA Section 9601(14). A list of more than 600 CERCLA hazardous substances is provided in 40 Code of Federal Regulations (CFR) 302.4. CERCLA Section 9601(33) defines pollutants or contaminants in terms of their negative impact on people and the environment.
- Hazardous substances are also defined under the state MTCA (Revised Code of Washington [RCW] 70.105D.020 (13)) as follows.

  > (a) Any dangerous or extremely hazardous waste as defined in RCW 70.105.010 (1) and (7), or any dangerous or extremely dangerous waste designated by rule pursuant to chapter 70.105 RCW;
  >
  > (b) Any hazardous substance as defined in RCW 70.105.010(10) or any hazardous substance as defined by rule pursuant to chapter 70.105 RCW;
  >
  > (c) Any substance that, on March 1, 1989, is a hazardous substance under section 101(14) of the federal cleanup law, 42 U.S.C. Sec. 9601(14);
  >
  > (d) Petroleum or petroleum products; and
  >
  > (e) Any substance or category of substances, including solid waste decomposition products, determined by the director by rule to present a threat to human health or the environment if released into the environment.
  >
  > The term hazardous substance does not include any of the following when contained in an underground storage tank from which there is not a release: Crude oil or any fraction thereof or petroleum, if the tank is in compliance with all applicable federal, state, and local law.

3.6.3.2 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative related to hazardous materials in the study area.

- *DataMap Area Study for the On-Site Alternative* (Environmental Data Resources 2014)

- *Millennium Coal Export Terminal Longview, Washington Hazardous Materials Resource Report* (URS Corporation 2014)
- *Final Remedial Investigation and Feasibility Study* (Anchor QEA 2015)
- Washington State Department of Ecology (Ecology) (2014a) regulatory files

The *DataMap Area Study for the On-Site Alternative* (Environmental Data Resources 2014) investigated all sites in the study area that use hazardous materials. The study included a search of federal, state, local, and other appropriate databases to obtain information on facilities that use, store, transport, or generate regulated and potentially hazardous substances. The database search results used in support of this analysis were reported in accordance with the ASTM Standard Practice for Environmental Site Assessments, E 1527-13. The *SEPA Hazardous Materials Technical Report* (ICF 2017a) contains a complete list of searched databases.

3.6.3.3 Data Screening

The *DataMap Area Study for the On-Site Alternative* (Environmental Data Resources 2014) identified 24 sites within 1 mile of the project area. Eight of these sites are associated with historical and current operations in the Applicant's leased area (i.e., the 540-acre industrial site currently leased by the Applicant). Ten orphan sites[2] were identified; however, nine of these ten sites were determined to be outside the study area and were eliminated from further evaluation (Environmental Data Resources 2014). The one remaining orphan site within the study area was also eliminated from further consideration because no known releases have been reported for the site.

The remaining sites located outside the Applicant's leased area but within the study area were then screened to determine if they should be eliminated or carried forward for analysis. Screening criteria are listed below.

- Sites where hazardous materials are stored and used in compliance with laws and regulations (e.g., RCRA), including large- and medium-quantity generators and underground storage tank sites, were assumed to have negligible risks of being affected by or having an impact on the Proposed Action. Thus, these types of sites were excluded from further analysis.
- Other sites were also eliminated from further analysis, including closed sites or NFA sites where remediation (e.g., contaminated soil removal or groundwater cleanup) had been completed.

Sites that were retained based on the screening criteria listed above were subsequently ranked as being high-, medium-, or low-risk with regard to whether hazardous materials could affect or be affected by construction or operation of the Proposed Action.

- **High-risk sites.** High-risk sites include sites where both soil and groundwater have been affected by hazardous materials releases and groundwater flow is predominantly toward the project area; the site is partially closed (e.g., soil cleanup has been completed) but has ongoing groundwater-focused remedial or monitoring activities planned; and the site is located within 500 feet of the project area.

[2] Orphan sites are hazardous materials sites where the polluter could not be identified or held accountable, and/or the address/location information is incomplete.

- **Medium-risk sites**. Medium-risk sites include sites where both soil and groundwater have been affected by hazardous materials releases and groundwater flow is predominantly toward the project area; the site is partially closed (e.g., soil cleanup has been completed) but has ongoing remedial or monitoring activities planned; and the site is located within 500 to 1,000 feet of the project area.
- **Low-risk sites.** Low-risk sites include sites where only soil has been affected by hazardous materials releases and groundwater has not been affected; the site has been closed by an oversight agency with a status of NFA or no further remedial action is planned; and the site is located more than 1,000 feet from the project area but within the study area.

The ranking criteria considered the environmental media contaminated (soil or groundwater), the direction of groundwater flow, the status of remediation (site partially closed or closed with status of NFA), and distance between the hazardous materials site and the project areas.

Based on these criteria, five sites were identified in the study area: two sites were categorized as high risk, two as medium risk, and one as low risk. The remaining five sites in the study area are listed below.

- **Site 1.** U.S. Department of Energy, Bonneville Power Administration, Longview Substation (high risk)
- **Site 2.** McCall Trucking (high risk)
- **Site 3.** Schill Brothers Asphalt & Paving/American Asphalt (medium risk)
- **Site 4.** GT Metals and Salvage (low risk)
- **Site 5.** Weyerhaeuser Chlor-Alkali Facility (medium risk)

These five hazardous materials sites are presented in Figure 3.6-1 and described in Section 3.6.5.1, *Proposed Action*.

3.6.3.4 Impact Analysis

Hazardous materials in the study area were assessed to determine the potential impacts of the Proposed Action and No-Action Alternative on hazardous materials, and the potential impacts of hazardous materials on these alternatives.

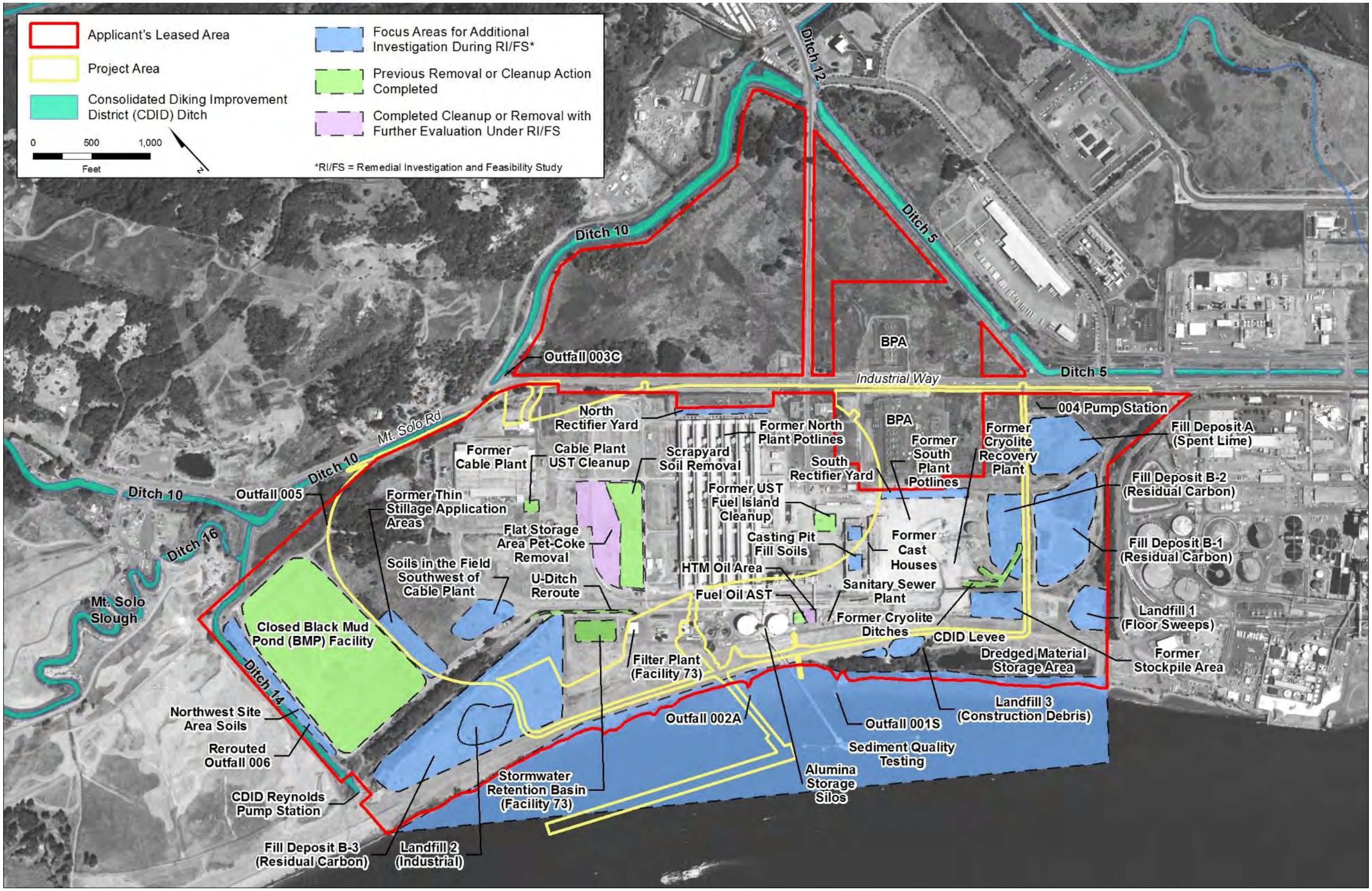
3.6.4 Existing Conditions

This section describes the existing conditions in the study area related to hazardous materials that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

3.6.4.1 Contaminated Sites

This section summarizes the history of contamination and remedial actions in the Applicant's 540-acre leased area, which includes the 190-acre project area itself and the Applicant's leased area outside of the project area. The discussion also identifies chemicals of concern and final cleanup options or actions that would take place under a cleanup action plan unrelated to the Proposed Action. The boundary of the Applicant's leased area and the project area in relation to existing and former facilities is shown in Figure 3.6-2.

Figure 3.6-2. Previous Cleanup and Focus Areas in the Applicant's Leased Area and the Project Area



For more information relative to past activities in the project area and in the Applicant's leased area, including remedial actions and further information, refer to the *Remedial Investigation/Feasibility Study* (Anchor QEA 2015).

Project Area

Contaminated sites in the project area include aluminum production facilities and former cable plant operations.

Aluminum Production Facilities

Initial industrial operations at the former Reynolds facility began in 1941 when the eastern portion of the project area was developed as an aluminum reduction plant for aluminum smelting and casting operations. These operations were expanded in 1967 when the western portion of the former Reynolds facility was developed for additional aluminum production; this area was known as the North Plant.

Smelter operations required an extensive dry-materials handling system for raw materials, such as alumina ore (transported by rail or ocean-going vessel), petroleum coke, coal tar pitch, anthracite coal, cryolite, and aluminum fluoride (transported by rail and truck). Liquid coal tar was unloaded from rail cars and transferred into on-site storage tanks, which were connected to the greenmill by distribution lines. At the greenmill, pitch (which contains polycyclic aromatic hydrocarbons [PAHs]) was used as a raw material for anode and cathode fabrication. Elevated concentrations of fluoride in soils have been associated with historical smelter operations at the former Reynolds facility.

Figure 3.6-2 shows the location of the aluminum manufacturing facilities. The potline buildings and cast houses lie within the boundaries of the project area, while the alumina storage silos lie outside the project area's southern boundary.

Former Cable Plant Operations

The cable plant was constructed in the late 1960s. It was located west of the aluminum production facilities and within the boundaries of the project area. The cable plant produced electrical cable products, including aluminum wire, rods, and insulated (polyethylene and polyvinyl) low- and medium-voltage cable. The cable plant received molten aluminum from the aluminum production facilities and processed it in three furnaces: a continuous ingot caster, a rolling mill, and wire drawers. Ancillary structures associated with the cable plant included office buildings, a parking lot, and an on-site sanitary wastewater treatment plant.

The cable plant ceased production in 1992 and all assets were removed from the buildings. Since the mid-1990s, the facility has been mostly inactive and used only sporadically for storage. In addition, with approval from Ecology, successfully treated soil from the fuel island cleanup area was used for fill in former equipment concrete pits in the cable plant warehouse floor (Section 3.6.4.2, *Remediation History*).

Applicant's Leased Area Outside of the Project Area

Contaminated sites on the Applicant's leased area, outside of the project area, include a cryolite recovery plant, industrial landfills, the closed Black Mud Pond (BMP) facility, and potentially other remnants of historical uses of the former Reynolds facility.

Cryolite Recovery Plant

The cryolite recovery plant was constructed in 1953 in the former Reynolds facility East Plant area, east of the cast houses and outside the project area boundary. It was used as a *spent potliner* (SPL) recovery and recycling facility for both the former Reynolds facility and other northwest aluminum reduction plants. SPL is a byproduct of the aluminum manufacturing process. It contains fluoride and PAH compounds and, potentially, varying levels of cyanide. The cryolite recovery plant also recovered reusable fluoride compounds, called *underflow solids*, which were generated from the air emission control systems that occurred during the aluminum manufacturing process. The underflow solids were collected in clarifiers at two locations on the former Reynolds facility.

The cryolite recovery process involved multiple steps, resulting in *black mud*, a black carbon liquid, which was disposed in several fill deposits on the former Reynolds facility. The fill deposits were closed in the 1960s and 1970s and were subsequently capped with clean soil. The cryolite recovery process also required lime to produce a sodium hydroxide solution. Circa 1980, the spent lime facility, which was constructed as part of the original cryolite recovery plant for the cryolite recovery process, was combined and managed with the residual carbon facility.

With the increase in regulatory requirements associated with SPL stockpiling and handling in the 1980s, Reynolds began to cover the stockpiled SPL. Groundwater monitoring wells were installed to assess and monitor potential impacts on groundwater.

In May 1990, the cryolite recovery plant ceased operation. The SPL generated during aluminum manufacturing was removed and shipped to permitted treatment, storage, and disposal facilities. The cryolite recovery plant facilities were removed in May 1990; the land in that area is now vacant. No deposits of SPL are known to remain within the former Reynolds facility.

Carbon was generated as a by-product of operation of the on-site cryolite recovery process. Residual carbon from this process typically includes calcium carbonate, alumina, fluoride compounds, sodium, iron, and sulfate. Test results from groundwater monitoring wells indicated that shallow groundwater at the former cryolite plant contained elevated concentrations of fluoride, with high alkalinity as a result of the cryolite plant's operations. Additional investigations, findings, and cleanup of the residual carbon deposits are discussed in Section 3.6.4.2, *Remediation History*.

Industrial Landfills

Three historical landfills are located in the Applicant's leased area but outside the project area (Figure 3.6-2). These include the floor sweeps landfill (Landfill 1), east of the former cryolite recovery plant; the industrial landfill (Landfill 2) on the southwest side of the former Reynolds facility West Plant area; and the construction debris landfill (Landfill 3), between the Consolidated Diking Improvement District (CDID) #1 levee and the Columbia River.

The floor sweeps landfill (Landfill 1) received dry materials gathered from floors in the potline buildings, including alumina, bath, cryolite, and aluminum fluoride. By the mid-1970s, the floor sweeps landfill was no longer in use, and the industrial landfill (Landfill 2) began operation. The industrial landfill was used primarily for management of inert wastes, including scrap coke, ore, cryolite, aluminum fluoride, bath, brick, concrete, and debris from miscellaneous maintenance activities. The construction debris landfill (Landfill 3) contains concrete debris and other plant wastes, similar to those of the industrial landfill. Standard practices included not placing liquids in the landfills.

Closed Black Mud Pond (BMP) Facility

As discussed under the former cryolite recovery plant operations, a byproduct of the cryolite recovery process was black mud, which was disposed of in several fill deposits. One such pond was located in the West Plant area near Landfill 2 (Figure 3.6-2). The 33-acre BMP impoundment, which was formally closed in 1992, has been subject to an approved ongoing maintenance and monitoring program overseen by Ecology. Since implementation, the closed BMP facility has continued to meet the requirements of the maintenance and monitoring program. Details on closure, post-closure, and maintenance and monitoring can be found in the *Millennium Coal Export Terminal Longview, Washington Hazardous Materials Resource Report* (URS Corporation 2014). No further remedial activities related to the closed BMP facility are required in the final cleanup action plan.

Uses after Closure of the Reynolds Facility

Aluminum production operations at the former Reynolds facility ceased in 2001 at the time of the facility's closure. Between 2004 and 2011, Chinook Ventures, Inc. (Chinook Ventures) operated a terminal for the import, handling, and export of dry bulk materials, such as alumina, coal, green petroleum coke, cement, fly ash, slag, and other materials. During this time, Chinook Ventures decommissioned the majority of the facilities associated with aluminum manufacturing operations and recycled materials from smelters, which were being decommissioned throughout the northwest region of the United States. These activities included the removal and disposal or recycling of alumina, electrolyte bath, coal, and carbon products. In 2011, Chinook Ventures sold its assets to the Applicant. The Applicant subsequently removed most of the structures that were constructed by Chinook Ventures and continued facility decommissioning, removal, and cleanup activities.

3.6.4.2 Remediation History

The remediation history for the study area is presented in Appendix H, *Hazardous Materials Remediation History*. In 2007, Northwest Alloys signed an Agreed Order (AO No. DE-8940) with Ecology to complete a remedial investigation and feasibility study (RI/FS). The purpose of the RI/FS was to investigate the nature and extent of impacts at the site and identify cleanup options. From 2011 through 2014, the Applicant tested soils and completed laboratory analyses as part of the RI/FS. In May 2014, Northwest Alloys submitted a second RI/FS, detailing over 18,000 chemical measurements of soil, surface water, groundwater and sediment along with extensive testing and engineering to support possible cleanup alternatives.

Ecology held a public comment period from June 2 through August 1, 2014, which included several public workshops and a formal hearing. Following the public comment period, Ecology prepared a Responsiveness Summary in January 2015, and has developed a draft cleanup action plan. Ecology will then select cleanup standards and points of compliance in the final cleanup action plan. A cleanup action plan is typically prepared after the RI/FS has been finalized and a preferred remedial alternative has been selected. The plan is based on information and technical analyses generated during the RI/FS and consideration of public comments and community concerns.

A draft cleanup action plan and draft consent decree was released in 2016 for a 60-day public comment period (Washington State Department of Ecology 2016). The comment period ended March 18, 2016. A responsiveness summary will be prepared to address public comments and then the reports will be finalized. Likely remedial technologies will include a combination of, but not necessarily all of, the following: removal, consolidation, capping, groundwater treatment, and monitored natural attenuation treatments. Property owner Northwest Alloys, Inc. (a subsidiary of

Alcoa, Inc.) and the Applicant are legally responsible for the cleanup, including paying for and performing the work.

Appendix H, *Hazardous Materials Remediation History*, provides an overview of the remedial action process, screening levels by media, remediation activities prior to the RI/FS, remediation of the project area, remediation of the Applicant's leased area, chemicals of concern, and final remedial actions.

3.6.4.3 Hazardous Materials Sites in the Study Area

This section discusses environmental conditions related to hazardous materials sites outside of the Applicant's leased area but in the study area for hazardous materials. Data screening identified five hazardous materials sites in the Proposed Action study area that require further evaluation (Section 3.6.3.3, *Data Screening*). These sites, shown in Figure 3.6-1, are described in Table 3.6-2.

3.6.5 Impacts

This section describes the potential direct and indirect impacts related to hazardous materials that would result from construction and operation of the Proposed Action and the No-Action Alternative.

3.6.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area as a result of construction and operation of the Proposed Action. Construction-related activities for the Proposed Action would occur in two stages and include the activities identified below.

Construction Activities

Stage 1	Stage 2
• Construction staging • Demolition of existing structures • Site preparation • Preloading • Rail loop construction • Dredging, trestle, and dock construction • Installation of coal export terminal equipment • Construction of berms • Construction of stackers and reclaimers • Construction of buildings	• Construction of any remaining rail storage tracks (for a total of eight rail storage tracks) • Construction of two remaining berms (for stackers and reclaimers) (for a total of five berms) • Construction of two additional stackers and reclaimers • Construction of additional conveyors, buffer bins, and transfer towers, including 26,200 linear feet of conveyors, of which 17,900 linear feet would be open conveyors and 8,300 linear feet would be enclosed • Construction of one shiploader on Dock 3 • Construction of additional support structures, electrical transformers, switchgear and equipment, buildings, process control equipment

Table 3.6-2. Hazardous Materials Sites in the Study Area

Site	Business Name	Distance from Project Area	Case Summary	Reason for Risk Class	Risk Class
1	U.S. DOE BPA Longview Substation/Longview Substation	33 feet from project area	• Site contains registered underground storage tanks • Site is a registered small-quantity generator of hazardous waste. • A site discovery/release was first reported in 1992. • Groundwater is suspected to be contaminated with nonhalogenated organics and petroleum/diesel. • Groundwater is confirmed to have benzene and petroleum/gasoline contamination above cleanup levels. • Soils are suspected to be contaminated with benzene, nonhalogenated organics, and petroleum/gasoline. • Soils are confirmed to be below cleanup levels for petroleum/diesel. • A site hazard assessment was conducted in June 2013. Cleanup of leaking underground storage tanks has started, and rest of the site is awaiting cleanup.	• Located 33 feet east of the project area for the Proposed Action. • Groundwater contamination has been confirmed for benzene and petroleum/gasoline. • Soils suspected to be contaminated with benzene, nonhalogenated organics, and petroleum/gasoline. • Case is still active and cleanup is in process for leaking underground storage tanks. • Other identified contamination is awaiting cleanup.	High

Site	Business Name	Distance from Project Area	Case Summary	Reason for Risk Class	Risk Class
2	McCall Trucking	127 feet from project area	• Initial site investigation occurred in 1994. • Groundwater, surface water, and soils are suspected to be contaminated with halogenated organics, metals, solvents, and petroleum products. • Soil has been confirmed above cleanup levels for petroleum products. • Case is still active and site is awaiting cleanup.	• Located 127 feet northwest of the project area for the Proposed Action. • Groundwater, surface water, and soils are suspected to be contaminated with various contaminants. • Site is awaiting cleanup.	High
3	Schill Brothers Asphalt & Paving/American Asphalt[a]	722 feet from project area	• The site was first inspected in 1990 and then removed from the Washington HSL in 1995. • The site was reopened in 2008 and again in 2013. • Groundwater, surface water, soil, and air were all contaminated with various organic and inorganic materials, metals, petroleum products, and phenolic compounds. • All media has been remediated with the exception of soil, which still contains petroleum products above cleanup levels. • Site is still awaiting cleanup.	• Located 722 feet northwest of the project area for the Proposed Action. • Groundwater and soil have been impacted, requiring further cleanup.	Medium

Site	Business Name	Distance from Project Area	Case Summary	Reason for Risk Class	Risk Class
4	GT Metals and Salvage (formerly Longview Auto Wrecking)	1,902 feet from project area	• An initial site assessment was performed in June 2004. • Soils were confirmed to be above cleanup levels for petroleum products. • Case is still active and site is awaiting cleanup.	• Located 1,902 feet northeast of the project area for the Proposed Action. • Soil has been affected.	Low
5	Weyerhaeuser Chlor-Alkali Facility	2,953 feet from project area	• Stores hazardous chemicals; site being cleaned up under state regulations. • In October 1991, Ecology issued an agreed order for remedial action at the site. • Mercury contamination was found in soils and groundwater after demolition of an on-site facility. • In December 1995 an RI/FS was completed for the facility. • In August 1995 the site was listed on Washington HSL as a Rank 1 site.	• Located 2,953 feet southeast of the project area for the Proposed Action. • Both soil and groundwater have been affected. • Cleanup activities are complete. Institutional controls are in place and long-term groundwater monitoring continues.	Medium

Notes:

[a] The Schill Brothers Asphalt & Paving/American Asphalt 1 site is located adjacent to and partially atop the inactive Mount Solo Landfill, which was classified as a limited-purpose landfill that disposed of mainly wood-wastes and construction and demolition waste between about 1966 and 1992. The landfill was closed in 1993 under WAC 173–304 Minimum Functional Standards for Solid Waste Handling. According to information received from the Cowlitz County Health Department, Environmental Health Unit (EHU), the current environmental status of the Mount Solo Landfill is unknown. According to the EHU, the last annual report was received in 2008 and the last post closure permit was issued that same year. The landfill has not been actively monitored since then (Long pers. comm.).

Sources: Washington State Department of Ecology 2014b–2014o; ICF 2017a.

U.S. DOE = U.S. Department of Energy; BPA = Bonneville Power Administration; Ecology = Washington State Department of Ecology; HSL = Washington Hazardous Sites List; RI/FS = remedial investigation/feasibility study; WAC = Washington Administrative Code

Construction—Direct Impacts

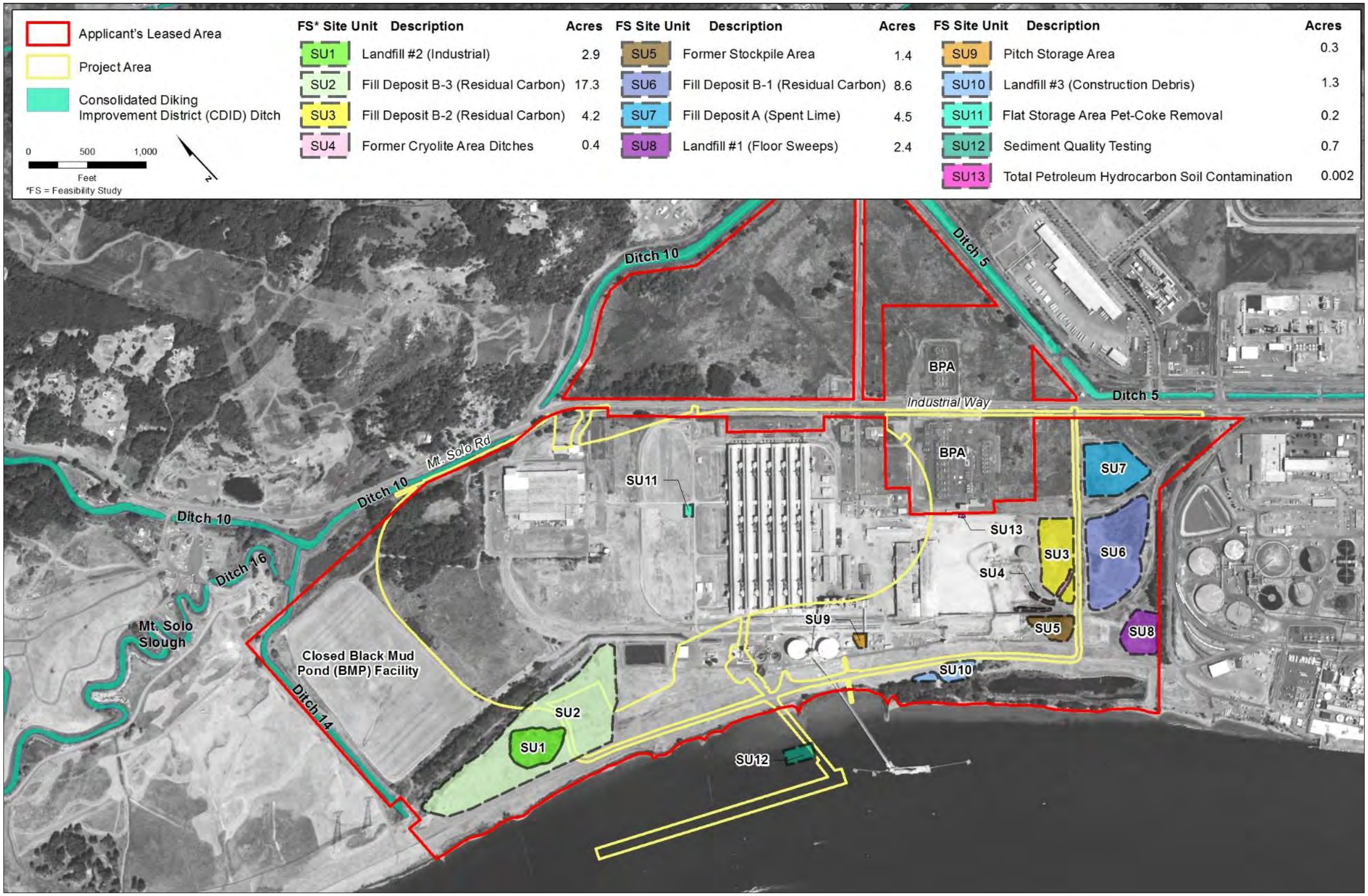
Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers). Construction equipment would include heavy machinery to prepare foundations and footings for the new facility, associated services, and utilities. This equipment would likely include cranes, wheel loaders, dozers, dump trucks, excavators, graders, rollers, compactors, drill rigs, pile-driving equipment, portable ready-mix batch plant, ready-mix trucks, concrete pumps, elevated work platforms, forklifts, rail track laying equipment, welders, water pumps, and other similar machinery. Waste typically generated or encountered during construction activities could consist of contaminated soils; contaminated sediments; contaminated groundwater generated from excavation, drilling, and dewatering activities; and existing on-site building materials containing lead or asbestos. Demolition activities could result in exposing these substances.

Encounter Hazardous Materials during Construction

Construction of the Proposed Action could encounter hazardous materials in the project area that could pose risks to human health and the environment through contact with contaminated soil, contaminated groundwater, and inhalation of toxic vapors. However, with the exception of two small areas on the eastern corner of the flat storage area and the northeastern portion of Fill Deposit B-3 (SU11 and SU2 in Figure 3.6-3), the Proposed Action would be constructed in the project area where remedial action mandated as part of the final cleanup action plan is not required, either because hazardous materials do not occur in these areas or because hazardous materials have been previously remediated. For the two areas where overlap would occur, construction of the Proposed Action and remediation of the project area would be coordinated to avoid and minimize conflicts and potential exposure to construction personnel and the environment. Furthermore, Northwest Alloys and the Applicant would be required to follow the final cleanup action plan, comply with applicable state and federal laws and regulations, and provide for compliance monitoring to ensure cleanup actions comply with the cleanup plan. Therefore, remedial actions are expected to remove or isolate all hazardous materials and ensure that any remaining hazardous materials are below thresholds established by federal, state, and local regulations, thereby avoiding the potential for construction personnel or the environment to be exposed to hazardous materials. Construction activities associated with the Proposed Action could encounter possible lead- and asbestos-containing materials, chemically treated wood, and polychlorinated biphenyls (PCBs) during demolition of existing structures. Releases of these materials could migrate to the air, soil, surface water, or groundwater and affect the health and safety of construction personnel and others. Exposure to these contaminants are described in the following sections.

Additionally, project area preparations would involve preloading and installing vertical wick drains to consolidate low-consistency silt and low-density sand. These activities could take place adjacent to areas where known groundwater contamination exists and the contaminated groundwater could potentially penetrate these areas. According to the RI/FS (Anchor QEA 2015), fluoride transport in groundwater is limited due to the solubility of fluoride.

Figure 3.6-3. Feasibility Study Site Units in the Applicant's Leased Area and the Project Area



Furthermore, the permeability of the earth materials used for preloading would be relatively low and would not be particularly susceptible to the infiltration of contaminated groundwater. As described in Chapter 4, Section 4.4, *Groundwater*, once preloading is complete and the vertical drains are removed, the drains would be tested and characterized for the presence of dangerous waste prior to disposal. This work would be regulated and coordinated under the project-specific National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit.

Lead and Asbestos

Buildings and structures that have lead- or asbestos-containing materials would require proper abatement procedures prior to demolition, renovation, or repair activities to reduce potential impacts. The use of asbestos in buildings and structures was common prior to 1980. The U.S. Environmental Protection Agency (EPA) issued a ban and phase-out rule for asbestos in 1989. Most of the structures in the project area were built prior to 1980 and are planned for demolition as part of the Proposed Action. Both asbestos-containing materials and materials that contain lead (such as some types of paint) must be handled carefully during demolition and must be recycled or disposed of at an approved site as required by the Washington Hazardous Waste Management Act (RCW 70.105), and the Washington Dangerous Waste Regulations, (WAC 173–303). Asbestos surveys were performed for all existing on-site buildings (PBS Engineering and Environmental 2014). A lead paint survey was performed on the south plant only; lead surveys for the remaining buildings would be conducted prior to demolition activities. Abatement and management would be conducted prior to demolition, renovation, and/or repair for lead and asbestos as required by Washington Hazardous Waste Management Act and Washington Dangerous Waste Regulations.

Buildings identified in the surveys as having asbestos-containing materials include the main office, maintenance and weld shop, cast house (expansion), North Plant compressor, cable plant, and potline building. Details regarding quantities, types of construction materials, etc. can be found in the December 2014 Subset of Previous Asbestos Survey Reports Millennium Bulk Terminals (PBS Engineering and Environmental 2014).

Chemically Treated Wood

The State of Washington has dangerous waste exclusions for treated wood; these exclusions are outlined in WAC 173-303-071(3)(g)(i) for arsenical-treated wood and in WAC 173-303-071(3)(g)(ii) for wood treated with other preservatives (most commonly pentachlorophenol and creosote). Arsenical-treated wood, and in particular copper chromate arsenic (CCA)–treated wood is most often used for (but is not limited to) outdoor building materials and is often referred to as "pressure-treated wood." Pentachloraphenol (PCP) and creosote-treated wood is most often used for poles, pallets, marine piling and timbers, and railroad crossties. It should be noted that the dangerous waste exclusion for CCA-treated wood only applies to treated wood that fails the toxicity characteristic leaching potential for the applicable constituents.

If CCA-treated wood is encountered, and it meets the exclusion requirements described above, disposal options include the following.

- Disposal in a permitted municipal solid waste landfill (providing local regulation allows).
- Disposal/processing at a permitted treatment, storage, and disposal facility.

- Reuse by others.

If wood treated with other preservatives, as defined in WAC 173-303-071(3)(g)(ii), is encountered during demolition activities it could be disposed of as follows.

- Wood designated as "state"-only may be disposed in a municipal solid waste landfill provided the landfill is equipped with a leachate detection system.
- Wood that is designated as a "listed" waste or fails the toxicity characteristic leaching potential test may be sent to a non-permitted facility for treatment or recycling.
- Creosote-treated wood may be sent to a permitted treatment, storage, and disposal facility, i.e., burned in a regulated furnace or boiler for energy production.

Caulking and Sealants

PCBs were widely used in caulking and elastic sealant materials from the 1950s through the 1970s. These materials were primarily used in or around windows, door frames, stairways, building joints, masonry columns, and other masonry building materials. Prior to demolition, caulking would be sampled to determine if PCBs exist. If PCBs were found in on-site structures, remediation and disposal of these materials would be conducted under the Toxic Substances Control Act's PCB regulations at 40 CFR 761 and using Ecology's *Draft PCB Chemical Action Plan*.

Demolition of former Reynolds facility buildings and structures would require adherence to all applicable standards and regulations. The applicable agencies and regulations would provide oversight and prevention techniques. Thus, lead- and asbestos-containing material, treated wood debris, and caulking waste (containing PCBs) would be managed properly and disposed of at off-site facilities, thereby avoiding and minimizing potential impacts on human health and the environment.

Introduce New Sources of Hazardous Materials during Construction

Construction of the Proposed Action would involve the routine transport, use, storage, and disposal of hazardous materials such as fuels, solvents, paints, oils, concrete-curing compounds, and grease. Hazardous materials likely to be transported, used, stored, and disposed of in the project area during construction would be materials typical of construction projects and would generally be used and handled in relatively small quantities (less than 5 gallons). Impacts from releases would likely be localized and short-term in nature although spills could reach and affect the Columbia River. Fuel spills could range from less than 50 gallons up to a worst-case maximum spill from a fuel truck of approximately 4,000 gallons.[3]

The transport, use, storage, and disposal of hazardous materials would be compliant with applicable federal, state and local regulations such as the RCRA, U.S. Department of Transportation Hazardous Materials Regulations, and other regulations identified above under Section 3.6.1, *Regulatory Setting*. The enforcement of construction and demolition standards, including best management practices by appropriate local and state agencies (i.e., Ecology, Longview Fire Department, Cowlitz County Public Works), would further minimize the potential for a spill, release, or explosion, and would ensure a timely cleanup response.

[3] The capacity for fuel trucks used during construction and operations is discussed in Chapter 4, Section 4.9, *Energy and Natural Resources*.

The Applicant would be required to obtain and comply with the NPDES Construction Stormwater Permit, which requires controls to protect surface water and groundwater. The permit would require the preparation of a construction stormwater pollution prevention plan and implementation of best management practices to avoid and minimize the risk of pollutants entering surface waters and groundwater. Moreover, the best management practices identified under Section 3.6.6, *Required Permits,* would be implemented during construction and operation of the Proposed Action to further avoid and minimize risks of exposure on surface waters.

Construction—Indirect Impacts

Construction-related activities associated with the Proposed Action could result in indirect impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Encounter Hazardous Materials during Construction

The following sections describe impacts related to encountering hazardous materials on the Applicant's leased area and hazardous materials sites in the study area during construction of the Proposed Action.

Applicant's Leased Area

Construction of the Proposed Action is not expected to encounter hazardous materials in the Applicant's leased area outside the limits of disturbance for the project area. The chemicals of concern occurring in the Applicant's leased area include fluoride and PAHs in soils associated with the landfills and fill deposits (Figure 3.6-3). These areas are contained by soil caps, and ongoing soil and groundwater monitoring show that fluoride has limited mobility under existing conditions and is not affecting down-gradient groundwater or surface water quality. The final cleanup action plan would include remediation of these areas along with those identified in the project area. Therefore, although groundwater and soils are contaminated in the Applicant's leased area, it is to be expected that they would be remediated during project construction and operations.

Hazardous Materials Sites in the Study Area

Construction of the Proposed Action is not expected to encounter hazardous materials that could pose risks to human health and the environment from any of the five hazardous materials sites identified in the study area (Section 3.6.4.3, *Hazardous Materials Sites in the Study Areas*). This is because soil contaminants associated with these sites would not come into contact with construction activities, and groundwater contamination has either not been reported, or groundwater flows away from the project area.

Introduce New Sources of Hazardous Materials during Construction

The following sections describe impacts related to introducing new sources of hazardous materials on the Applicant's leased area and hazardous materials sites in the study area during construction of the Proposed Action.

Applicant's Leased Area

Construction activities associated with the Proposed Action would be limited to the project area and no activities would occur in the Applicant's leased area outside the limits of disturbance for the project area; however, construction vehicles could move through the Applicant's leased area when traveling to and from the project area. When in transit, vehicles transporting hazardous materials could introduce new sources of hazardous materials to the Applicant's leased area that could pose risks to human health and the environment.

As described above for direct construction impacts, construction of the Proposed Action would involve the routine transport, use, storage, and disposal of hazardous materials such as fuels, solvents, paints, oils, concrete-curing compounds, and grease. Hazardous materials likely to be transported through the Applicant's leased area during construction would be materials typical of construction projects and would generally be used and handled in relatively small quantities (less than 5 gallons). Impacts from releases would likely be localized and short term in nature, although fuel spills could reach and affect the Columbia River. Fuel spills could range from less than 50 gallons up to a worst-case maximum spill from a fuel truck of approximately 4,000 gallons. Any spills that could occur would require the Applicant reporting and responding as required by federal, state, and local laws.

The transport of hazardous materials would be compliant with applicable federal, state and local regulations such as the RCRA, U.S. Department of Transportation Hazardous Materials Regulations, and other regulations identified above under Section 3.6.1, *Regulatory Setting*. Furthermore, best management practices enforced by appropriate local and state agencies (i.e., Ecology, Longview Fire Department, Cowlitz County Public Works), would further minimize the potential for a spill, release, or explosion, and would ensure a timely cleanup response.

Hazardous Materials Sites in the Study Area

Construction of the Proposed Action would not cause impacts on the five documented hazardous materials sites in the study area that could pose new risks to human health and the environment. Although hazardous materials sites are located in the study area, construction activities would be limited to the boundaries of the project area, and would not affect hazardous materials sites outside of the project area.

Operations—Direct Impacts

Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

The following hazardous materials are expected to be used during normal operations of the Proposed Action and would be stored in the project area.

- Diesel fuel, gasoline, oils, greases, hydraulic fluids, antifreeze/coolants, and solvents used for equipment operation and maintenance.
- Flocculants used for water treatment. Antiscalants could also be used to manage the hardness in the process waters.
- Wastes classified as hazardous and nonhazardous waste.

These materials would be stored on site and all necessary collection and containment measures would be located in appropriate locations for immediate response to any spill.

The Proposed Action would not include refueling activities for rail or vessels, and no fuel for rail or vessels would be stored on site; therefore, there would be no increased risk of spills associated with refueling activities or storage in the project area. As described in Chapter 5, Section 5.4, *Vessel Transportation*, because no bunkering at Docks 2 and 3 would take place as part of the Proposed Action, there would be no increased risks of oil spills associated with vessel transfers associated with the Proposed Action.

Operation of the Proposed Action would result in the following direct impacts.

Encounter Hazardous Materials during Operations

Operation of the Proposed Action is not expected to encounter hazardous materials in the project area that could pose risks to human health and the environment. Operation of the Proposed Action would occur concurrently with, but would be independent of, environmental remediation and monitoring as required in the final cleanup action plan for the former Reynolds facility. The remedial and monitoring activities associated with the former Reynolds facility would be carried out in accordance with all applicable regulations and would be coordinated to avoid contact and exposure to operations personnel and the environment. Furthermore, remedial and monitoring activities associated with the final cleanup action plan would result in bringing previously contaminated soils and groundwater to levels that are protective of human health and the environment, thereby reducing the potential for exposure for sensitive receptors.

Introduce New Sources of Hazardous Materials during Operations

Operations of the Proposed Action could introduce new sources of hazardous materials such as fuel, oil, grease, lubricants, hydraulic fluids, solvents, and acids and would generate small quantities of hazardous waste. Locomotives (with fuel capacity of approximately 5,000 gallons) and fuel trucks (with fuel capacity of up to approximately 4,000 gallons) would travel to and from the project area and could also release fuel during operations. Some of these materials can be classified as hazardous; however, these hazardous material products would generally be stored and used in small quantities. The Applicant is responsible for reporting and responding as required by federal, state, and local laws.

As with construction, the transport, use, storage, and disposal of hazardous materials would be compliant with applicable federal, state and local regulations such as the RCRA, U.S. Department of Transportation Hazardous Materials Regulations, and other regulations identified in Section 3.6.1, *Regulatory Setting.* The Applicant would follow regulations governing the storage of hazardous materials and the separation of hazardous materials in designated storage areas. Water quality would be protected from polluted stormwater runoff as a result of the Applicant complying with the requirements of the NPDES Industrial Stormwater Permit.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

As listed under *Operations—Direct Impacts*, several hazardous materials are expected to be used during normal operations of the Proposed Action. These materials would be stored on site and all necessary collection and containment measures would be located in appropriate locations for immediate response to any spill. The Proposed Action would also generate hazardous waste in small quantities.

The increase in rail traffic under the Proposed Action (16 trips per day with four locomotives per train) on the Reynolds Lead, BNSF Spur, and BNSF main line could also result in indirect impacts related to hazardous materials, which are described below. Further information on rail transportation is provided in the Chapter 5, Section 5.1, *Rail Transportation*. Indirect impacts associated with increased vessel traffic are addressed in Chapter 4, Section 4.5, *Water Quality*, and Chapter 5, Section 5.4, *Vessel Transportation*.

Encounter Hazardous Materials during Operations

The following sections describe potential for impacts related to encountering hazardous materials on the Applicant's leased area and hazardous materials sites in the study area during operation of the Proposed Action.

Applicant's Leased Area

Operation of the Proposed Action is not expected to encounter hazardous materials in the Applicant's leased area that could pose risks to human health and the environment. Operation of the Proposed Action would occur within the boundaries of the project area and would not result in impacts on the larger Applicant's leased area. Implementation of the final cleanup action plan for the former Reynolds facility would result in bringing previously contaminated soils and groundwater to levels that are protective of human health and the environment, thereby reducing the potential for exposure for sensitive receptors.

Hazardous Materials Sites in the Study Area

Operation of the Proposed Action would occur within the boundaries of the project area and therefore is not expected to result in encountering hazardous materials from any of the five hazardous materials sites identified in the study area that could pose risks to human health and the environment (Section 3.6.4.3, *Hazardous Materials Sites in the Study Area*).

Introduce New Sources of Hazardous Materials during Operations

The following sections describe impacts related to introducing new sources of hazardous materials on the Applicant's leased area and hazardous materials sites in the study area during operation of the Proposed Action.

Applicant's Leased Area

Operational activities associated with the Proposed Action would be limited to the boundaries of the project area, and no activities would occur within the larger Applicant's leased area. However, vehicles used during operations would move through the Applicant's leased area when traveling to and from the project area. When in transit, vehicles could introduce new sources of hazardous materials to the Applicant's leased area that could pose risks to human health and the environment. Impacts would be similar to those described above for indirect construction impacts in the Applicant's leased area and could include releases of hazardous substances or fuels. Any spills that could occur would likely be short term with the Applicant reporting and responding as required by federal, state, and local laws.

As with construction, the transport of hazardous materials would be compliant with applicable federal, state and local regulations such as the RCRA, U.S. Department of Transportation Hazardous Materials Regulations, and other regulations identified above under Section 3.6.1, *Regulatory Setting.* Furthermore, best management practices enforced by appropriate local and state agencies would further minimize the potential for a spill, release, or explosion, and would ensure a timely cleanup response.

Hazardous Materials Sites in the Study Area

Operation of the Proposed Action would not introduce new sources of hazardous materials that could pose risks to human health and the environment to the five documented hazardous materials sites in the study area. Although hazardous materials sites exist in the study area, Proposed Action operations would occur within the boundaries of the project area, and would not affect hazardous materials sites outside of the project area.

Release Hazardous Materials during Day-to-Day Rail Operations

There is the potential for indirect impacts related to the release of hazardous materials during rail operations. Similar to direct impacts, day-to-day rail operations could increase the potential for hazardous materials (e.g., fuel, oil, grease, lubricants, hydraulic fluids) to be released into the environment through leaks and spills from the locomotives and rail cars along the Reynolds Lead, BNSF Spur, and BNSF main line. These materials would be used to maintain adequate operations and maintenance of the locomotives and rail cars and would not be the main cargo. Some of these materials can be classified as hazardous. Locomotives and rail cars are assumed to be maintained, and leaks would be avoided by timely repairs by the train and railroad operators, thereby avoiding and minimizing the potential for a leak. Spills of petroleum hydrocarbons or hazardous materials during day-to-day rail operations could occur, but the frequency and magnitude of spills cannot be predicted.

Release Hazardous Materials during Collision or Derailment

Fuel spills could occur if any of the trains or rail cars collide or derail. Potential public safety and environmental risks of a fuel spill by collision or derailment would include fires or explosions, wildfires, water contamination, air quality impacts, impacts on tribal treaty resources, and impacts on wildlife, vegetation and fish. If a release of hazardous materials in the project area were to result from a collision or derailment, emergency response and cleanup measures would be implemented as required by the federal and state law, including Washington State regulations under RCW 90.56.

3.6.5.2 No-Action Alternative

Under the No Action Alternative, the Applicant would not construct the Proposed Action and impacts related to construction and operation of the Proposed Action would not occur. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses, including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

Because previous Reynolds facility operations have resulted in cleanup actions throughout the Applicant's leased area, new development or expansion of existing uses could encounter similar impacts during construction and operation as those discussed for the Proposed Action. However, all potential impacts could be minimized through remedial actions carried out in the cleanup action plan and compliance with federal, state, and local regulations as well as implementation of best management practices. Therefore, impacts related to hazardous materials are expected to be similar to the Proposed Action.

3.6.6 Required Permits

The following permits related to hazardous materials would be required for the Proposed Action.

- **National Pollutant Discharge Elimination System Construction Stormwater Permit—Washington State Department of Ecology.** The quality of surface water and groundwater would be protected as a result of the Applicant obtaining and following the NPDES Construction Stormwater Permit issued by Ecology. The permit would require preparation of a construction stormwater pollution prevention plan and implementation of best management practices to avoid and minimize the risk of pollutants entering surface waters and groundwater.

  As part of the NPDES Construction Stormwater Permit, a stormwater pollution prevention plan will be required by Ecology. A stormwater pollution prevention plan is a site-specific, written document that identifies potential sources of stormwater pollution at the construction site; describes practices to reduce pollutants in stormwater discharges from the construction site (reduction of pollutants is often achieved by controlling the volume of stormwater runoff, e.g., taking steps to allow stormwater to infiltrate into the soil); and identifies procedures the operator will implement to comply with the terms and conditions of the NPDES Construction Stormwater Permit.

  The following best management practices identified by the Applicant would likely be conditions of the stormwater pollution prevention plan under this permit.

  - **BMP C153.** Material delivery, storage, and containment would be used to prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage.
    - Storage of hazardous materials on site would be minimized to the extent feasible.
    - Materials would be stored in a designated area, and secondary containment would be installed where needed.
    - Refueling would occur in designated areas with appropriate spill control measures.
  - **BMP C154.** Concrete waste and washout waters would be either disposed of off -site or in a designated facility on site designed to contain the waste and washout water.
    - The contractor will apply typical construction best management practices for working over, in, and near water, including checking equipment for leaks and other problems that could result in discharge of petroleum-based products, hydraulic fluid, or other material to the Columbia River.

- The contractor will inspect fuel hoses, oil or fuel transfer valves, and fittings on a regular basis for drips or leaks in order to prevent spills into the surface water.
- The contractor will keep, store, handle, and use all fuel and chemicals in a fashion which avoid entry into the water.
- The contractor will have a spill containment kit, including oil-absorbent materials, on site to be used in the event of a spill or if any oil product is observed in the water.

- **National Pollutant Discharge Elimination System Industrial Stormwater Permit—Washington State Department of Ecology.** The quality of surface water and groundwater would be protected as a result of the Applicant obtaining and following the NPDES Industrial Stormwater Permit issued by Ecology. The permit would require the preparation of a stormwater pollution prevention plan and implementation of best management practices to avoid and minimize the risk of pollutants entering surface waters and groundwater.

  As part of the NPDES Industrial Stormwater Permit, a stormwater pollution prevention plan will be required by Ecology. A stormwater pollution prevention plan is a site-specific, written document that identifies potential sources of stormwater pollution from operations; describes practices to reduce pollutants in stormwater discharges (reduction of pollutants is often achieved by controlling the volume of stormwater runoff, e.g., taking steps to allow stormwater to infiltrate into the soil); and identifies procedures the operator will implement to comply with the terms and conditions of an industrial stormwater permit.

  The following best management practices identified by the Applicant would likely be conditions under this permit.

  - **BMP C153.** Material delivery, storage, and containment would be used to prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage.
    - Storage of hazardous materials on site would be minimized to the extent feasible.
    - Materials would be stored in a designated area, and secondary containment would be installed where needed.
    - Refueling would occur in designated areas with appropriate spill control measures.
  - **BMP C154.** Concrete waste and washout waters would be either disposed of off -site or in a designated facility on site designed to contain the waste and washout water.
    - The operator will apply typical operational best management practices for activities which take place over, in, and near water, including checking equipment for leaks and other problems that could result in discharge of petroleum-based products, hydraulic fluid, or other material to the Columbia River.
    - The operator will inspect fuel hoses, oil or fuel transfer valves, and fittings on a regular basis for drips or leaks in order to prevent spills into the surface water.
    - The operator will keep, store, handle, and use all fuel and chemicals in a fashion which avoid entry into the water.
    - The operator will have a spill containment kit, including oil-absorbent materials, on site to be used in the event of a spill or if any oil product is observed in the water.

- **Clean Water Act, Section 401 Water Quality Certification—Washington State Department of Ecology.** The Proposed Action would result in the construction and operation of a facility that could discharge into navigable waters and would require a Clean Water Act, Section 401, water quality certification.

  The following best management practice identified by the Applicant would likely be a condition under the Section 401 water quality certification.

  - Construction contractors and the facility operator conducting in-water and over-water work, including demolition, will be familiar with implementation of best management practices and permit conditions typical of working in the aquatic environment.

3.6.7 Proposed Mitigation Measures

This section describes the proposed mitigation measure that would reduce impacts related to hazardous materials from construction and operation of the Proposed Action. This mitigation measure would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

3.6.7.1 Applicant Mitigation

The Applicant will implement the following proposed measure to mitigate impacts related to hazardous materials. The following proposed mitigation measure is also presented in Section 4.5, *Water Quality*.

MM WQ-1. Locate Spill Kits Near Main Construction and Operations Areas

The Applicant will locate spill response kits throughout the project area during construction and operations. The spill response kits will contain response equipment and personal protective equipment appropriate for hazardous materials that will be stored and used during construction and operations. Site personnel will be trained in the storage, inventory, and deployment of items in the spill response kits. Spill response kits will be checked a minimum of four times per year to ensure proper-functioning condition, and will otherwise be maintained and replaced per manufacturer recommendations. Should a spill response kit be deployed, the Applicant will notify Cowlitz County and Ecology immediately. The Applicant will submit a map indicating the types and locations of spill response kits to Cowlitz County and Ecology for approval prior to beginning construction and operations.

3.6.8 Unavoidable and Significant Adverse Environmental Impacts

Compliance with laws and implementation of the measures and design features described above would reduce impacts related to hazardous materials. There would be no unavoidable and significant adverse environmental impacts related to hazardous materials.

Chapter 4
Natural Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures

4.0 Introduction

For the purposes of this Final Environmental Impact Statement (Final EIS), environmental resource areas have been divided into three categories: the Built Environment, the Natural Environment, and Operations (Chapters 3, 4, and 5, respectively). The purpose of this chapter is to provide a discussion of the natural environment resource areas assessed for the Millennium Bulk Terminals—Longview project (Proposed Action).

Information contained in this Final EIS was extracted from technical reports prepared specifically for the Proposed Action. Provided in Volume III of this Final EIS, the technical reports are incorporated by reference and include the determination of study areas, analysis methods, existing conditions, and potential impacts.

Data sources used for this analysis are briefly discussed with each resource. In addition, a detailed list of sources is provided in Appendix A, *References* of this Final EIS.

4.0.1 Natural Environment Resource Areas

Chapter 4, *Natural Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures*, evaluates the natural habitat and biological communities near the Proposed Action. The resource areas reviewed as part of the natural environment analysis include geology and soils; surface water and floodplains; wetlands; groundwater; water quality; vegetation; fish; wildlife; and energy and natural resources (Table 4.0-1). Additional detailed information about these resources can also be found in their corresponding technical reports in Volume III of this Final EIS.

In addition to these resource areas, Chapter 6, *Cumulative Impacts*, discusses cumulative impacts resulting from the Proposed Action combined with other past, present, and reasonably foreseeable actions.

Table 4.0-1. Resource Areas and Corresponding Final EIS Chapters

Chapter	Section Number	Environmental Resource Area
Chapter 3, Built Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures	3.1	Land and Shoreline Use
	3.2	Social and Community Resources
	3.3	Aesthetics, Light, and Glare
	3.4	Cultural Resources
	3.5	Tribal Resources
	3.6	Hazardous Materials
Chapter 4, Natural Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures	4.1	Geology and Soils
	4.2	Surface Water and Floodplains
	4.3	Wetlands
	4.4	Groundwater
	4.5	Water Quality
	4.6	Vegetation
	4.7	Fish
	4.8	Wildlife
	4.9	Energy and Natural Resources
Chapter 5, Operations: Existing Conditions, Project Impacts, and Proposed Mitigation Measures	5.1	Rail Transportation
	5.2	Rail Safety
	5.3	Vehicle Transportation
	5.4	Vessel Transportation
	5.5	Noise and Vibration
	5.6	Air Quality
	5.7	Coal Dust
	5.8	Greenhouse Gas Emissions and Climate Change

4.0.2 Alternatives and Timeframe for Analysis

This chapter analyzes the impacts that could occur as a result of construction and operation of the Proposed Action. The analysis contained in this chapter assumes construction beginning in 2018 and full operations[1] occurring by 2028. Throughout this chapter, the 190-acre coal export terminal site is referred to as the *project area*. The impacts identified for 2028 would occur for the lifetime of the Proposed Action. Proposed mitigation measures are intended to apply for the lifetime of the Proposed Action.

This chapter also analyzes impacts that could occur if the Proposed Action were not approved (the No-Action Alternative). Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, of this Final EIS provides a description of the Proposed Action and No-Action Alternative.

[1] Full operation means the coal export terminal would have a maximum throughput of up to 44 million metric tons of coal per year, as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

4.0.3 Study Areas and Type of Impacts Analyzed

Each resource area has its own study area depending on its physical characteristics or regulations that oversee the resource area. Two types of study areas were identified—a direct impacts study area and an indirect impacts study area. Table 4.0-2 explains the differences between these two study areas. In some cases, both study areas are the same.

Table 4.0-2. Types of Impacts

Type of Impact[a]	Description	Description of Impacts Categories
Direct	An impact resulting from either construction or operation of the Proposed Action that occurs in the project area.	• **Construction:** Temporary impacts within the project area that are resolved or mitigated by the end of construction activity, or permanent impacts that result from changes to the project area due to construction of the coal export terminal. • **Operation:** Impacts occurring in the project area resulting from rail unloading, coal storage, machinery operations, equipment, vessel loading, etc.
Indirect	An impact resulting from either construction or operation of the Proposed Action that occurs beyond the project area.	• **Construction:** Impacts from activities beyond the project area during construction, such as vehicle and rail traffic. • **Operation:** Impacts from activities beyond the project area during operations, such as rail, vehicle, and vessel traffic.

Notes:
[a] Washington Administrative Code (WAC) 197-11-192.

Table 4.0-3 provides a summary of the direct and indirect impacts study areas by Chapter 4 resource.

Table 4.0-3. Direct and Indirect Impacts Study Areas by Resource

Section and Resource	Direct Impacts Study Area	Indirect Impacts Study Area: Cowlitz County	Indirect Impacts Study Area: Washington State (beyond Cowlitz County)
4.1, Geology and Soils	Project area	Project area and the broader geologic environment in the surrounding area that could influence the project area	No additional study area[a]
4.2, Surface Water and Floodplains	• Surface Water: Columbia River and stormwater drainage ditches in the project area • Floodplains: Project area	• Surface Water: Stormwater system drainage ditches adjacent to the project area and the Columbia River 1 mile downstream from the project area • Floodplains: Project area and surrounding 500-year floodplain on the north side of the Columbia River in the vicinity of the project area	No additional study area[a]
4.3, Wetlands	Project area	Project area and the immediate vicinity, where wetlands might be affected by construction or operation of the coal export terminal	No additional study area
4.4, Groundwater	Project area	Applicant's leased area	No additional study area[a]
4.5, Water Quality	Project area and the area extending 300 feet from the project area into the Columbia River, and potential in-river dredged material disposal sites plus the area extending 300 feet downstream of each disposal site	Project area, stormwater system drainage ditches adjacent to the project area, the Columbia River up to 1 mile downstream of the project area, and potential in-river dredged material disposal sites plus the area extending 300 feet downstream of each disposal site	No additional study area

Section and Resource	Direct Impacts Study Area	Indirect Impacts Study Area	
		Cowlitz County	**Washington State (beyond Cowlitz County)**
4.6, Vegetation	Project area plus additional elements (e.g., access roads, docks, and rail line)	The area within 1 mile of the project area for potential impacts from coal dust deposition from operations in the project area; the lower Columbia River for Proposed Action-related vessels; rail routes for Proposed Action-related trains	Rail routes for Proposed Action-related trains[a,b]
4.7, Fish	Main channel of the Columbia River 3.92 miles upstream and downstream of the project area	Columbia River downstream from the project area to the mouth of the Columbia River for Proposed Action-related vessels; rail routes along the Columbia River for Proposed Action-related trains	Rail routes for Proposed Action-related trains[a,b]
4.8, Wildlife	• Terrestrial Species and Habitats: Project area and up to 0.5 mile from project area • Aquatic Species and Habitats: Main channel of the Columbia River to 5.1 miles upstream and 2.1 miles downstream of the proposed docks for potential underwater noise impacts; surface and stormwater ditches, ponds, and wetlands in the project area	• Terrestrial Species: Rail routes for Proposed Action-related trains for potential coal spill and wildlife strike impacts • Aquatic Species: Columbia River downstream from the project area to the mouth of the river for potential impacts on marine mammals	• Terrestrial Species: Rail routes for Proposed Action-related trains[a]
4.9, Energy and Natural Resources	Project area	Area within 0.25 mile of project area	Not in the study area

Notes:

[a] Appendix F, *Rail and Vessel Corridor Information*, provides additional information for the Proposed Action-related rail and vessel corridors from the *Tesoro Savage Vancouver Energy Distribution Terminal Facility Draft Environmental Impact Statement* (Washington State Energy Facility Site Evaluation Council 2015).

[b] Study area for potential impacts related to coal spills only.

4.0.4 Mitigation Measures Development Approach

Applicable regulations, potential permit conditions, and required planning documents were evaluated to determine if they would address potentially significant adverse environmental impacts identified in this Final EIS. When applicable, each section describes specific measures identified by the Applicant to be implemented during construction and operations. When potential significant adverse environmental impacts remained, other proposed mitigation measures were identified that would reduce the identified impact (Applicant Mitigation). Mitigation measures included in permit conditions would become legal requirements of the Applicant. In addition to the proposed mitigation measures identified in each section of this chapter, the following measure is proposed.

- The Applicant will provide to Cowlitz County and the Washington State Department of Ecology an annual report of compliance with mitigation requirements of an issued permit. Mitigation compliance reports will be part of the public record.

Proposed mitigation measures were identified as required by the Washington State Environmental Policy Act (SEPA) consistent with Washington Administrative Code (WAC) 197-11-660, which states that mitigation shall be reasonable, capable of being accomplished and imposed to the extent attributable to the identified adverse impact of the proposal.

The thresholds of significance and proposed mitigation measures were determined by the co-lead agencies (Cowlitz County and the Washington State Department of Ecology). Additionally, when applicable, each section identifies mitigation measures that could be implemented by other agencies, groups, or companies (Other Measures to be Considered) to reduce potential Proposed Action-related impacts that are beyond the Applicant's control or authority.

4.1 Geology and Soils

Geology and soils are resources with defining characteristics (such as soil structure, composition, or geologic formations) that are unique or valuable or support unique habitats. Geology and soils can also influence the potential for geologic hazards, such as landslides, earthquakes, seismic effects (e.g., surface fault ruptures, strong ground shaking, liquefaction, lifting and lowering of the surface, and tsunamis), and volcanic activity. Understanding the types of soils and the underlying geologic conditions is important in determining whether a project would be exposed to increased risks related to these conditions.

This section describes the geology and soils in the study areas. It then describes potential impacts on geology and soils that could result from construction and operation of the Proposed Action and under the No-Action Alternative, as well as the geologic conditions that exist in the study areas that could pose a risk to the project area. This section also presents proposed measures identified to mitigate impacts resulting from the Proposed Action.

4.1.1 Regulatory Setting

Laws and regulations relevant to geology and soils are summarized in Table 4.1-1.

Table 4.1-1. Regulations, Statutes, and Guidelines for Geology and Soils

Regulation, Statute, Guideline	Description
Federal	
Clean Water Act Section 402 Permit for Stormwater Discharges Associated with Construction Activities	Primarily deals with water quality but includes eroded soils potentially delivered offsite via runoff. Mandates that certain types of construction activities (and operations) comply with the EPA NPDES program. The EPA has designated Washington State Department of Ecology the nonfederal authority for the NPDES program in Washington State. Includes development of a stormwater pollution prevention plan.
Local	
Cowlitz County Critical Areas Protection Ordinance (CCC 19.15)	Designates geologically hazardous areas (including seismic, volcanic, erosion, and landslide hazards) and defines performance standards and specific requirements for development within these areas.
Cowlitz County Grading (CCC 16.35)	Grading plan requirement and standards including the protection of water quality from adverse impacts of erosion and sedimentation.
Cowlitz County Building Code (CCC 16.05)	Cowlitz County has adopted the 2012 International Building and Residential Codes.

Notes:
EPA = U.S. Environmental Protection Agency; NPDES = National Pollutant Discharge Elimination System; CCC = Cowlitz County Code

4.1.2 Study Area

The study area for direct impacts on geology and soils is the project area.

The study area for indirect impacts on geology and soils is the project area and the broader geologic environment in the area surrounding the project area that could influence the project area. These broader geologic influences include earthquakes (seismicity) and their associated impacts (ground shaking), as well as tsunamis (large earthquake-generated waves that can affect coastal zones and could travel some distance up large rivers) or landslides that might reach the project area. Figure 4.1-1 shows the study areas for the geology and soils analysis.

4.1.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts associated with the construction and operation of the Proposed Action and No-Action Alternative.

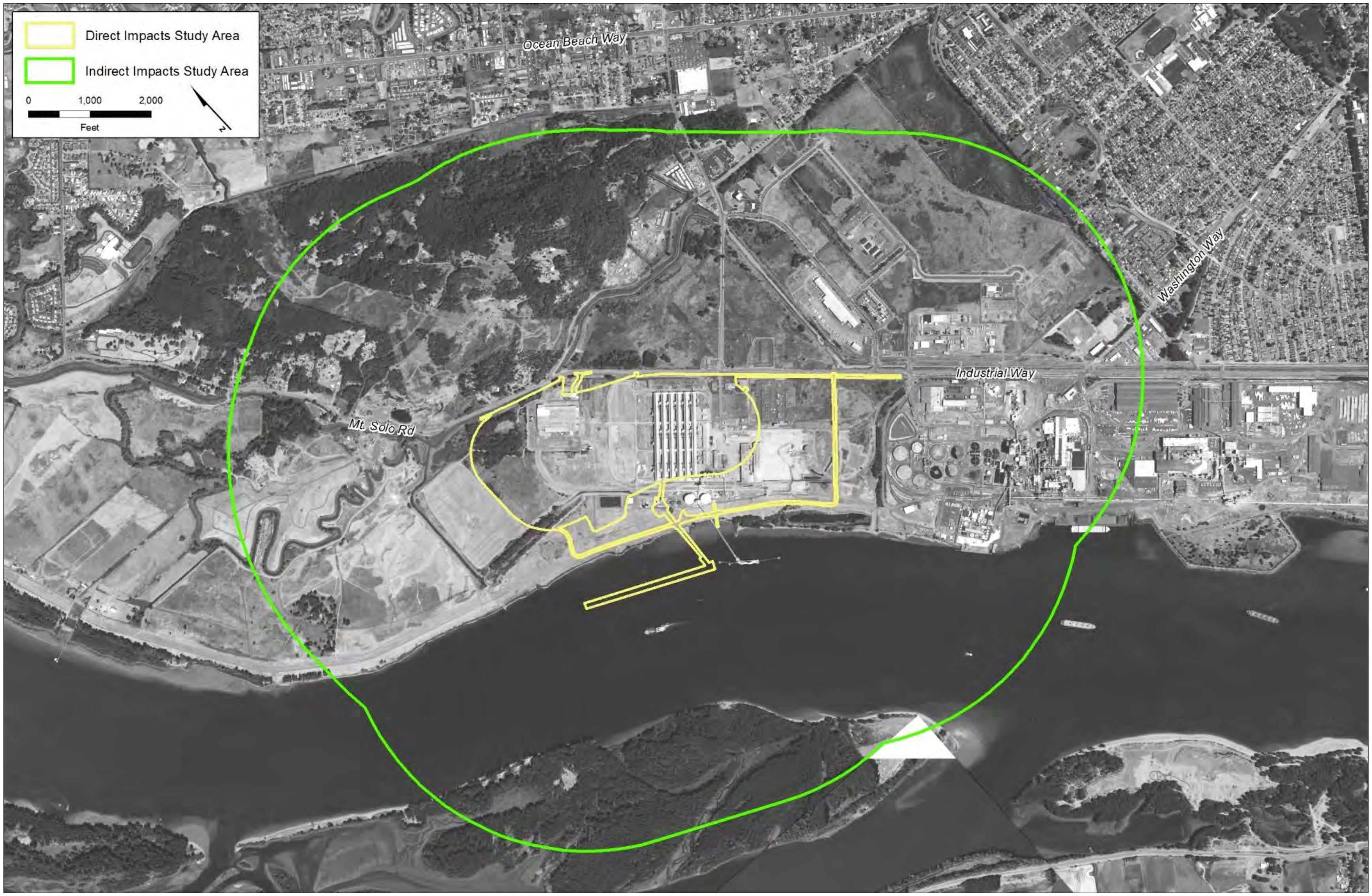
4.1.3.1 Information Sources

Information with respect to geology and soils was collected through review of information and reports provided by the Applicant as well as other sources of information and scientific literature, including Washington State Department of Natural Resources Division of Geology and Earth Resources materials, U.S. Geological Survey (USGS) maps and reports, U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) soil information, and geological and soil literature. Additionally, a site visit by a professional geologist conducted on January 29, 2014, provided an overview of existing conditions at the project area.

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on geology and soils in the study area.

- USGS National Seismic Hazard Maps and associated report (U.S. Geological Survey 2013)
- Cascadia Region Earthquake Workgroup (2013) report on the Cascadia Subduction Zone earthquakes
- Washington State Department of Natural Resources Division of Geology and Earth Resources geologic mapping and geologic hazards of the Longview area (various)
- NRCS soil mapping (2013)
- Geotechnical engineering reports and geotechnical engineering data reports prepared for the project area (GRI 2011, 2012)
- Professional workshop and refereed scientific journal materials on tsunamis in the Columbia River
- Geology and soil report prepared for the project area by the Applicant (URS Corporation 2014)

Figure 4.1-1. Geology and Soils Study Areas



4.1.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on geology and soils.

The analysis of potential impacts related to geology and soils reviewed the following.

- Regional and site characteristics (bedrock, unconsolidated sediment, and soil characteristics) and how they could influence site or structure stability through soil erosion, landslides, and settling.
- Potential ground shaking and ground settling that could occur due to earthquakes and the stability of the underlying materials.
- The potential for impacts related to volcanic hazards and tsunamis.

4.1.4 Existing Conditions

This section describes the existing environmental conditions in the study area related to geology and soils that could be affected by the construction and operation of the Proposed Action and No-Action Alternative. Broader geologic context is provided as a foundation for the site-specific analysis presented in the following section.

4.1.4.1 Geology in the Project Area and Vicinity

The project area is located on the north shore of the Columbia River, approximately 5 miles downstream of the confluence of the Cowlitz and Columbia Rivers (at approximately river mile 63 in the Columbia River). Levees were constructed along the river side of the project area (Figure 4.1-2) around 1920, and the area has been used as an industrial site since the 1940s (Anchor QEA 2011). The project area is relatively level with some steep slopes that descend into drainage ditches on the northern part of the project area and to the Columbia River on the south side. Soils consist mostly of alluvium (i.e., river deposits of gravel, sand, and silt) as well as human-made sources of fill. The project area is at an elevation approximately 16 feet above sea level.

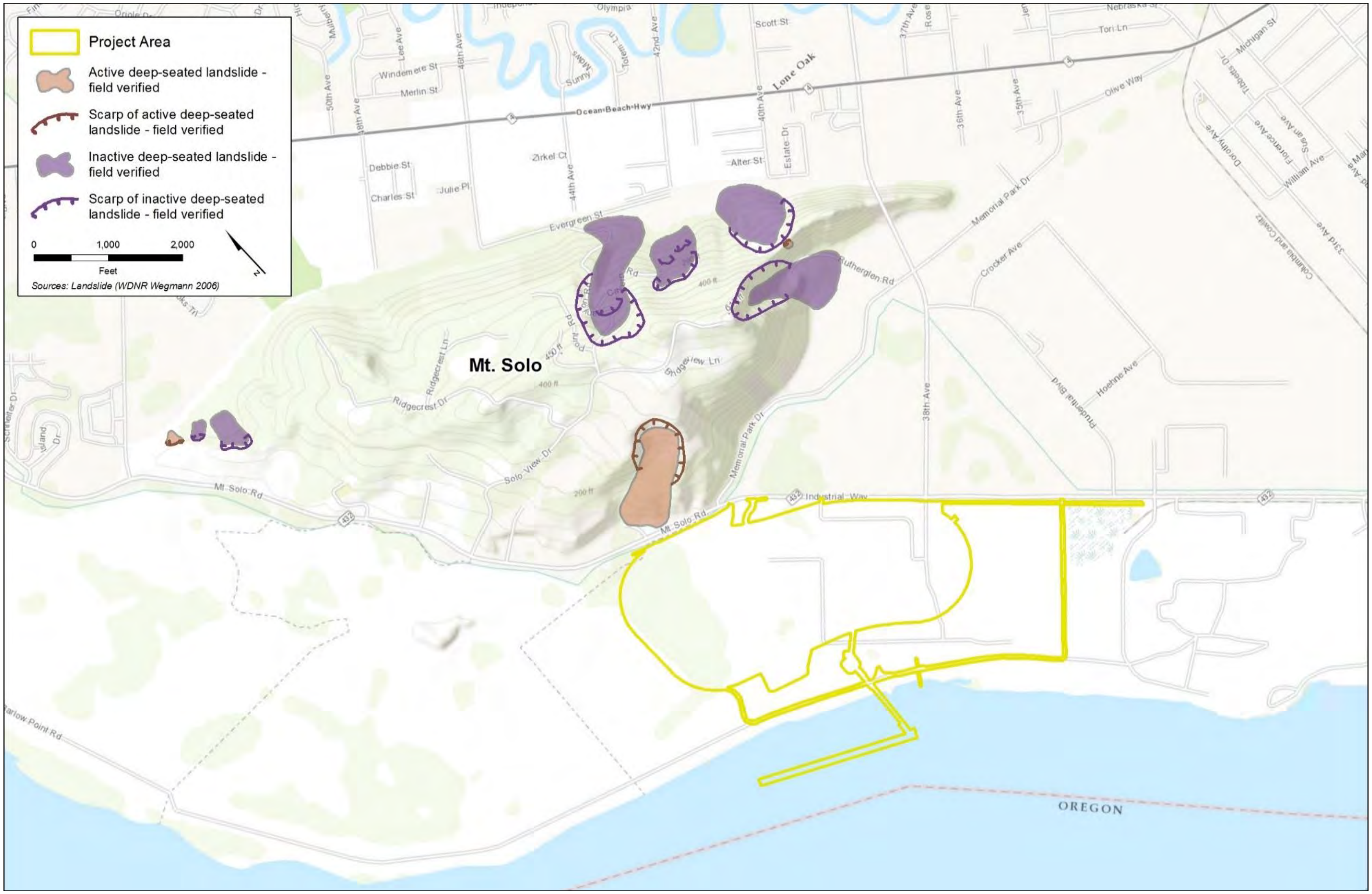
The adjacent Columbia River navigation channel is approximately 43 feet deep at low tide (National Oceanic and Atmospheric Administration Chart 18524) and from 28 to 42 feet deep at low tide at the location of the proposed docks (Dock 2 and Dock 3). No unique geologic physical features, such as unique geologic formations, rock outcroppings, cliffs, or soil formations, occur at the project area.

The study area exhibits attributes that are typical of the lower Columbia River valley. The regional geology is dominated by events related to the eastward movement of the Juan de Fuca tectonic plate against the North American plate (Evarts et al. 2009; Parsons et al. 2005). As these plates shift, the Juan de Fuca plate descends below the North American plate and it liquefies at depth. The associated magma (lava) rises to the surface to form the volcanic Cascade mountain range.

Areas of exposed bedrock are present near the project area. These areas include Mount Solo to the immediate north of the project area (Figure 4.1-3) and Mount Coffin approximately 0.5 mile upstream of the project area (Washington State Department of Natural Resources 2014). The outermost bedrock on Mount Solo is mapped as volcanic rocks (basalt). At the study area scale, landslides are also mapped along the slopes of Mount Solo.

Figure 4.1-2. Levees in the Project Area and Vicinity

Figure 4.1-3. Landslides in the Project Area and Vicinity



Subsurface Conditions

The soil material beneath the project area is derived from the interaction of the river and the floodplain during high flow events that deposit sediments consisting of sand, silt, and clay, as well as areas of peat (Anchor Environmental 2007; Anchor QEA 2011; GRI 2012; URS Corporation 2014). Groundwater is found between 3 and 20 feet below the ground surface, so sediments have varying amounts of water content (Anchor QEA 2011, 2013; GRI 2012; URS Corporation 2014). Geotechnical investigations indicate that the surface and near-surface sediments are soft or loose (URS Corporation 2014). These conditions indicate the potential for some settlement under the weight of certain project features, such as stockpile pads, buildings, and rail loops. Field tests indicate the potential for relatively significant settlement of these underlying materials over a long period of time (URS Corporation 2014).

Because of saturated sandy soil conditions that exist at the project area, liquefaction of soils could result from an earthquake. Geotechnical reports prepared for a previously proposed asphalt plant at the site identified the potential for post-earthquake liquefaction of soils to cause settlement of 7 to 16 inches (GeoEngineers 2007) and 12 to 16 inches (Shannon and Wilson 2008).

Landslides and Slope Stability

Landslides were not identified as a potential risk for the Proposed Action in local slope instability reports or on-site investigations (Figure 4.1-3) (Fiksdal 1989; Wegmann 2006; Anchor Environmental 2007; GRI 2011, 2012). The project area for the Proposed Action is flat; therefore, there is a low likelihood of landslides occurring. Much of the shoreline of the Columbia River has been armored with riprap along the length of the levee adjacent to the Proposed Action. The riprap protects the levee from erosion, while the levee itself protects upland areas from flooding.

Landslides have been identified on Mount Solo. Fiksdal (1989) identified two landslide areas on the eastern flanks of Mount Solo, as well as one on the north side and another on the south side (Figure 4.1-3). More detailed mapping by Wegmann (2006) identified multiple landslides around Mount Solo. Wegmann (2006) also determined whether the features were inactive or active. One of the active landslides is on the south side of Mount Solo, meaning that it could affect the project area. This landslide is formed by the exposed bedrock that is discussed in Section 4.1.4.1, *Geology in the Project Area and Vicinity*. Landslides on Mount Solo could be caused by strong ground shaking from earthquakes or by saturated soil.

Seismicity

Pacific Northwest earthquakes are caused by one of four possible geologic events: movements between the tectonic plates on the coastal Cascadia Subduction Zone (CSZ), subduction of the Juan de Fuca plate sinking beneath the North American tectonic plate, shallow crustal movements in the North American tectonic plate, and movements related to volcanic activity.

No great earthquakes (magnitude 8.0 to 9.0[1] or higher) have occurred on the CSZ during the historical record but reconstructions from the geologic record show that more than 10 great

[1] The Richter scale is used to define the scale for earthquake magnitudes presented in this section.

earthquakes have occurred in Oregon and Washington over the last 5,000 years (Cascadia Region Earthquake Workgroup 2013; URS Corporation 2014). The interval in which these earthquakes reoccur is estimated at approximately 250 to 900 years with the last occurrence in 1700 (Atwater 1994; Jacoby et al. 1997).

Based on the historical record, plate movement due to the sinking of the Juan de Fuca plate under the North American plate is considered capable of causing earthquakes as large as magnitude 7.5 (URS Corporation 2014). These earthquakes generally do not have faults that reach ground level and the recurrence time is unknown. Earthquakes that were caused by this type of plate movement in Washington include the 1949 Olympia 7.1 magnitude, the 1965 Seattle 6.5 magnitude, and the 2001 Nisqually 6.8 magnitude. These earthquakes did not cause significant damage in the Longview area (Noson et al. 1988; Washington State Department of Natural Resources 2001; Washington State Seismic Safety Committee 2012; URS Corporation 2014).

Shallow earthquakes in the earth's crust occur over large areas. Based on data gathered and historical records in the Pacific Northwest, these earthquakes can be greater than magnitude 6.0 and perhaps as high as magnitude 7.0 to 7.5 (URS Corporation 2014). The 1872 North Cascade (Lake Chelan, Washington, area) magnitude 6.5 to 7.0 earthquake is considered the largest historical shallow crustal earthquake (Bakun et al. 2002; URS Corporation 2014). Shallow faults in southwestern Washington and northwestern Oregon have the potential to generate magnitude 6.0 and greater earthquakes (Wong et al. 2000; Lidke et al. 2003; Personius et al. 2003; URS Corporation 2014).

Volcanic earthquakes occur beneath the Cascade volcanoes; Mount St. Helens is about 40 miles east of the project area. These earthquakes are associated with magma movement or volcanic faults within the Mount St. Helens seismic zone. The largest recorded earthquake beneath Cascade volcanoes was a magnitude 5.1 earthquake in 1981 (U.S. Geological Survey 2013).

Surface Fault Rupture

No shallow crustal faults are active or potentially active within the immediate vicinity of the project area (Lidke et al. 2003; Personius et al. 2003; Barnett et al. 2009; Czajkowski and Bowman 2014.). The closest faults are the Portland Hills and Frontal Fault–Lacamas Lake Faults that are about 40 miles to the southeast near Portland, Oregon (Wong et al. 2000; URS Corporation 2014). The Mount St. Helens Seismic Zone is a fault line about 45 miles to the east and offshore faults are about 60 miles to the west.

Strong Ground Shaking

Between 1872 and 2014, earthquakes ranged in magnitude from 5.0 to 7.3 for all of Washington (URS Corporation 2014). Large earthquakes that would have affected the Longview area primarily took place in the Puget Sound area and Portland, Oregon. They range in magnitude from 5.0 to 7.1 (URS Corporation 2014). Large earthquakes would cause severe ground shaking in the Longview area including the project area.

The USGS National Seismic Hazard Maps determine earthquake ground motions for different seismic thresholds that are used for seismic requirements in building codes. These values come from evaluating all of the potential earthquakes (including their locations, depths, and likelihoods) that could affect an area. The maps display peak ground acceleration, the measure of the ground's acceleration from no motion at all to a peak motion during ground shaking. This acceleration causes shaking and stress on structures. A peak ground acceleration in the range of 0.34 to 0.65 gravity (g) is regarded as severe shaking and could cause moderate to heavy damage to buildings or structures, depending on the duration of the event, the types of underlying materials, and the structural integrity of the affected buildings or structures (Petersen et al. 2014). The USGS map shows a peak ground acceleration in the study area of 0.4 to 0.5 g, which has a 2% chance of being exceeded in 50 years (Petersen et al. 2014).

Ground shaking is also stronger in areas of soft soils or loose deposits such as sand and silt. The Site Class Map of Cowlitz County, Washington, shows the project area as site class E, which has the softest soil conditions and highest level of potential ground shaking (Palmer et al. 2004).

Cascadia Region Earthquake Workgroup (2013) notes that underwater landslides, which could disrupt the Columbia River navigation channel and adjacent industrial and commercial berthing areas, also pose a ground shaking and liquefaction hazard to the area.

Secondary Seismic Hazards: Liquefaction and Subsidence

Liquefaction occurs when stress such as ground shaking causes saturated or partially saturated soil to lose its strength and act like a fluid. The project area has potential for liquefaction during ground shaking. The Liquefaction Susceptibility Map of Cowlitz County, Washington, shows the area as having high liquefaction potential (Palmer et al. 2004). The area is underlain by hundreds of feet of gravel, sand, silt, and organic layers. The sandy layers can liquefy during strong ground shaking and then could flow or lose stability, and no longer support the ground above them. The flowing layers could flow horizontally or vertically depending on the adjacent layers and whether the liquefying layer could exit the ground (e.g., by flowing out of an adjacent slope or river channel or coming out at the surface by forming one or more sand volcanos[2]).

The geologic record provides evidence of liquefaction potential along the Columbia River. Previous investigations at the site for a proposed asphalt plant resulted in similar estimates for settlement from liquefaction that range from 7 to 16 inches for a CSZ earthquake ranging from magnitudes 7.4 to 8.3, though this varies with location.

Volcanic Hazards

The main volcanic hazard at Longview is from airborne fragments, ash fall, and lahars (volcanic mudflows) reaching, and continuing down, the Columbia River. Active volcanoes within the Cascade Range lie to the east of Longview, with the closest active volcano being Mount St. Helens about 40 miles to the east. The project area does not lie within the Cowlitz County designated volcanic flowage hazard zone 1 (within a 5-mile radius of volcanic activity). USGS estimates the annual chance of ash fall greater than 4 inches at Longview to be between 0.01% and 0.02% or between 1 in 10,000 to 1 in 5,000 (Wolfe and Pierson 1995).

Lahars originating from the south flank of Mount Rainier in the upper Cowlitz River are unlikely to reach the lower Cowlitz River (Cakir and Walsh 2012). Lahars have been documented upstream along the Sandy River draining from Mount Hood in Oregon (Pierson et al. 2009) at approximately 55 miles upstream of Longview. Lahars from Mount Adams could reach the Columbia River via the

[2] A sand volcano is a cone of sand formed by the ejection of sand onto the surface from a central point. The cone looks similar to a volcano. The process is often associated with earthquake liquefaction and the ejection of fluidized sand that can occur in water-saturated sediments during an earthquake.

White Salmon River; its confluence is more than 100 river miles upstream of Longview. The Longview area is not within the Cowlitz County-designated volcanic flowage hazard zone 3, which would require an evacuation and emergency management plan.

Mine Hazard Areas

Mine hazard areas in Cowlitz County are mainly associated with historical coal mining and areas affected by mine workings such as adits, tunnels, drifts, or airshafts. There is no bedrock with coal along the Columbia River in the Longview area.

Tsunamis

Washington and Oregon tsunamis could result from CSZ earthquakes along their coastline or similar major earthquakes in areas such as southern Alaska, Japan, or Indonesia. Tsunami hazard and evacuation maps for Washington and Oregon only extend up the Columbia River to a point just east of Astoria, Oregon (river mile 15, approximately 50 miles downstream of the project area) (Walsh et al. 2000; Washington State Department of Natural Resources 2010; Oregon Department of Geology and Mineral Industries 2012). Modeling calculations found that an 18-foot-high tsunami at the Columbia River mouth decreased to less than 8 inches at Longview (Yeh et al. 2012).

Sea Level Rise

Sea levels are rising. However, some areas of the Pacific Northwest are experiencing uplift; by contrast, areas around Puget Sound are subsiding and experiencing larger-than-average impacts from rising sea levels. Sea level rise in the Pacific Northwest is expected to be as little as 5 inches or less to more than 4 feet by the end of the century. The project area is approximately 60 miles inland from the mouth of the Columbia River, and sea level rise at the project area is expected to be minimal. Further, the project area is behind Columbia River levees of approximately 36 feet above sea level, and since this is higher than the potential sea level rise, there would not be any impacts on soils on the project area or an increased risk of erosion. Sea level rise is discussed further in Chapter 5, Section 5.8, *Greenhouse Gas Emissions and Climate Change.*

4.1.4.2 Soils in the Project Area and Vicinity

Cowlitz County soils have been mapped by NRCS (Natural Resources Conservation Service 2013). These soil units and some of their characteristics are shown in Table 4.1-2. Excluding water, five soil units are mapped at the project area (Figure 4.1-4). All of these soil units reflect the alluvial (river deposit) origin of the soil material and are relatively fine-grained.

The erosion hazard is considered slight for all of the soils in the study area. The K factor[3] indicates a soil's vulnerability to erosion. The higher the soil's K factor, the higher its erosion potential. Based on the K factor, the Caples silty clay loam (Map Unit Number 17), the Maytown silt loam (Map Unit 127), and Snohomish silty clay loam (Map Unit Number 199) have a higher erosion hazard under bare soil conditions. These soils have a low susceptibility to wind erosion.

The site soils are all moderate in regards to their potential for corrosion of concrete. Several engineering measures address concrete and steel corrosion, such as improving drainage and replacing native soil with fill (Washington State Department of Transportation 2014).

[3] K factor is a soil erodibility factor which represents both susceptibility of soil to erosion and the rate of runoff.

Figure 4.1-4. Soil Types in the Project Area and Vicinity

A soil's linear extensibility is the measure of its potential to expand during wetting and to contract during drying. The more a soil expands the more potential it has to affect overlying materials such as structure foundations. The soil expansion classes for the project area range from low (Arents, Pilchuck loamy fine sand), to moderate (Maytown silt loam, Snohomish silty clay loam), to high (Caples silty clay loam). The values in Table 4.1-2 are provided as a percent expansion and a descriptive classification (class).

The above discussion relates to the naturally occurring soils at the project area. However, the project area has been an industrial site since the 1940s and has had various amounts of surface disturbance and fill material (sand, silt, mixed silt and sand, large gravel, and crushed rock [Anchor QEA 2011; GRI 2011, 2012]) placement. Due to the industrial use, site-specific surface soil materials could vary from NRCS mapping. Data reports for the project area indicate varying areas of fill materials, particularly under existing structures.

Table 4.1-2. Soils and Soil Properties in the Project Area

Map Unit Number[a]	Soil Map Unit Name	Drainage Class	K Factor[b]	Erosion Hazard	Corrosion of Concrete[c]	Corrosion of Uncoated Steel[d]	Linear Extensibility (Class)
5	Arents, 0 to 5% slopes	Moderately well drained	0.28	Slight	Moderate	Moderate	1.5% (Low)
17	Caples silty clay loam, 0 to 3% slopes	Somewhat poorly drained	0.43	Slight	Moderate	High	7.0% (High)
127	Maytown silt loam, 0 to 3% slopes	Moderately well drained	0.49	Slight	Moderate	High	3.6% (Moderate)
160	Pilchuck loamy fine sand, 0 to 8% slope	Not defined	0.20	Slight	Moderate	Low	1.5% (Low)
199	Snohomish silty clay loam, 0 to 1% slopes	Poorly drained	0.37	Slight	Moderate	High	4.5% (Moderate)
263	Water	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
[a] Higher K factor values indicate greater potential for erosion: K factor values below 0.13 have low erosion potential; values 0.13 to 0.26 have medium erosion potential; values greater than 0.26 have high erosion potential.
[b] The potential for concrete corrosion increases decreasing water and soil acidity and increases in sodium, magnesium sulfate, and sodium chloride.
[c] The potential for corrosion of uncoated steel increases with soil water saturation, greater water acidity and conductivity.
Source: Natural Resources Conservation Service 2013
N/A = not applicable

4.1.5 Impacts

This section describes the potential direct and indirect impacts related to geology and soils that would result from construction and operation of the Proposed Action and the No-Action Alternative.

4.1.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area[4] as a result of construction and operation of the Proposed Action.

Construction activities could affect geology and soils directly through ground disturbance associated with construction of the coal export terminal and preloading of the coal stockpile areas. Operational activities could affect geology and soils indirectly through exposure of people and structures to potential effects from catastrophic events

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Enlarge Land, Affect a Unique Physical Feature, or Cause Substantial Soil Erosion

Construction of the Proposed Action would not result in the enlargement of land area by placing fill in the Columbia River or by depositing sediments in the Columbia River. There are no unique physical features at the project area that would be affected by the Proposed Action. Although steep slopes occur along drainage ditches and the Columbia River banks, there are no indications of instability and project activities are not expected to cause instability at these locations.

Construction of the Proposed Action would involve ground-disturbing activities such as grading, railroad construction, excavating for foundations, and road construction that would affect about 190 acres of land. Approximately 2.1 million cubic yards of material would be imported for compressing soils on site, as well as about 130,000 cubic yards of ballast rock for rail-related structures and infrastructure. Approximately 2.5 million cubic yards of material would be moved around the project area during the compression of on-site soils.

As discussed in Section 4.1.4.2, *Soils in the Project Area and Vicinity*, and shown in Table 4.1-2, although the soils in the project vicinity have a moderate to high potential for erosion, the on-site soils have a slight erosion hazard mainly due to the site's flat, low gradient. Bare soil could be exposed for varying periods of time due to construction activities over several years. This could lead to potential soil erosion due to rainfall or wind. Soil erosion would have the potential for off-site transport of eroded soil materials to waterways such as the Columbia River and adjacent ditches. Wind erosion potential would be limited—because of the precipitation levels that occur at the site and proposed dust suppression during construction to control wind erosion—but could occur during summer dry periods. Dust from coal stockpiles is addressed in Chapter 5, Section 5.6, *Air Quality*. When build-out is complete, the project area would be approximately 90% impervious surfaces, which would reduce soil erosion potential to near zero.

[4] Acreages presented in the impacts analysis were calculated using geographic information system (GIS) technology, thus, specific acreage of impacts are an estimate of area based on the best available information.

As described in Chapter 2, Section 2.2.3, *Proposed Facilities, Construction, and Operations*, dredging related to the construction of Docks 2 and 3 would be managed under the Section 401 Water Quality Certification. This could involve approval of flow-lane disposal of dredge material, which would avoid impacts on uplands. The Applicant could, if approved, also dispose of dredge materials in upland portions of the project area for preloading the stockpile area. Placement of this dredge material in the stockpile area would compact the underlying soil (see *Affect Project Structures from Soil Materials Underlying the Site*, below, for more information). Potential impacts of disposal of dredge material on water quality and surface waters are addressed in Section 4.2, *Surface Water and Floodplains*, and Section 4.5, *Water Quality*.

Affect Project Structures from Soil Materials Underlying the Site

As discussed in Section 4.1.4.2, *Soils in the Project Area and Vicinity*, and shown in Table 4.1-2, the on-site soils have moderate potential to corrode concrete, low to high potential to corrode steel, and have an expansion-contraction (wet-dry) class of low to high. Impacts related to corrosion of project-related structures and infrastructure would be avoided through standard engineering and construction methods. Washington State Department of Transportation (2014) uses a variety of standard engineering measures to address concrete and steel corrosion such as improving drainage and replacing native soil with fill. Such standard engineering measures would be employed by the Applicant to ensure potential soil related corrosion would not occur.

The sediments beneath the project area are relatively fine-grained and water-saturated, and the water table is near the ground surface. These characteristics make the sediments vulnerable to compaction from the weight of overlying materials and structures. This vulnerability is mainly a concern for the coal stockpile areas on the project area due to the coal's weight. Thus, preloading and installing wick drains is required to expel the groundwater and consolidate soils beneath the stockpile areas prior to operations. Compaction would be less of a concern for other project components because they involve much less weight.

Compaction and settlement of underlying sediments in the coal stockpile areas are addressed in the project design through preloading. Preloading involves importing material to compact the underlying soil to improve its load-bearing capacity. Approximately 2.1 million cubic yards of material would be imported into the coal stockpile areas in stages over a period of up to 7 years. Preloading would provide soil compaction to avoid potential impacts associated with soil settlement during operations.

Construction—Indirect Impacts

Construction of the Proposed Action would not result in indirect impacts on geology and soils because construction impacts would be immediate and would be limited to the project area. Therefore, no construction impacts would occur later in time or farther removed in distance from the direct impacts on the project area as discussed previously.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Expose People or Structures to Potential Effects Involving Catastrophic Events

Operation of the Proposed Action could expose people or structures to potential effects involving catastrophic events such as; rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure (liquefaction), landslides, and tsunamis. Thus, potential effects from these types of catastrophic events were evaluated.

Earthquake Faults

There are no known earthquake faults in the study area that reach the ground surface. Therefore, no ground surface ruptures could directly damage structures or buildings in the study area.

Ground Shaking

The project area and surrounding area could be subject to strong ground shaking from earthquakes. The USGS National Seismic Hazard Map shows that there is a 2% probability of an earthquake with a peak ground acceleration of 0.4 g to 0.5 g, occurring over 50 years (Petersen et al. 2014). As a generalization, this means that in any 50-year period, there is a 2% chance that an earthquake could occur that would result in severe shaking. This amount of shaking could directly damage proposed structures and buildings. As per the Cowlitz County Critical Areas Protection Ordinance (Cowlitz County Code 19.15), construction of the Proposed Action would be required to comply with International Building Code 16.05 and Cowlitz County Grading Ordinance 16.35, as applicable. Additionally, a geotechnical report would be prepared as part of the Proposed Action and would inform project design and construction techniques, which would likely reduce potential impacts associated with ground shaking.

Seismic-Related Ground Failure (Liquefaction)

The study area could be subject to liquefaction during strong ground shaking. Palmer et al. (2004) characterizes the area as having high liquefaction susceptibility. An investigation of the area that was conducted for a previously proposed asphalt plant indicated that settlement after liquefaction would vary with earthquake location and earthquake magnitude. The investigations concluded that ground settling due to post-liquefaction settlement could damage the proposed structures and buildings. The Proposed Action would comply with the adopted International Building Code (per Cowlitz County Code 16.05 and 16.35 Grading Ordinance). Preloading the stockpile area would expel groundwater and consolidate soils in the immediate vicinity of the coal stockpile areas, which would reduce the susceptibility of the soils to liquefaction. This would also likely reduce the potential for damage to proposed structures that occur in the immediate vicinity of the preloading area. Preparation of a geotechnical report would identify the specific soil conditions pre- and post-project construction, and would inform project design and construction techniques to further reduce potential impacts based on the potential susceptibility of liquefaction.

Landslides

There are no existing landslides in the study area. Strong ground shaking associated with earthquakes would have minimal potential to cause new landslides in the study area, because the area is level and there is only about 40 feet of elevation difference between the site surface and the adjacent Columbia River bottom.

The project area is near the active deep-seated landslide on the south side of Mount Solo, but it is approximately 250 feet from the edge of the estimated greatest extent of the landslide, more than the 50 feet required by the Cowlitz County Critical Areas Ordinance 19.15 for landslide hazards. However, as with all landslides, periods of prolonged and intense rainfall (including multiyear periods) or earthquake-caused ground shaking could trigger this landslide. However, because the project area is approximately 200 feet beyond the minimum distance required by the Cowlitz County Critical Areas Ordinance (CCC 19.15) and it is physically isolated from the landslide, the Proposed Action would not increase the risk that a landslide would occur.

Tsunamis

Large earthquakes in the Pacific Ocean or on the CSZ could cause a tsunami, which could affect the coastal zone of Washington and Oregon. Large tsunamis have been detected as far up the Columbia River as Portland, Oregon. Modeling calculations found that an 18-foot-high tsunami at the Columbia River mouth decreased to less than 8 inches at Longview (Yeh et al. 2012). Tsunami levels at the project area would be similar and would not affect project-area structures or operations, including ships at the docks.

Operations—Indirect Impacts

Operation of the Proposed Action would not result in any indirect impacts on geology or soils because operations would not result in any further changes to soils or geology that may occur later in time of further removed in distance than the direct impacts.

4.1.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal and ongoing operations in the project area would continue and additional storage and transfer activities might occur using existing buildings and structures and impacts on geology and soils related to the Proposed Action would not occur. The Applicant would continue with current and future increased operations in the project area. The project area for the Proposed Action could be developed for other industrial uses including an expanded bulk product terminal or other industrial uses. However, no activities that would require a U.S. Army Corps of Engineers permit or shoreline permit would occur as part of the No-Action Alternative. New construction, demolition, or related activities to develop the project area into an expanded bulk terminal could occur on previously developed upland portions of the area.

4.1.6 Required Permits

The Proposed Action would require the following permits for geology and soils.

- **Fill and Grade Permits/Building Permits—Cowlitz County**. Fill and grade permits and building permits would be required from Cowlitz County to ensure that final design and construction follow the County and engineering requirements.
- **Critical Areas Permit—Cowlitz County**. The Proposed Action would require a Critical Areas Permit to address compliance with Cowlitz County's Critical Areas Ordinance related to the presence and protection of Critical Aquifer Recharge Areas located on site.

- **Construction Stormwater Permit—Washington State Department of Ecology.** A Construction Stormwater Permit would be required from the Washington State Department of Ecology to address erosion control and water quality during construction.
- **Industrial Stormwater Permit—Washington State Department of Ecology.** An industrial Stormwater Permit would be required from the Washington State Department of Ecology to address erosion control and water quality during operations. The permit and stormwater pollution prevention plan control adverse impacts through the application of best management practices. Best management practices are defined as schedules of activities, prohibitions of practices, maintenance procedures, and structural and managerial practices, that when used singly or in combination, prevent or reduce the release of pollutants and other adverse impacts on waters of Washington State. The types of best management practices are source control, treatment, and flow control.

The following permit requirements would be required for construction of the Proposed Action.

- A qualified geologist or engineer would monitor the fill placement during construction and conduct appropriate field tests to verify proper compaction of the fill soils.
- A site-specific preloading plan would be developed prior to initiating construction of the Proposed Action by the geotechnical engineer working with the civil and structural engineers. The plan would include measures to maintain proper site drainage, collection and treatment of water generated, volumes, and sources of fill sources, and staging of fills, setbacks from existing structures. The plan would also consider the short- and long-term impacts on adjacent structures and features, including but not limited to, railroads, existing streets and utility connections, utilities, drainage features, landfills, existing hazardous materials, and buildings.
- Visual inspection would be conducted following abnormal seismic activity. These inspections would document whether the seismic activity resulted in changes to the surface conditions (i.e., soil settlement, structural damage).
- Best management practices would minimize the potential for erosion. A stormwater pollution prevention plan would be required and implemented. Clearing, excavation, and grading would be limited to the areas necessary for construction and would not be completed far in advance of facility construction.
    - **BMP C107: Construction Road/Parking Area Stabilization**. Roads, parking areas, and other on-site vehicle transportation routes would be stabilized to reduce erosion caused by construction traffic or runoff.

4.1.7 Proposed Mitigation Measures

No impacts on geology and soils from construction and operation of the Proposed Action have been identified that would require mitigation. Nor have impacts on the Proposed Action from geologic events been identified that would require mitigation. Thus, no mitigation measures are proposed for geology and soils.

4.1.8 Unavoidable and Significant Adverse Environmental Impacts

Compliance with laws and required plans described above would reduce impacts on geology and soils. There would be no expected unavoidable and significant adverse environmental impacts on geology and soils in the study area related to the Proposed Action.

4.2 Surface Water and Floodplains

Surface waters such as rivers, lakes, and coastal waterways provide natural beauty and sustain the health of human and natural communities. Floodplains are lowland areas adjacent to surface water features that are periodically inundated by water during flood events. Floodplains carry and store floodwaters. Floodplains often contain areas vital to a diverse and healthy ecosystem. Undisturbed, they have high natural biological diversity and productivity, and support many waterfowl species and migrating birds.

The quality of surface waters and floodplains refers to the physical, chemical, biological, and aesthetic characteristics of water, which are used to measure the ability of water to support aquatic life and human uses. Surface water and floodplain quality can be diminished by contaminants introduced by domestic, industrial, and agricultural practices.

This section describes the surface waters and floodplains in the study area. It then describes potential impacts on surface waters and floodplains that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

4.2.1 Regulatory Setting

Laws and regulations relevant to surface water and floodplains are summarized in Table 4.2-1.

Table 4.2-1. Regulations, Statutes, and Guidelines for Surface Waters and Floodplains

Regulation, Statute, Guideline	Description
Federal	
Rivers and Harbors Act of 1899	Authorizes the Corps to protect commerce in navigable streams and waterways of the United States by regulating various activities in such waters. Section 10 of the Act (33 USC 403) specifically regulates construction, excavation, or deposition of materials into, over, or under navigable waters, or any work that would affect the course, location, condition, or capacity of those waters.
Clean Water Act (33 USC 1251 *et seq*.)	Establishes the basic structure for EPA to regulate discharges of pollutants into the waters of the United States and regulate quality standards for surface water.
Section 404 of the Clean Water Act	Regulates the placement of dredged or fill material into waters of the United States, including special aquatic sites such as sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes. EPA is the agency responsible for enforcing this act.

Regulation, Statute, Guideline	Description
Section 401 of the Clean Water Act	Requires that a Water Quality Certification be obtained from Ecology for any activity that requires a federal permit or license to discharge any pollutant into a water of the United States. This certification attests that the state has reasonable assurance that the proposed activity will meet state water quality standards.
Sections 301 and 402 of the Clean Water Act	Section 301 prohibits the discharge of any pollutant to a water of the United States without a permit. Section 402 (33 USC 1342) establishes the NPDES permitting program (40 CFR 122). The NPDES permitting program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Authorized by the Clean Water Act.
National Flood Insurance Act of 1968	Established the NFIP, a federal floodplain management program designed to reduce future flood losses nationwide through the implementation of community-enforced building and zoning ordinances in return for the provision of affordable, federally backed flood insurance to property owners. FEMA is the agency responsible for enforcing the National Flood Insurance Act.
EO 11990, Protection of Wetlands	Applies to all agencies managing federal lands, sponsoring federal projects, or providing federal funds to state or local projects. EPA is the agency responsible for enforcing this EO.
EO 11988, Floodplain Management	Requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative (42 FR 26951). FEMA is the agency responsible for enforcing this EO.
State	
Water Resources Act of 1971 (RCW 90.54)	Sets forth fundamental policies for the state to ensure that waters of the state are protected and fully utilized for the greatest benefit. Ecology is the agency responsible for enforcing the Water Resources Act.
Water Pollution Control (RCW 90.48)	Policy to maintain the purity of waters of the state consistent with public health and public enjoyment, as well as propagation and protection of wildlife and industrial development of the state, and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state.
Water Quality Standard for Surface Waters of the State of Washington (WAC 173-201A)	Establishes water quality standards for surface waters of the state of Washington.

Regulation, Statute, Guideline	Description
National Pollutant Discharge Elimination System Permit Program (WAC 173-220)	Establishes state individual permit program for discharge of pollutants and other wastes and materials to surface waters of the state.
Shoreline Management Act (RCW 90.58)	Regulates and manages the use, environmental protection, and public access of the state's shorelines. The SMA was passed by the Washington State Legislature in 1971 and adopted in 1972. Ecology is the agency responsible for enforcing the Shoreline Management Act.
Local	
Cowlitz County Stormwater Drainage Ordinance (CCC 16.22)	The Cowlitz County Stormwater Drainage Ordinance is a requirement of the NPDES Phase II Municipal Stormwater Permit issued to Cowlitz County by Ecology. The permit requires Cowlitz County to reduce stormwater runoff and pollution in unincorporated areas of Cowlitz County adjacent to the Cities of Longview and Kelso. The Proposed Action is not within the area affected by the NPDES Phase II Municipal Stormwater Permit.
Cowlitz County Phase II Municipal Stormwater Management Plan (CCC 19.22)	Requires Cowlitz County to develop a SWMP. The SWMP must incorporate best management practices to reduce the discharge of pollutants from the regulated area to the maximum extent practicable to protect water quality. Cowlitz County is responsible for enforcing the SWMP.
Cowlitz County Critical Areas Ordinance (CCC 19.15)	Requires Cowlitz County, in compliance with the GMA, to adopt development regulations based upon the best available science that assure the protection of critical areas such as wetlands, aquifer recharge areas, geologically hazardous areas, fish and wildlife habitat, and frequently flooded areas. Cowlitz County is responsible for enforcing this ordinance.
Cowlitz County Shoreline Master Program (CCC 19.20)	Requires Cowlitz County to provide for the enhancement of shorelines and protection against adverse effects to vegetation, wildlife, and waters of the state, and their aquatic life.
Cowlitz County Floodplain Ordinance (CCC 16.25)	Requires Cowlitz County to implement the Washington State Flood Control Zone permit program to regulate floodplain development. Cowlitz County adopted a revised floodplain ordinance and revised FIRM in December 2015.

Notes:
USC = United States Code; EPA = U.S. Environmental Protection Agency; Ecology = Washington State Department of Ecology; NPDES = National Pollutant Discharge Elimination System; NFIP = National Flood Insurance Program; FEMA = Federal Emergency Management Agency; EO = Executive Order; FR = *Federal Register*; WAC = Washington Administrative Code; RCW = Revised Code of Washington; SMA = Shoreline Management Act; GMA = Washington State Growth Management Act; CCC = Cowlitz County Code; SWMP = Stormwater Management Plan

4.2.2 Study Area

The study area for direct impacts on surface waters is the Columbia River and stormwater drainage ditches in the project area. The study area for indirect impacts on surface waters encompasses the Consolidated Diking Improvement District (CDID) #1 stormwater system drainage ditches adjacent to the project area and the Columbia River downstream 1 mile from the project area. Figure 4.2-1 shows the study areas for surface water.

The study area for direct impacts on floodplains is the project area. The study area for indirect impacts on floodplains is the project area and surrounding 500-year floodplain on the north side of the Columbia River in the vicinity of the project area. Figure 4.2-2 shows the study areas for floodplains.

4.2.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on surface waters and floodplains associated with the construction and operation of the Proposed Action and No-Action Alternative.

4.2.3.1 Information Sources

The following sources of information were used to define the existing conditions relevant to surface waters and floodplains and identify the potential impacts of the Proposed Action and No-Action Alternative on to surface waters and floodplains in the study areas.

- *Engineering Report for NPDES Application Millennium Bulk Terminals—Longview, LLC* (Anchor QEA 2011)
- *Engineering Report Update for NPDES Application Millennium Bulk Terminals—Longview, LLC* (Anchor QEA 2014)
- *Columbia River Basin: State of the River Report for Toxics* (U.S. Environmental Protection Agency 2009)
- *Diminishing Returns: Salmon Declines and Pesticides* (Ewing 1999)
- *Columbia River Estuary ESA Recovery Module for Salmon and Steelhead* (National Marine Fisheries Service 2011)
- Columbia River Estuary Operational Forecast System website
- *Designated Beneficial Uses Mainstem Columbia River 340-41-0101* (Oregon Department of Environmental Quality 2003)
- *303(d)/305(b) Integrated Water Quality Assessment Report* (Oregon Department of Environmental Quality 2012)
- USGS water-quality data, Columbia River Estuary, 2004–2005 (U.S. Geological Survey 2005)
- USGS water-quality data, Columbia River at The Dalles, Oregon, 2012 (USGS 14105700)
- *Stormwater Management Manual for Western Washington* (Washington State Department of Ecology 2012)
- Grays-Elochoman, Cowlitz River Basins Water Resource Management Programs (Washington State Department of Ecology 2014)
- Reports and analysis provided by the Applicant

Figure 4.2-1. Surface Waters Study Area

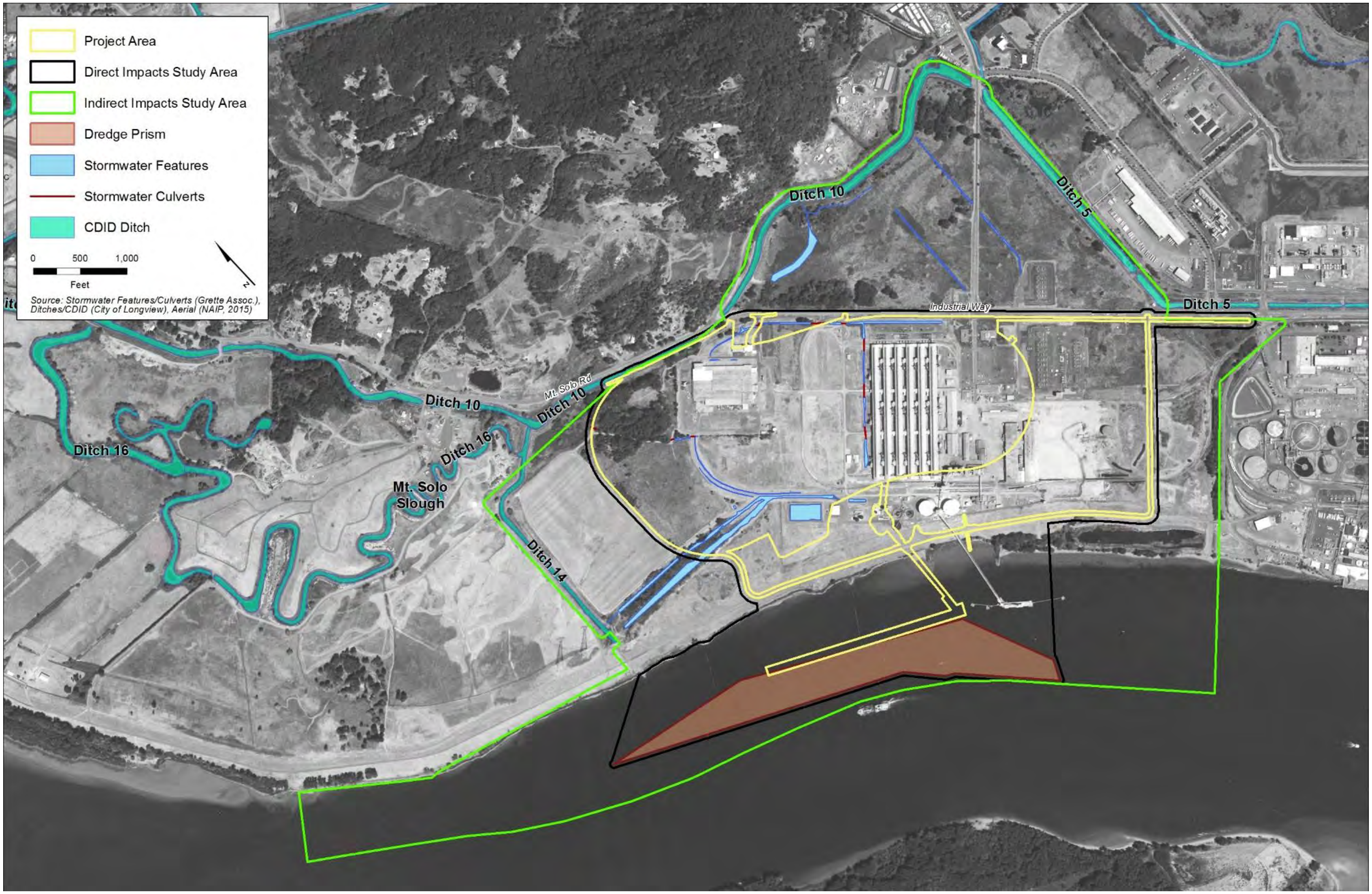
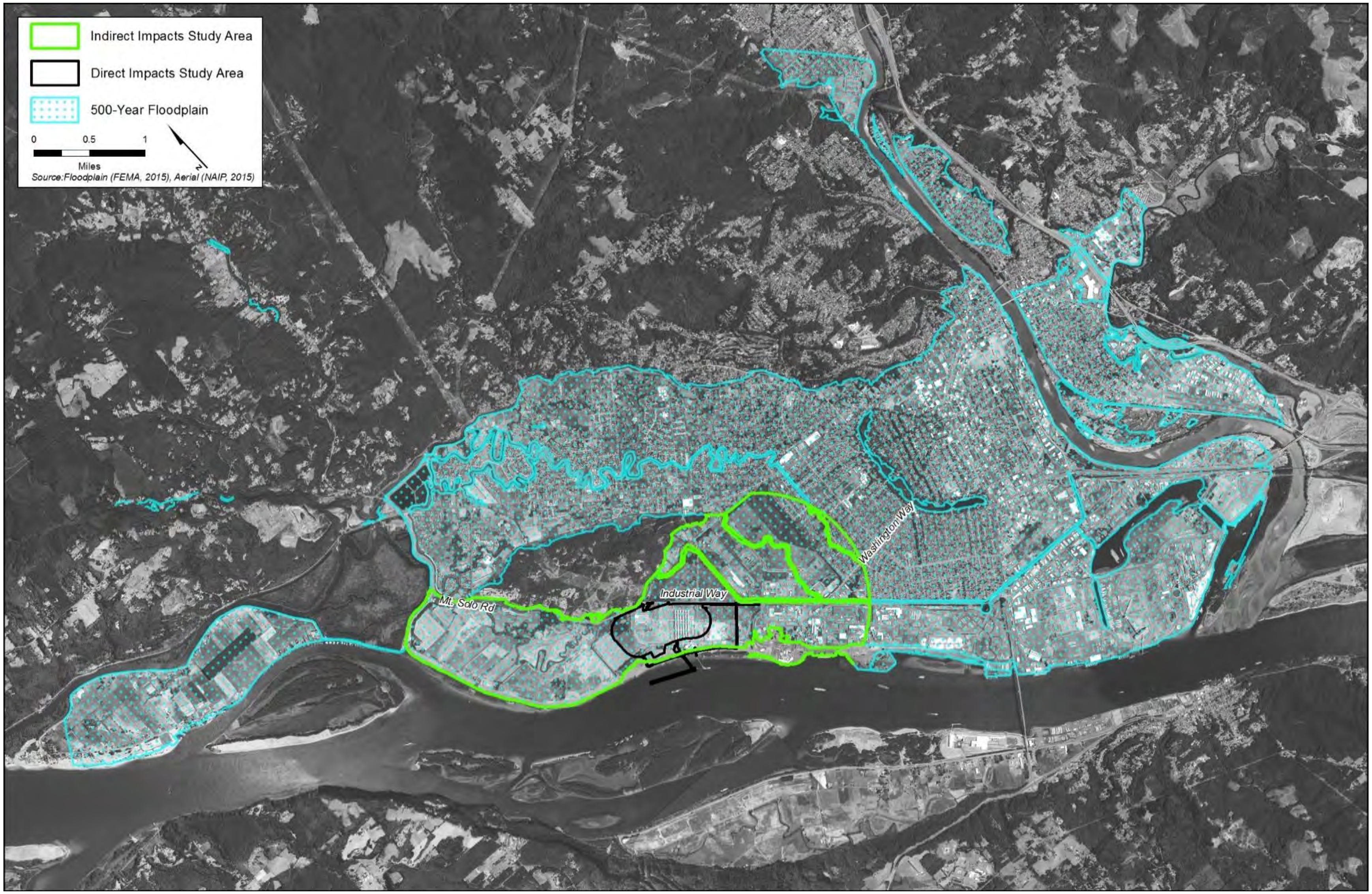


Figure 4.2-2. Floodplains Study Area



4.2.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on surface waters and floodplains. The impact analysis also evaluated how surface water conditions could affect the study areas.

Potential surface waters and floodplains impacts have been evaluated regarding general parameters, such as changes to surface water drainage, surface water discharge, and floodplain connectivity, and how the Proposed Action and the No-Action Alternative could affect these parameters.

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). The assessment of impacts also considers regulatory controls, such as those required in the National Pollutant Discharge Elimination System (NPDES) Industrial Stormwater Permit and NPDES Construction Stormwater Permit required for the Proposed Action.

4.2.4 Existing Conditions

This section describes the existing environmental conditions in the study areas related to surface waters and floodplains that could be affected by construction and operation of the Proposed Action and the No-Action Alternative.

The project area is along the Columbia River near river mile 63 near Longview. The topography of the study areas is relatively flat; in the vicinity of the project area it is protected by a levee system operated and maintained by CDID #1, which also operates and maintains a series of ditches and pump stations in the vicinity of the project area. The Applicant operates and maintains independent stormwater and facility process water treatment and conveyance facilities for the project area.

4.2.4.1 Surface Water and Floodplain Features

Columbia River

The Columbia River basin comprises 260,000 square miles from its headwaters in British Columbia, Canada, to its mouth near Astoria, Oregon, bordering Washington and Oregon. The river's annual discharge rate fluctuates with precipitation and ranges from 63,600 cubic feet per second in a low water year to 864,000 cubic feet per second in a high water year (U.S. Geological Survey 2014). The Columbia River has been identified as a flow exempt waterbody, which means it is exempt from flow control requirements associated with the detention/retention and discharge of stormwater. Water quality criteria must still be met for all stormwater discharges.

The lower Columbia River is tidally influenced by the Pacific Ocean from the estuary near Astoria, to Bonneville Dam, located upstream of Portland (Bonneville Power Administration 2001). Tidal fluctuations are diurnal, meaning there are two high tides and two low tides in each 24-hour tidal cycle. Tidal ranges vary along the lower Columbia River and are reported to have a mean range of 3.78 feet at Longview. The Columbia River experiences seasonal variation in flow from year to year depending on snow mass in the upper watershed.

All surface waters from the study area are ultimately discharged to the Columbia River, either as groundwater, surface water, or treated stormwater discharge. The project area is on the right-bank floodplain of the Columbia River near river mile 63 near Longview (Figure 4.2-2). The project area is protected from Columbia River flooding by the CDID #1 levee (see *Columbia River Levee*, below).

Water Resource Inventory Area 25

A watershed generally has a topographic boundary that defines an area draining to a single point of interest. The Washington State Department of Ecology (Ecology) and other state natural resources agencies have divided Washington State into 62 Water Resource Inventory Areas (WRIAs) to delineate and manage the state's major watersheds. The project area is located in the WRIA 25 Grays/Elochoman Basin.

Consolidated Diking Improvement District #1

Other than the Columbia River levee, the study areas are surrounded and protected by the levees, ditches and pump stations of CDID #1. CDID #1 consists of 19 miles of levees; over 35 miles of sloughs, ditches, and drains for flood protection; a stormwater collection and routing system; and seven pump stations for removing and discharging stormwater to receiving waters outside of the levee system, such as the Columbia River. These pump stations are instrumental for removing stormwater and preventing local and area-wide flooding.

Columbia River Levee

The CDID#1 levee system can be divided into three major segments, but the study areas are primarily protected by the Columbia River levee. This levee protects the study areas from flooding along the Columbia River and from related backwater elevations in Coal Creek Slough. It extends from the main pump station and office complex around the western edge of Longview and unincorporated portions of Cowlitz County, up the Columbia River to its confluence with the Cowlitz River. The levee is a mixture of well-defined rural levees and overbuilt sections associated with urbanized levees through industrial areas.

Pump Stations

In addition to the CDID #1 levee, the study areas are surrounded and protected by smaller levees, ditches, and pump stations maintained by CDID #1 as described below.

The two pumps of primary interest in the project vicinity are the Reynolds Pump Station and the Industrial Way Pump Station.

- **Reynolds Pump Station**. The Reynolds Pump Station is located at the terminus of Ditch 14; this pump station draws water from Ditch 10 and pumps directly to the Columbia River. Total pumping capacity is 80,000 gallons per minute.
- **Industrial Way Pump Station**. The Industrial Way Pump Station is located adjacent to Ditch 5 and Industrial Way. It has a pumping capacity of 90,000 gallons per minute and pumps water a distance of nearly 0.5 mile, where it discharges to the Columbia River through the levee at the east end of the project area.

Ditches

CDID #1 maintains approximately 35 miles of sloughs, ditches, and drains that collect and convey stormwater to the CDID #1 pump stations. The ditches have a dual function, acting as a conveyance system to transport stormwater to the pumping stations and as a storage reservoir for intense rainfalls exceeding the capacity of the pumps. The Columbia River is the ultimate destination of the drainage water. Below is a description of the CDID #1 ditches that are on or adjacent to the project area (Figure 4.2-3).

- **Ditch 5.** Ditch 5 borders the eastern edge of Parcel 10213 and extends toward the south from 38th Avenue to the Industrial Way Pump Station along Industrial Way, which pumps water to the Columbia River via an underground pipeline. A second branch of Ditch 5 extends from the pump station toward the southeast along the north side of Industrial Way down to Washington Way. It connects with other drainage ditches (Ditches 1 and 3) and conveys flow to the pump station.
- **Ditch 10.** North of Industrial Way, Ditch 10 forms the northern boundary of Parcel 10213 and extends toward the west from 38th Avenue. It continues toward the west, crosses under Industrial Way through a culvert, and extends toward the northwest, eventually connecting to other segments of the drainage system including Ditch 14 and Ditch 16. Ditch 14 conveys flow to the south to the Reynolds Pump Station, which discharges to the Columbia River through an underground pipeline. South of Industrial Way, Ditch 10 is to the north of the former cable plant and remnant forested area. Ditch 10 intersects with Ditch 14 just north of the closed Black Mud Pond (BMP) facility.
- **Ditch 14.** Ditch 14 is located along the western boundary of the project area and consists of a trapezoidal-shaped drainage ditch that receives flow from Ditch 10 and Ditch 16 and other privately owned ditches located both on site (e.g., Cable Plant Ditch) and off site. During high water events, it conveys flow south toward the Reynolds Pump Station, which pumps water under the CDID #1 levee.

Stormwater and shallow groundwater drainage for the project area is controlled by a system of ditches, pump stations, treatment facilities, and outfalls. All of these facilities currently operate under a single NPDES permit. As shown in Figure 4.2-3, all of the project area drainage is either held on site until it evaporates, is discharged to CDID #1 ditches that eventually flow and discharge to the Columbia River, or is treated and discharged through Outfall 002A (operated by the Applicant) to the Columbia River. Table 4.2-2 lists the drainage basins in the project area; and drainage basins are shown in Figure 4.2-3.

Figure 4.2-3. Existing Drainage Systems in the Project Area

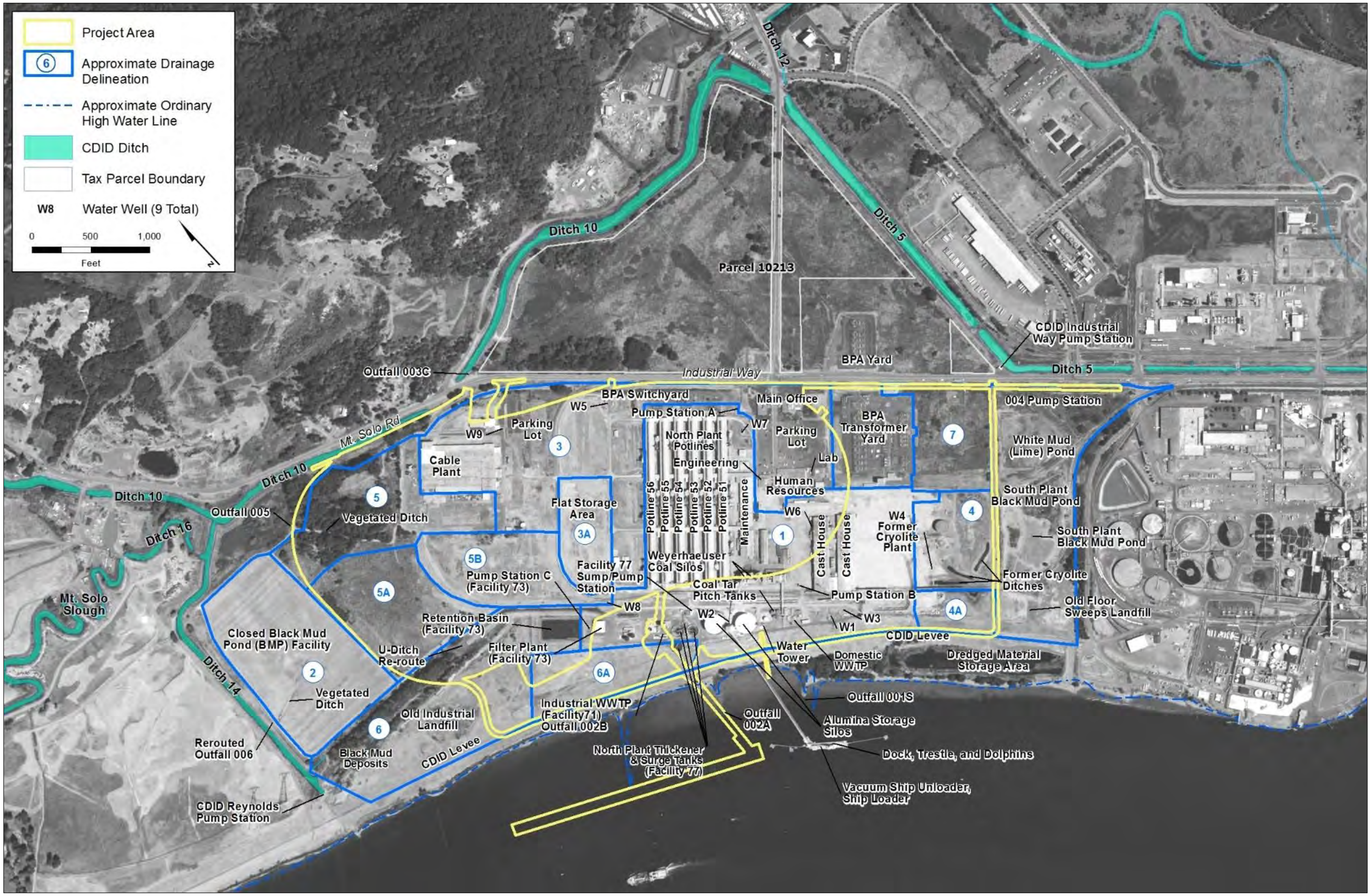


Table 4.2-2. Existing Drainage Basins in the Project Area

Area	Description
1	Stormwater runoff gravity drains to Facility 77 and is pumped to Facility 73 for treatment prior to discharge through Outfall 002A.
2	Stormwater runoff gravity drains to a vegetated conveyance swale and is pumped into the U-Ditch, where it drains to the Facility 77 and is pumped to Facility 73 for treatment prior to discharge through Outfall 002A as designed. Larger runoff events may overflow the sump and discharge into CDID Ditch 14 through Rerouted Outfall 006.
3	Stormwater runoff ponds locally and/or gravity drains to a vegetated ditch and is discharged through Outfall 003C into CDID Ditch 10.
3A	Stormwater runoff ponds locally and infiltrates/evaporates and/or is pumped to the U-Ditch, where it drains to Facility 77 and is pumped to Facility 73 for treatment prior to discharge through Outfall 002A.
4	Stormwater runoff gravity drains to ditches and is pumped via Pump Station 004 to Facility 77, where it is pumped to Facility 73 for treatment prior to discharge through Outfall 002A.
4A	Stormwater runoff ponds locally and infiltrates/evaporates.
5	Stormwater runoff from improved areas pond locally and infiltrates/evaporates; runoff from the larger events may gravity drain to a vegetated ditch and discharge through Outfall 005 to CDID Ditch 14. Stormwater runoff from unimproved areas may gravity drain towards the vegetated ditch.
5A	Stormwater runoff ponds locally and infiltrates/evaporates.
5B	Stormwater runoff ponds locally and infiltrates/evaporates.
6	Stormwater runoff ponds locally and infiltrates/evaporates. Larger runoff events may sheet flow to the U-Ditch, which discharges to Facility 77, and is then pumped to Facility 73 for treatment prior to discharge through Outfall 002A.
6A	Stormwater runoff ponds locally and infiltrates/evaporates. Unimproved areas may gravity drain toward the vegetated ditch.
7	Stormwater runoff ponds locally and infiltrates/evaporates.

Drainage Components

Stormwater and shallow groundwater drainage for the study areas are controlled by a system of ditches, pump stations, treatment facilities, and outfalls. All of these facilities currently operate under a single NPDES permit. All of the project area drainage is either held on site and evaporates, discharged to CDID #1 ditches that eventually flow to the Columbia River, or treated and discharged through Outfall 002A to the Columbia River. The following is a brief description of the drainage components of the study areas (Figure 4.2-3).

- **Sheetflow and infiltration.** Subbasins 4A, 5, 5A, 5B, 6A, and 7 receive sheetflow from storm events. The water remains in the subbasins until it infiltrates or evaporates.
- **Columbia River discharge.** Subbasins 1, 2, 3A, 4, and 6 are conveyed via pumped systems or gravity to Facility 73 where they are treated and then discharged to the Columbia River via Outfall 002A.

- **CDID #1 discharge.** Subbasin 3 flows through a vegetated ditch that discharges to Ditch 10 through Outfall 003C. During larger storm events, overflow from Subbasin 2 and Subbasin 5 (both described above) can discharge to the CDID #1 ditch system. Subbasin 2 overflows would discharge to Ditch 14 through Outfall 006. This is a designed overflow system and it is equipped with a high-flow alarm to alert staff when it is activated. Subbasin 5 flows can enter a vegetated ditch that discharges to Ditch 10 through Outfall 005. Ultimately, all CDID #1 ditch flows discharge to the Columbia River.
- **Drainage features on Parcel 10213.** These features include three vegetated ditches, two unvegetated ditches, and a shallow stormwater pond. Two of the vegetated ditches run north-south across the two larger portions of Parcel 10213. They are narrow and linear and convey stormwater to a culvert approximately 16 inches in diameter located on the north end of these ditches, which then empties into CDID Ditch 10. The third vegetated ditch consists of three segments of linear vegetated ditches adjacent to Industrial Way. These three ditch segments are connected by two culverts that are beneath the site's access roads. This feature likely collects stormwater from Industrial Way and adjacent areas and conveys it to CDID Ditch 10.

  One unvegetated ditch runs parallel to Ditch 10 and consists of two sections of a narrow ditch that was likely constructed to intercept shallow groundwater that was affecting agricultural use of the site. This unvegetated ditch is several feet deep, nearly vertical along its sides, and is bisected by one of the vegetated ditches that runs parallel across the site; however, there is no surface hydrology connection between these two ditches. The other unvegetated ditch serves as the outlet channel for the stormwater pond. This ditch is located at the northeast end of the stormwater pond and conveys excess stormwater from the pond to CDID Ditch 10 through a 16-inch culvert. All six features are privately owned and are not managed by CDID #1.
- **Off-site privately owned ditch.** This ditch is located near the northwest corner of the former Reynolds Metals Company facility (Reynolds facility). It conveys flow into Ditch 14 at a point just north of the Closed BMP Facility.
- **Outfall 002A**. This is a 30-inch outfall to the Columbia River that discharges treated water received from Facility 73 (the site's stormwater treatment system) and treated wastewater from Facility 71 (the site's wastewater treatment system). Typical flow rates through the outfall are currently less than 2,000 gallons per minute. The maximum flow rate is 14,000 gallons per minute.

4.2.4.2 Columbia River and Cowlitz River Floodplain

The project area is in the right bank floodplain of the Columbia River approximately 5 miles downstream of the confluence of the Cowlitz River and the Columbia River. Longview and Kelso were developed on the floodplain of the Columbia and Cowlitz Rivers. The majority of the project area is located behind the CDID #1 levee that is operated and maintained by CDID #1. The average elevation of the project area is 13.9 feet North American Vertical Datum of 1988 (NAVD88) (16.4 feet Columbia River Datum), and the levee averages 33.9 feet NAVD88 (36.4 feet Columbia River Datum) (Anchor QEA 2014). The portion of the project area waterward of the CDID #1 levee is within the floodway of the Columbia River. Construction and operational changes associated with the proposed new docks and trestle would occur on the river side of the existing levee system, where the floodplain is constrained by the levee alignment.

CDID #1 operates the slough, ditch, and drain system several feet lower than the low-flow elevation of the Columbia River throughout the year. This strategy provides necessary stormwater storage capacity and allows the pump system to maximize the flood control potential of the levee's interior drainage. The combined capacity of the seven CDID #1 pump stations (a total of 19 pumps) is 700,000 gallons per minute. These pump stations are instrumental in removing stormwater and preventing local and area-wide flooding. The need for this pumping capacity is apparent when considering that 1 inch of rainfall on the 16,000-acre watershed is equivalent to 434 million gallons of water. For example, during a 1986 storm event, removal of 4.8 inches of rain deposited required 54 hours of continuous pumping.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) identifies the project area landward of the CDID #1 levee as Zone X – Other Flooded Areas (Figure 4.2-4) (Federal Emergency Management Agency 2015). Zone X – Other Flooded Areas is described by FEMA as follows.

> Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood (Medium shading).

The FEMA FIRM maps the CDID #1 levee and areas waterward of the project area Zone X – Other Areas (Figure 4.2-4) (Federal Emergency Management Agency 2015). Zone X – Other Areas is described by FEMA as follows.

> Areas determined to be outside the 500-year floodplain;

The current FIRM delineates the project area in "medium shading" and maps the current levee that protects the area.

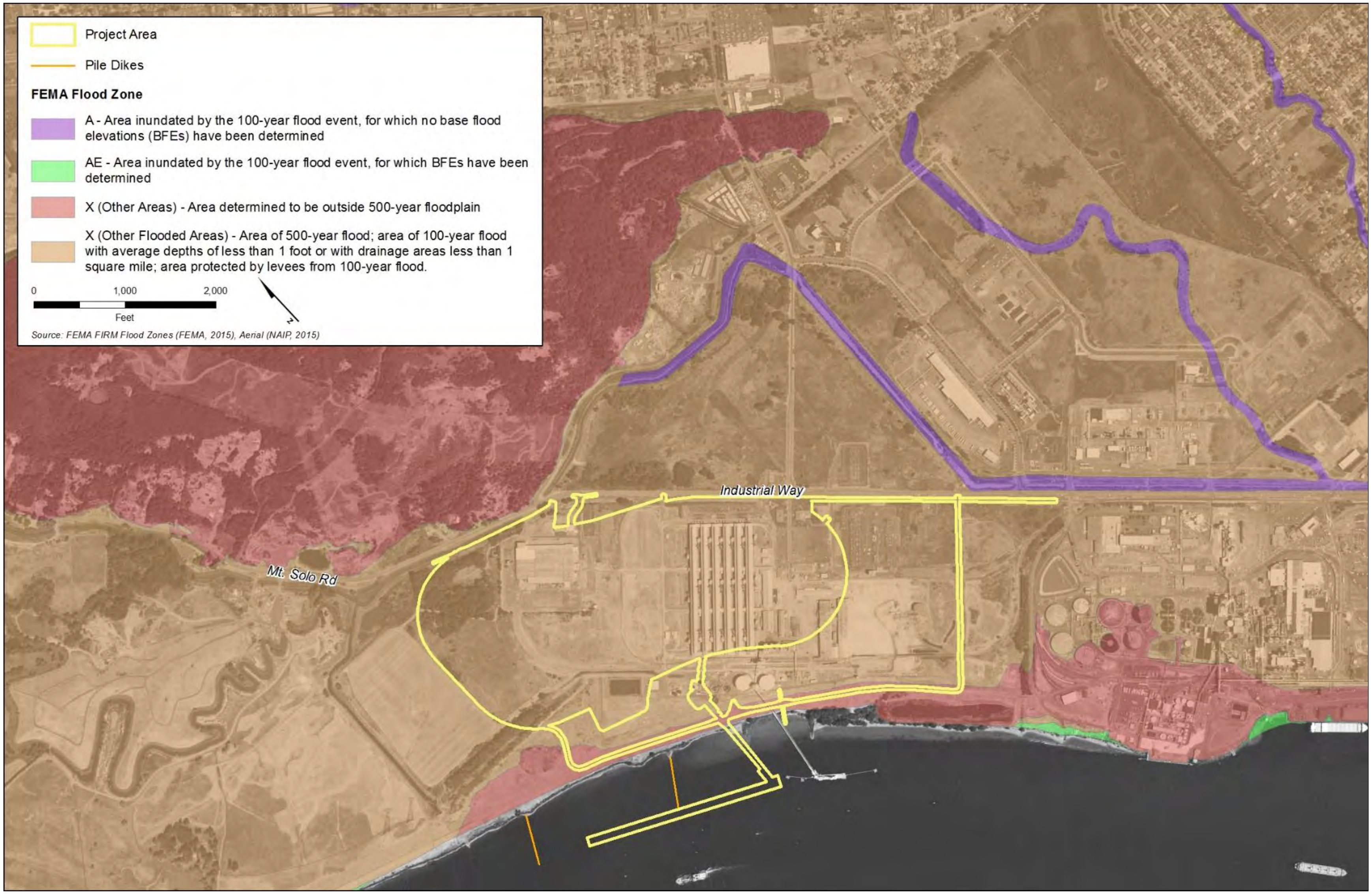
Flooding at the project area is expected to be minimal under existing conditions. Events that could cause flooding would include pump station failures, precipitation events that exceed pumping capacity, levee failure, and levee overtopping.

The portions of the project area located waterward of the levee are within the floodway. The project area improvements would need to consider the flood inundation limits and velocities for this condition.

4.2.5 Impacts

This section describes the potential direct and indirect impacts related to surface waters and floodplains that would result from construction and operation of the Proposed Action and the No-Action Alternative. All wastewater and stormwater generated in the project area and potentially discharged from the project area after treatment would be evaluated and characterized by the state. Once the water to be discharged has been accurately evaluated and characterized by the state, the specific standards for water discharged from the project area would be defined and the type of NPDES permit would be determined and issued.

Figure 4.2-4. FEMA Flood Insurance Rate Map for the Proposed Action



4.2.5.1 Proposed Action

This section describes the potential impacts that could occur in the study areas as a result of construction and operation of the Proposed Action. The Applicant identified the following best management practices to be implemented; these were considered when evaluating potential impacts of the Proposed Action.

- **BMP C107: Construction Road/Parking Area Stabilization**. Roads, parking areas, and other on-site vehicle transportation routes would be stabilized to reduce erosion caused by construction traffic or runoff.

The following were identified by the Applicant as actions that would be implemented during construction and/or operations.

- Based on site grading and drainage areas, five water quality ponds (Wetponds) would treat runoff based on Ecology's requirements. In general, the ponds are sized for treatment of the volume and flow from the water quality design storm event (72% of the 2-year storm). Additional storage would be provided within the coal storage area so that the runoff is always treated within the stockyard area, even for larger storm events. The ponds are designed to provide settlement as the water passes through. Subsequently, water released from these ponds would be conveyed downstream to the existing pump station Outfall 002A that discharges into the Columbia River via an existing 30-inch steel pressure line. The ponds that treat runoff from the coal stockyard would harvest water for circulation around the project area for multiple uses, including dust-control measures.

  Ecology's criteria would be used as the basis of design, which uses the Western Washington Hydrology Model computer simulation for facility sizing. Because of the project area's flat nature, some surface ponding would occur in both the yard areas and open conveyance systems. The piped conveyance systems would be sloped at a 0.50% minimum.

- Additional water storage would be provided in the coal storage area in the event of a larger storm event. Water volumes exceeding the demands for reuse would be discharged off site via the existing Outfall 002A into the Columbia River. Water released off site would be treated and would meet the requirements of Ecology and required discharge permits.

Construction activities that could affect surface water and floodplains include the following.

- Disturbance of surface soils during construction of the coal export terminal.
- Redirection of drainage and sheet flow during construction.
- Removal of vegetation from leveed floodplain.

Operational activities that could impact surface water and floodplains include the following.

- Use of water from rainfall runoff and on-site wells for dust suppression, washdown water, and fire-protection systems.
- Redirection of stormwater via a new pump station.

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers). Construction-related activities at the project area that could affect surface water and floodplains include the following.

- Preparing the project area and preloading the coal stockpile areas.
- Regrading the project area to drain toward specific collection areas.
- Constructing the rail loop.
- Installing coal processing equipment (unloading facilities, transfer towers, conveyors).
- Constructing offices, maintenance buildings, and other structures.
- Constructing water-management and storage facilities.
- Constructing Docks 2 and 3 and removing existing pile dikes.

Alter Drainage from Heavy Equipment and Staging Areas

The placement of heavy equipment and establishment of on-site staging areas could redirect sheetflow and potentially lead to localized flooding on or off site. Redirection of sheetflow has the potential to create rivulet and gully flow across bare soil, which could result in erosion and introduce sediment to the surrounding drainage channels and basins. Introduction of increased sediment loads to the drainage system could change the sediment deposition and transport characteristics of that system, resulting in potential changes in downstream channel morphology, including a reduction in channel sinuosity (i.e., channel bends and meanders) and storage, increased channel gradient, and reduced pool depth. The potential for localized flooding and increased erosion from redirected sheet flow increases with higher density of heavy equipment placement on site. This could result in the need for additional channel maintenance. However, this is unlikely because the Applicant must comply with erosion and sediment control best management practices and the requirements of the NPDES Construction Stormwater Permit, which would be obtained for the Proposed Action, would avoid and minimize potential impacts during construction. All measures would also be monitored to ensure effectiveness. Weekly inspection and an inspection within 24 hours of a rain event would be required under the NPDES Construction Stormwater Permit. The inspections must be performed by a Certified Erosion and Sediment Control Lead.

Decrease Floodplain Floodwater Retention

Site preparation would require clearing of vegetation within a Zone X flood zone. However, because the project area is protected by levees, it does not currently function as a floodplain. Vegetation that would be removed from the project area does not currently contribute to the Columbia River floodplain's ability to retain or absorb floodwaters. Activities that occur landward of the levee would not modify conditions in the Columbia River. Thus, no decrease in the ability of the Columbia River to retain floodwaters within the floodplain would result from constructing the Proposed Action.

Temporarily Increase Turbidity and Affect Benthic Habitat

The Columbia River would be permanently altered and benthic (i.e., river bottom) habitat removed by the placement of piles. A total of 610 of the 630 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 (4,312 square feet) of benthic habitat (Refer to Section 4.7, *Fish*, for further information regarding impacts on benthic habitat).

Creosote-treated piles would be removed from the deepest portions of two existing timber pile dikes (Figure 4.2-4). In total, approximately 225 linear feet of the pile dikes would be removed. Removal of creosote-treated piles would result in a temporary increase in turbidity and would temporarily affect benthic habitat. Refer to Sections 4.5, *Water Quality*, and 4.7, *Fish,* for further information regarding impacts on water quality and fish, respectively.

Use Water for Construction

Construction of the Proposed Action would use water from rainfall runoff and on-site groundwater wells for dust suppression, washdown water, and fire-protection systems. This would be regulated under the NPDES Construction Stormwater Permit. Rainfall would be collected and treated and either stored in a detention pond to be constructed as part of the Proposed Action, or discharged to the Columbia River through the existing Outfall 002A. If stormwater is collected and used for industrial beneficial use (such as dust control), a Water Rights Permit would be required in accordance with RCW 90.03. The Proposed Action would not withdraw water from the Columbia River or other surface waters in the study area to meet construction water demands. Thus, no impacts on surface water and floodplains are anticipated related to water needs or use during construction.

Construction—Indirect Impacts

Construction of the Proposed Action would not result in indirect impacts on surface waters or floodplains because construction of the coal export terminal would be limited to the project area.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Use Water for Operations

Operations of the Proposed Action would use water from rainfall runoff and on-site groundwater wells for dust suppression, washdown water, and fire-protection systems. Rainfall would be collected and treated and either stored in a detention pond to be constructed as part of the Proposed Action, or discharged to the Columbia River through the existing Outfall 002A. The Proposed Action would not withdraw water from the Columbia River or other surface waters in the study area to meet operations water demands. Thus, no impacts on surface water and floodplains are anticipated related to water needs or use during operations.

Alter Water Collection and Discharge

Currently, stormwater runoff at the project area is managed by infiltration or evaporation and by a complex stormwater collection and treatment system in conformance with the Applicant's existing NPDES permit (WA-000008-6). The NPDES system includes 12 stormwater basins and five outfalls that the Applicant manages under its NPDES permit, which discharge to the Columbia River. The existing stormwater collection and treatment system configuration would not adequately serve the needs of the future conditions resulting from the Proposed Action. The Proposed Action would develop a water management system, including capture of stormwater from the project area, separate from the existing stormwater management system and isolated from it. Information on stormwater is included in Section 4.5, *Water Quality*.

If stormwater is collected and used for industrial beneficial use (such as dust control), a Water Rights Permit would be required in accordance with RCW 90.03. The project water management system would collect all stormwater and surface water (washdown water) from the stockpile areas, the rail loop, office areas, the dock and other paved/impervious surface areas at the project area and direct these waters to a series of vegetated ditches and ponds, then to a collection basin or sump. Similar to existing conditions, collected water would be pumped to an existing on-site treatment facility consisting of settling pond(s) with a flocculent addition to promote settling as needed. Chemical treatments must be identified as part of the NPDES permit process. Treated water would be pumped to a surface storage pond for reuse to support operations, or, if storage is not necessary, the excess treated water would be discharged to the Columbia River via Outfall 002A in accordance with the NPDES permit limits.

Discharge Less Water to CDID #1 Ditches

Basins 2, 3, and 5 of the existing water management system at the project area currently discharge to CDID #1 drainage ditches. Once constructed, most of the project area would no longer drain to the CDID #1 ditches, with the exception of a portion of the access overpass and frontage improvements, which would continue to drain to the ditches. All stormwater and excess dust suppression water within the footprint of the project area would be collected, conveyed, treated, and either stored on site for reuse or discharged to the Columbia River. The ditches would remain as they exist today. Therefore, no negative impacts on the CDID #1 ditches would occur under the Proposed Action. However, less water would be discharged to the ditches from the project area. As discussed below, this could have a beneficial indirect impact on the CDID #1 ditches.

Instigate Flooding from Interior Drainage System Failure

A new pump station and 18-inch outfall line is proposed to convey stormwater from the project area to the existing Facility 77 sump, and then all waters from the project area would go through Facility 73.

Failure of the interior drainage pumps could result in flooding of Basin 3A. However, redundancy would be built into the system to avoid flooding associated with pump failure, i.e., interior drainage pumps would have backup systems. Thus, the potential that both systems would fail simultaneously would be low.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Modifications to the existing water management system would be unlikely to have any measurable impact on the Columbia River. The Columbia River is a single receiving water with a mean annual discharge of 171.4 million acre-feet per year (55.85 trillion gallons per year).[1] The proposed changes to the volume and velocity of surface water discharged to the Columbia River associated with the Proposed Action would be negligible within the Columbia River. Annual discharge to the river is estimated to decrease from 276 million to 138.5 million gallons per year, which would equate to a decrease in average annual flow in the Columbia River of 0.0000025 ($2.5 * 10^{-6}$ %). A decrease in flow of this magnitude would essentially be undetectable in the lower Columbia River.

The CDID #1 ditches are much smaller than the Columbia River; therefore, changes to the volume of surface water discharged from the project area could potentially have a measurable effect on the capacity of the ditches. However, the proposed changes would reduce flow to the ditches from 88 million to 26.3 million gallons per year. This could be beneficial to the ditches because there would be additional capacity for drainage. As mentioned in Section 4.2.4.2, *Columbia River and Cowlitz River Floodplain*, the combined capacity of the CDID #1 pump stations is 700,000 gallons per minute. These pump stations are instrumental for removing stormwater and preventing local and area-wide flooding. Any reduction in discharge to the CDID #1 ditch system could provide a benefit during significant rain events.

4.2.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal and impacts on surface waters and floodplains related to the Proposed Action would not occur. The Applicant would continue with current and future increased operations in the project area. The project area for the Proposed Action could be developed for other industrial uses including an expanded bulk product terminal or other industrial uses.

No activities that would require a U.S. Army Corps of Engineers (Corps) permit or shoreline permit would occur as part of the No-Action Alternative; thus no impacts on surface waters or floodplains would occur. New construction, demolition, or related activities to develop the project area into an expanded bulk terminal could occur on previously developed upland portions of the area. Additionally, the quantity of impervious surface could change but drainage patterns would be similar to existing conditions. Any new or expanded industrial uses that could substantially alter drainage patterns would trigger a new NPDES permit or modification to the permitting process. Impacts related to being located in a Zone B flood zone would be similar to those stated for the Proposed Action.

[1] U.S. Geological Station 14246900 Columbia River at Beaver Army Terminal, near Quincy, Oregon: Average Discharge for Period of Record, 23 years (water years 1969, 1992–2013).

4.2.6 Required Permits

The Proposed Action would require the following permits for surface waters and floodplains.

- **Shoreline Substantial Development Permit—Cowlitz County Department of Building and Planning.** The Proposed Action would result in new development in the shoreline area regulated by the Washington State Shoreline Management Act and *Cowlitz County Shoreline Master Program* (Cowlitz County 2012). Therefore, the Proposed Action would require a Shoreline Substantial Development Permit. This permit is administered by the Cowlitz County Department of Building and Planning.
- **Critical Areas Permit—Cowlitz County Department of Building and Planning.** The Proposed Action would result in development in designated critical areas because the project area contains a frequently flooded area, an erosion hazard area, and a critical aquifer recharge area. Therefore, it would require a Critical Areas Permit from the Cowlitz County Department of Building and Planning.
- **Floodplain Permit – Cowlitz County Building and Planning.** A floodplain permit would be required from Cowlitz County to address development in any areas designated as Frequently Flooded Areas.
- **Clean Water Act Section 401—Washington State Department of Ecology**. An Individual Water Quality Certification from Ecology under Section 401 of the Clean Water Act would be required for construction of the Proposed Action.
- **NPDES Construction Stormwater Permit—Washington State Department of Ecology.** A Construction Stormwater Permit would be required from Ecology to address erosion control and water quality during construction. All wastewater and stormwater generated in the project area and potentially discharged from the project area after treatment would be evaluated and characterized by the state. Once the water to be discharged has been accurately evaluated and characterized by the state, the specific standards for water discharged from the project area would be defined and the type of NPDES permit would be determined and issued.
- **NPDES Industrial Stormwater Permit—Washington State Department of Ecology**. An Industrial Stormwater Permit would be required from Ecology for discharge of industrial use water during operations. All wastewater and stormwater generated in the project area and potentially discharged from the project area after treatment would be evaluated and characterized by the state. Once the water to be discharged has been accurately evaluated and characterized by the state, the specific standards for water discharged from the project area would be defined and the type of NPDES permit would be determined and issued.
- **Water Rights—Washington State Department of Ecology.** If stormwater is collected and reused for beneficial industrial reuse, a Water Right Permit would be required in accordance with RCW 90.03.
- **Hydraulic Project Approval—Washington Department of Fish and Wildlife.** The Proposed Action would require a hydraulic project approval from WDFW because project elements would affect the Columbia River.
- **Clean Water Act Authorization, Section 404—U.S. Army Corps of Engineers.** Construction and operation of the Proposed Action would affect waters of the United States, including wetlands. Department of Army authorization by standard individual permit would be required.

- **Rivers and Harbors Act—U.S. Army Corps of Engineers.** Construction and implementation of the Proposed Action would affect navigable waters of the United States (i.e., the Columbia River). The Rivers and Harbors Act authorizes the Corps to protect commerce in navigable streams and waterways of the United States by regulating various activities in such waters. Section 10 of the RHA (33 USC 403) specifically regulates construction, excavation, or deposition of materials into, over, or under navigable waters, or any work that would affect the course, location, condition, or capacity of those waters.

4.2.7 Proposed Mitigation Measures

Impacts resulting from the Proposed Action on surface waters and floodplains are considered low and would not necessitate proposed mitigation that exceeds the minimum requirements specified by applicable laws and regulations.

4.2.8 Unavoidable and Significant Adverse Environmental Impacts

Compliance with laws and implementation of the mitigation and design features described above would reduce impacts on surface waters and floodplains. There would be no unavoidable and significant adverse environmental impacts on surface waters and floodplains.

4.3 Wetlands

Wetlands provide natural beauty, as well as functions and values that sustain the health of human and natural communities. They can form a regularly saturated transition between surface waters and uplands. These wet soils support a diversity of plants and animals that are adapted to these conditions.

For the purposes of this assessment, wetlands refer to areas that meet the federal definition of wetlands under the U.S. Army Corps of Engineers (Corps) *Wetlands Delineation Manual* (Environmental Laboratory 1987) as supplemented by the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Environmental Laboratory 2010). Wetlands were identified in the field between 2011 and 2013 by Grette Associates (Grette Associates 2014a, 2014b, 2014c, 2014d, 2014e, 2014f, and 2014g).

This section describes wetlands in the study area. It then describes impacts on wetlands that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

Impacts on ditches and stormwater conveyance features or *other waters* are also presented as described in the Grette Associates documents referenced in Section 4.3.3.1, *Information Sources*. No determination of federal jurisdiction over these types of features is implied by their inclusion herein. The existing conditions and impacts within the Columbia River are assessed in Section 4.2, *Surface Water and Floodplains*.

4.3.1 Regulatory Setting

Laws and regulations relevant to wetlands are summarized in Table 4.3-1. This section is largely focused on wetlands as a subset of waters of the United States, and thus, subject to Section 404 of the Clean Water Act as described in Table 4.3-1. Ditches, channels, and stormwater conveyance features that qualify as waters of the United States are generally subject to the same Clean Water Act requirements.

Table 4.3-1. Regulations, Statutes, and Guidelines for Wetlands

Regulation, Statute, Guideline	Description
Federal	
Clean Water Act (33 USC 1251 *et seq.*)	Section 401 (water quality certification) requires Water Quality Certification from the state for activities requiring a federal permit or license to discharge pollutants into a water of the United States. Certification attests the state has reasonable assurance the proposed activity will meet state water quality standards. Section 402 (33 USC 1342) establishes the NPDES program, under which certain discharges of pollutants into waters of the United States are regulated. Section 404 regulates the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands.

Regulation, Statute, Guideline	Description
State	
Washington State Shoreline Management Act (RCW 90.58)	Requires cities and counties, in partnership with Ecology, (through their SMPs) to protect shoreline natural resources against adverse impacts.
Hydraulic Code Rules (RCW 77.55, WAC 220-660)	Issued by WDFW for projects with elements that may affect the bed, bank, or flow of a water of the state or productive capacity of fish habitat. Considers effects on riparian and shoreline/bank vegetation in issuance and conditions of the permit, including for the installation of piers, docks, pilings and bank armoring and crossings of streams and rivers (including culverts).
Local	
Cowlitz County Critical Areas Ordinance (19.15)	Regulates activities within and adjacent to critical areas including 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 Shoreline Master Program (19.20)	Regulates development in the shoreline zone, including the shoreline of the Columbia River, a Shoreline of Statewide Significance.

Notes:
USC = United States Code; NPDES = National Pollutant Discharge Elimination System; RCW = Revised Code of Washington; SMP = Shoreline Management Program; WAC = Washington Administrative Code; WDFW = Washington Department of Fish and Wildlife

4.3.2 Study Area

The study area for direct impacts on wetlands is the project area (Figure 4.3-1). The study area for indirect impacts is the project area and the immediate vicinity, where wetlands might be affected by construction or operation of the proposed export terminal.

4.3.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on wetlands associated with the construction and operation of the Proposed Action and No-Action Alternative.

4.3.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on wetlands in the study area.

- Two reconnaissance level site visits conducted by ICF wetland biologists on April 8 and December 11, 2014, to view the areas determined to be wetland by Grette Associates.
- Reports prepared by Grette Associates and provided by the Applicant as part of the permit application materials.
    - *Coal Export Terminal Wetland and Stormwater Ditch Delineation Report–Parcel 619530400 and associated appendices* (Grette Associates 2014a)

- *Bulk Product Terminal, Wetland and Stormwater Reconnaissance Report–Parcel 10213* (Grette Associates 2014b)
- *Bulk Product Terminal Wetland and Stormwater Ditch Delineation Report–Parcel 61953* (Grette Associates 2014c)
- *Coal Export Terminal Wetland Impact Report–Parcel 619530400* (Grette Associates 2014d)

The Grette Associates documents report the presence of field-delineated wetlands in the study area using the *Regional Supplement to the U.S. Army Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region Version 2.0* (U.S. Army Corps of Engineers 2010).

Wetlands were classified by vegetation type using the U.S. Fish and Wildlife *Classification of Wetlands and Deep Water Habitat* (Cowardin et al. 1979). The regulatory category of wetlands in Washington State is determined per the Washington State Department of Ecology (Ecology) *Washington State Wetland Rating System for Western* (or *Eastern*) *Washington* (Rating System), as applicable (Hruby 2006).

The category and functions of wetlands were evaluated using the Rating System. Functions evaluated included water quality functions (the ability to filter sediment and pollutants), habitat functions (a place for plants and animals to live and grow), and hydrologic functions (the interaction between ground or surface water and the landscape). Based on the Rating System, wetlands are rated as providing low, moderate, or high functions depending on the following characteristics.

- The ability to retain water for sufficient periods to filter out pollutants.
- How diverse the wetlands vegetation and structure is to provide wildlife habitat and its connectivity to other wetlands or upland habitat.
- The position of the wetland in the landscape relative to its ability to store and retain surface water (i.e., the wetland's ability to act as a natural sponge to store water to prevent flooding and to gradually release water back to streams and other aquatic areas).
- The ability to prevent erosion caused by moving water.

Information regarding the existing conditions relative to ditches and stormwater conveyance features or other waters is presented in Section 4.2, *Surface Water and Floodplains*.

4.3.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on wetlands. For direct impacts, the analysis assumes best management practices would be incorporated into the design, construction, and operation of the proposed coal export terminal.

All quantitative and qualitative impacts on wetlands are summarized as described in the Grette Associates documents referenced in Section 4.3.3.1, *Information Sources*. Direct construction impacts on wetlands were reported for wetlands in the project area. All wetlands within the project area were considered permanently affected, because most would be replaced with gravel pads, stockpiles, railroad tracks, buildings, pavement, and other project features. Direct wetland impacts would be mitigated consistent with current federal, state, and local mitigation requirements.

Impacts on ditches, stormwater conveyance features or other waters are also summarized. No determination of federal jurisdiction over these types of features is implied by their inclusion herein.

4.3.4 Existing Conditions

Wetlands, as defined by the Corps' wetland delineation manual (Environmental Laboratory 1987, 2010) are "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

The Washington State Growth Management Act defines wetlands as:

> areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from nonwetland areas to mitigate the conversion of wetlands. (RCW 36.70A.030)

To identify areas that meet the wetland definition per the Corps wetland delineation manual (Environmental Laboratory 1987), scientists look for specific field characteristics of soil, hydrology (i.e., flooding, ponding, or groundwater saturating the soil), and vegetation that indicate an area is a wetland. Indicators of all three conditions (soil, hydrology, and vegetation) must be present for an area to be considered a wetland.

Approximately 26.93 acres of wetlands were identified in the study area. The distribution of wetlands in the study area is shown in Figure 4.3-1. Wetlands in the study area are identified using letters. Table 4.3-2 summarizes the wetlands by their location, vegetation classification, hydrogeomorphic classification (i.e., where the wetland fits on the landscape position and associated hydrology), regulatory category, and acreage. Regulatory category refers to the system of ascribing a ranked regulatory protection category from one to four (I to IV) to wetlands based on their functions, as derived from the *Washington State Wetland Rating System for Western Washington* (Hruby 2006). Category I wetlands have the highest level of function, are afforded the widest buffers, and impacts on such wetlands require the largest amount of compensatory mitigation. Category IV wetlands have the lowest level of function, are afforded more narrow buffers, and impacts on such wetlands require a lower amount of compensatory mitigation.

All wetlands in the study area are considered depressional from a hydrogeomorphic classification perspective; i.e., a classification based on where the wetlands occur on the landscape and their resulting physical characteristics.

Additional wetlands outside of the direct and indirect impacts study areas were delineated in the Applicant's leased area. These wetlands are shown in Figure 4.3-1 and listed in Table 4.3-3.

Under the Cowardin system, wetlands are classified by dominant vegetation. For example, wetlands can be classified as forested (woody plants over 20 feet tall), scrub-shrub (woody plants up to 20 feet tall), or emergent vegetation (non-woody plants like grasses, sedges, rushes, and herbaceous flowering plants). Individual wetlands can comprise more than one vegetation type. Wetlands in the study area are organized by Cowardin vegetation classification.

Figure 4.3-1. Wetlands in the Study Area

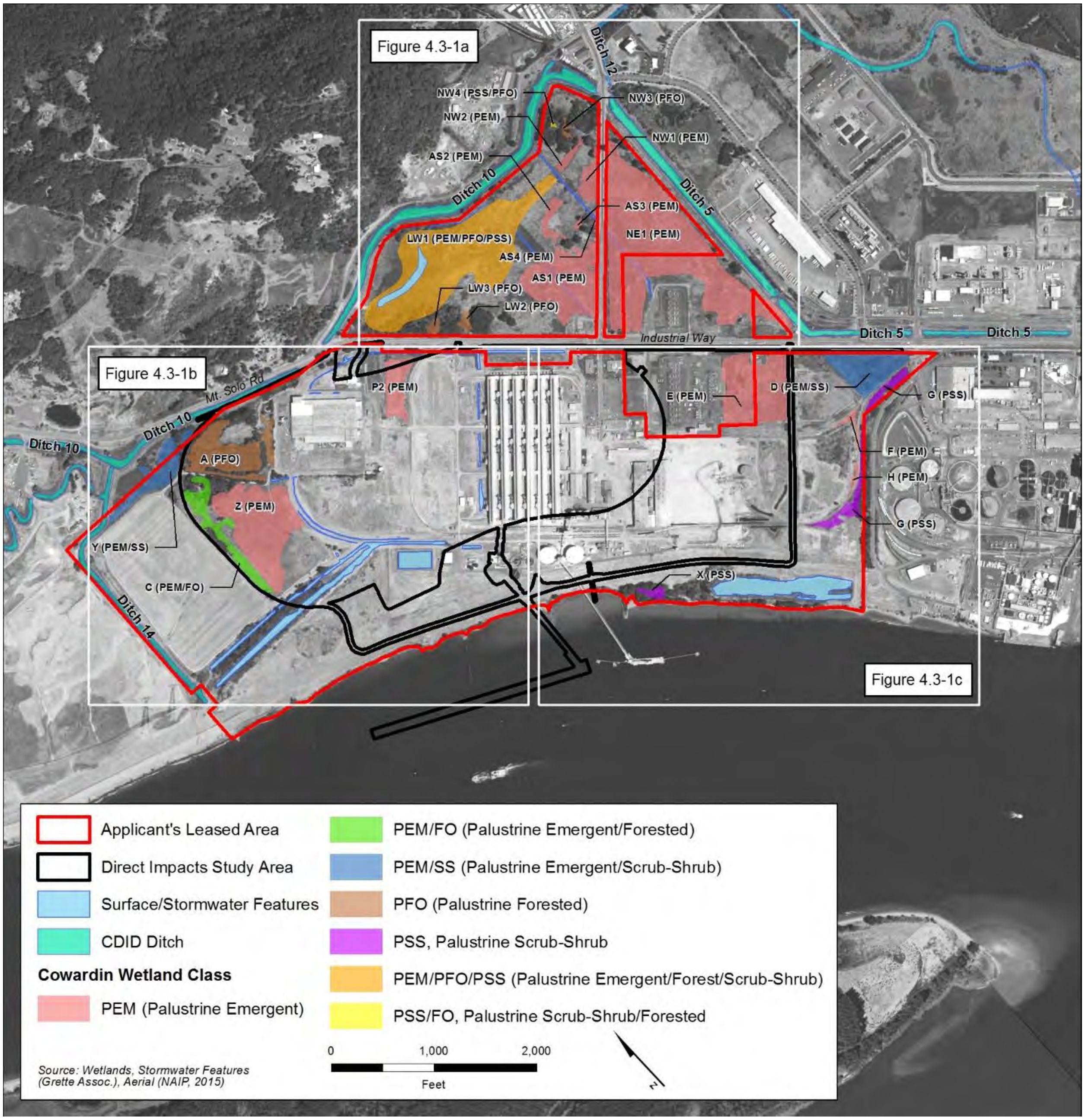


Figure 4.3-1a. Wetlands in the Study Area—North

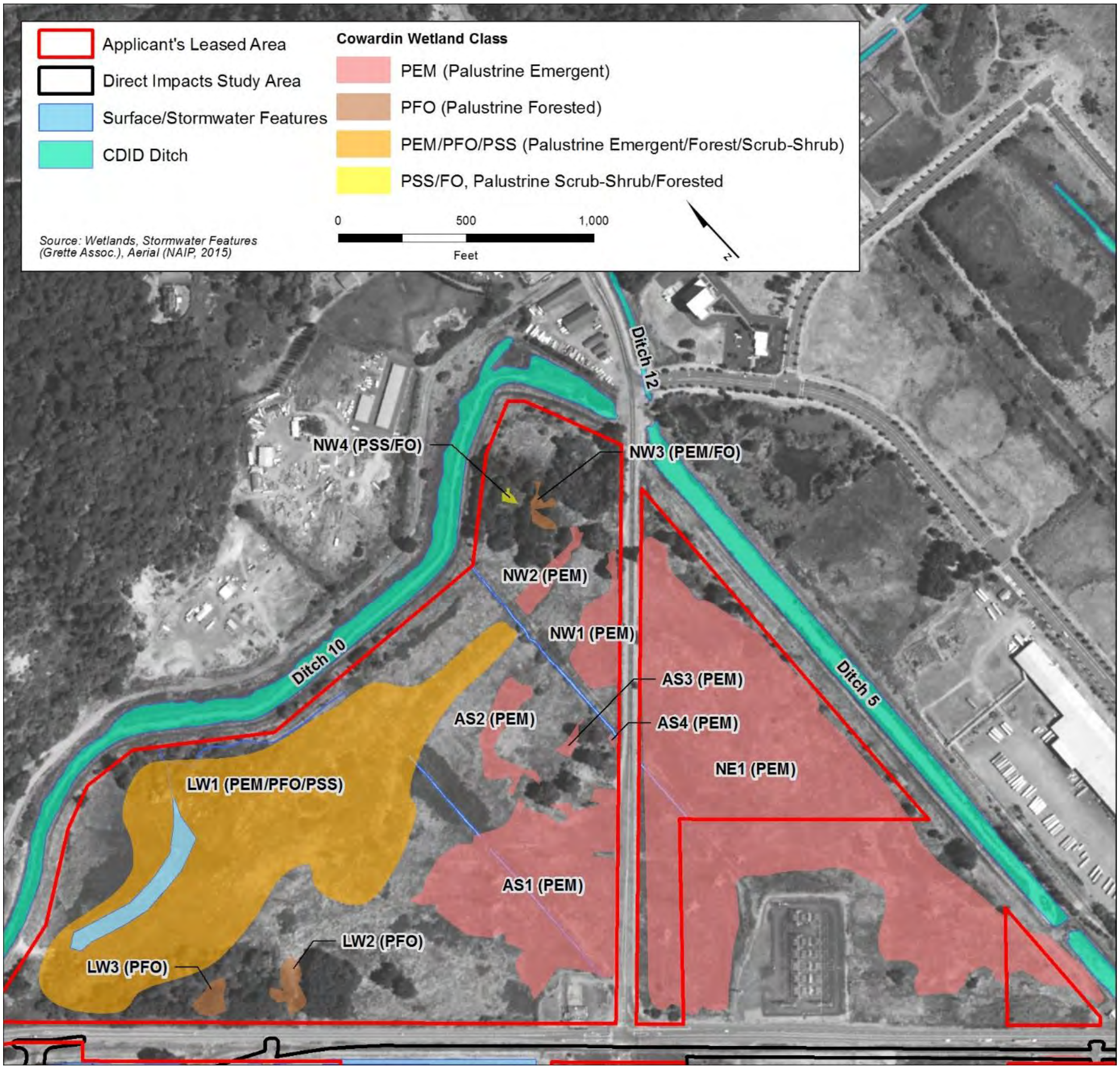


Figure 4.3-1b. Wetlands in the Study Area—West

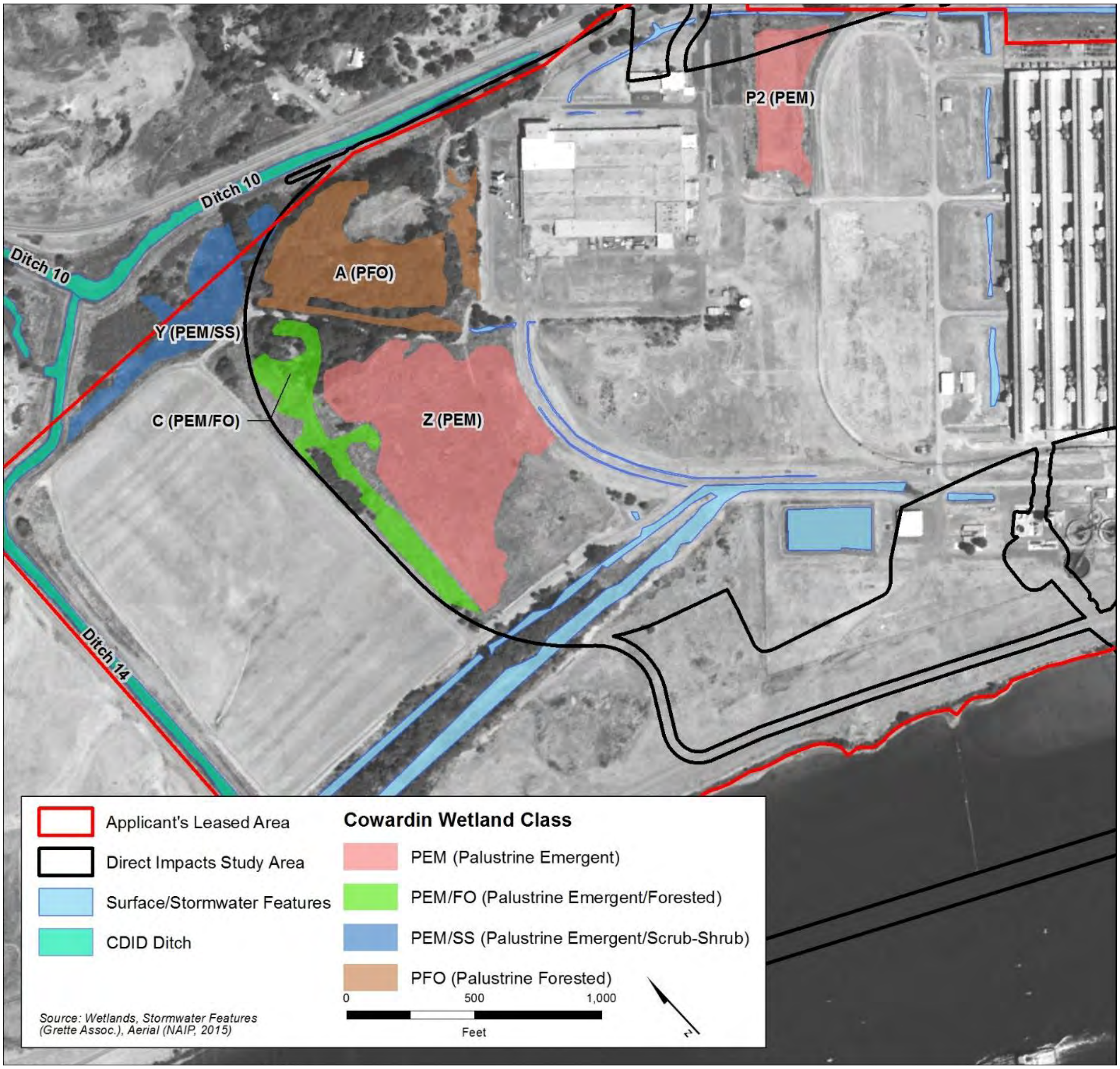


Figure 4.3-1c. Wetlands in the Study Area—East

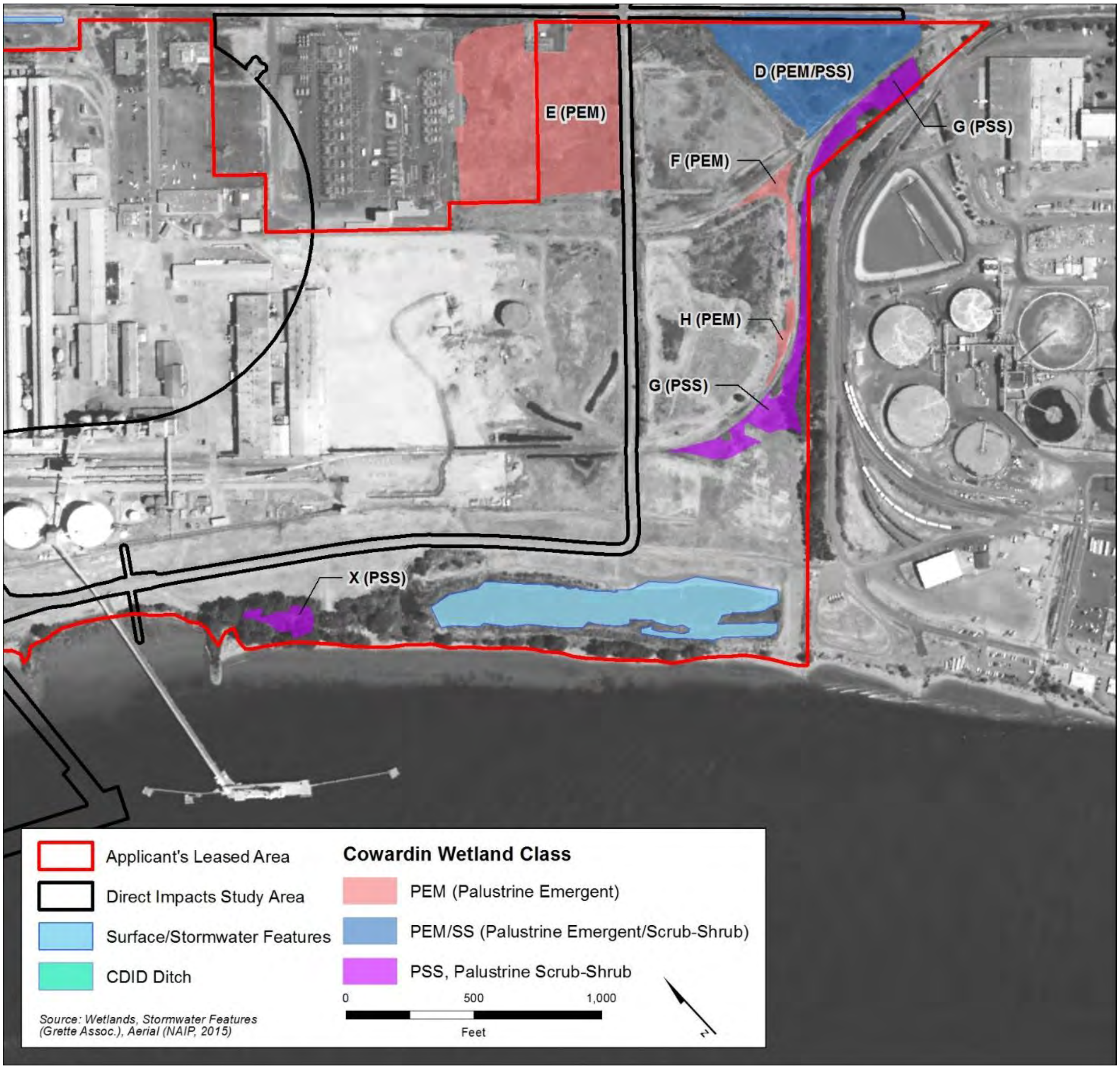


Table 4.3-2. Wetlands Identified in the Study Area

Wetland	Location (Parcel)	Cowardin Classification[a]	HGM Classification[b]	Category[c]	Area (acres)[d]
A	619530400	PFO	Depressional	III	6.28
C	619530400	PEM/PFO	Depressional	III	3.38
Y	619530400	PEM/PSS	Depressional	III	3.40
Z	619530400	PEM	Depressional	III	11.22
P2	619530400	PEM	Depressional	IV	2.65
Total					**26.93**

Notes:
[a] Cowardin classification per Classification of Wetland and Deepwater Habitats of the United States (Cowardin et al. 1979). Values include PFO = palustrine forested; PSS = palustrine scrub-shrub; and PEM = palustrine emergent
[b] Hydrogeomorphic (HGM) classification per the Washington State Wetland Rating System for Western Washington (Hruby 2006).
[c] Wetland category determined by Grette Associates using the Washington State Wetland Rating System for Western Washington (Hruby 2006).
[d] Acreages as reported by Grette Associates 2014 a, b, c.

Table 4.3-3. Wetlands Outside the Study Areas in the Applicant's Leased Area

Wetland	Location (Parcel)	Cowardin Classification[a]	HGM Classification[b]	Category[c]	Area (acres)[d]
D	61953	PEM/PSS	Depressional	III	5.43
E	61953, 61954	PEM	Depressional	III	9.46
F	61953	PEM	Depressional	III	0.45
G	61953	PSS	Depressional	III	2.60
H	61953	PEM	Depressional	III	0.24
X	61950	PSS	Riverine	III	0.44
AS1	10213	PEM	Depressional	III	8.86
AS2	10213	PEM	Depressional	IV	0.94
AS3	10213	PEM	Depressional	IV	0.12
AS4	10213	PEM	Depressional	III	0.02
NW1	10213	PEM	Depressional	III	1.38
NW2	10213	PEM	Depressional	III	0.50
NW3	10213	PFO	Depressional	IV	0.19
NW4	10213	PSS/PFO	Depressional	IV	0.05
NE1	10213	PEM	Depressional	III	29.48
LW1[e]	10213	PEM/PFO/PSS	Depressional	III	-
LW2[e]	10213	PFO	Depressional	III	-
LW3[e]	10213	PFO	Depressional	III	-
Total					**60.16**

Notes:
[a] Cowardin classification per Classification of Wetland and Deepwater Habitats of the United States (Cowardin et al. 1979). Values include PFO = palustrine forested; PSS = palustrine scrub-shrub; and PEM = palustrine emergent
[b] Hydrogeomorphic (HGM) classification per the Washington State Wetland Rating System for Western Washington (Hruby 2006).
[c] Wetland category determined by Grette Associates using the Washington State Wetland Rating System for Western Washington (Hruby 2006).
[d] Acreages as reported by Grette Associates 2014 a, b, c.
[e] These wetlands correspond to the three areas on Parcel 10213 that Grette Associates identified as *likely wetland* areas. Grette Associates did not report acreages for these areas.

4.3.4.1 Forested Wetlands

Approximately 6.28 acres of forested wetland occur in the study area as Wetland A. (Figure 4.3-1). This wetland is depressional and supported primarily by high groundwater and direct precipitation. Common plant species observed in the forested wetland include a predominately native overstory of black cottonwood (*Populus trichocarpa* ssp. *balsamifera*), Pacific willow (*Salix lucida*), red alder (*Alnus rubra*), and Oregon ash (*Fraxinus latifolia*) trees, overlying a shrub layer dominated by salmonberry (*Rubus spectabilis*) and nonnative Himalayan blackberry (*Rubus armeniacus*). Reed canarygrass (*Phalaris arundinacea*), an invasive grass, is the common herbaceous plant.

4.3.4.2 Emergent/Forested Wetlands

Approximately 3.38 acres of emergent/forested wetlands occur in the study area as Wetland C (Figure 4.3-1). This wetland is depressional and supported primarily by high groundwater and direct precipitation. The emergent portion of the wetland is dominated by reed canarygrass. Common plant species observed in the forested portion include a predominately native overstory of black cottonwood, Pacific willow, red alder, and Oregon ash trees, overlying a shrub layer dominated by salmonberry and nonnative Himalayan blackberry.

4.3.4.3 Emergent/Scrub-Shrub Wetlands

Approximately 3.40 acres of emergent/scrub-shrub wetland occur in the study area as Wetland Y. Wetland Y is located north of the closed Black Mud Pond facility, and is the only wetland in the direct impacts study area that extends outside of the study area (Figure 4.3-1). This wetland is depressional and supported primarily by high groundwater and direct precipitation. The scrub-shrub component is dominated by Himalayan blackberry, red osier dogwood (*Cornus sericea*), Douglas spirea (*Spiraea douglasii*), and narrowleaf cattail (*Typha angustifolia*). The emergent component is dominated by reed canarygrass and an unidentified bryophyte; some nonnative narrowleaf cattail is also present.

4.3.4.4 Emergent Wetlands

Approximately 13.87 acres of emergent wetland occur in the study area as Wetlands Z and P2 (Figure 4.3-1). These wetlands are depressional and supported primarily by high groundwater and direct precipitation. Wetland Z is dominated by reed canarygrass and soft rush (*Juncus effusus*) and contains several brush piles left over from past clearing activities. Wetland P2 is also dominated by reed canarygrass and soft rush.

4.3.4.5 Wetland Ratings and Functions

The wetlands in the study area were rated as either Category III or Category IV based on their generally low to moderate level of function (Grette 2014a, 2014c). Wetlands A, C, Z, Y and P2 generally provide low to moderate water quality, habitat, and hydrology functions (Grette 2014a). These wetlands filter out sediment from stormwater runoff and retain stormwater and overland flow during heavy rain events. Some of the wetlands also provide pollutant filtration and groundwater infiltration functions. Wildlife functions include habitat for large and small mammal foraging and cover; passerine, waterfowl, and raptor foraging and nesting; and amphibian foraging, breeding and refuge. Wetland Y provides the most potential to retain stormwater during heavy rain events due to its depth.

4.3.4.6 Ditches and Stormwater Conveyance Features or Other Waters

Ditches and stormwater conveyance features present within the study area include the Interceptor Ditch/U Ditch, and several narrow stormwater ditches that cross through the study area (Figure 4.3-1). These features, as well as the Columbia River, are described for the Proposed Action in Section 4.2, *Surface Waters and Floodplains*.

4.3.5 Impacts

The following impacts on wetlands could result from construction and operation of the Proposed Action and No-Action Alternative.

4.3.5.1 Proposed Action

The following sections describe the potential impacts to wetlands from construction and operation of the Proposed Action.

Construction—Direct Impacts

Construction would occur in the Columbia River and on currently developed and disturbed land adjacent to the Columbia River. Impacts would include permanent fill and conversion to upland, and temporary alteration of vegetation and habitat conditions.

Permanently Fill Wetlands and Other Waters Resulting in Loss of Acreage

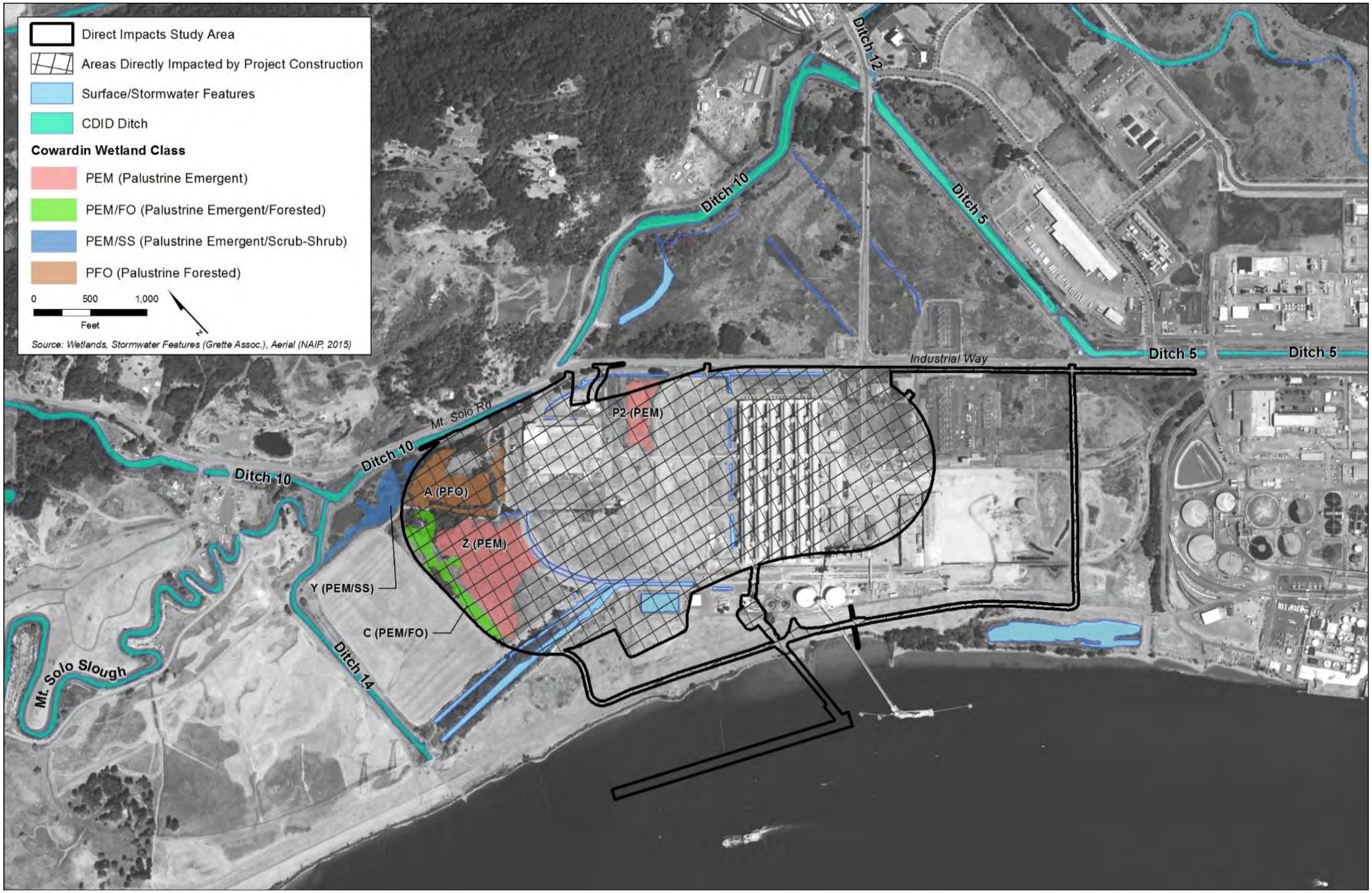
Construction of the Proposed Action would result in the permanent loss of 24.10 acres of wetlands (Table 4.3-4). Construction activities would permanently fill Wetlands A, C, Z, and P2 and a portion of Wetland Y (Figure 4.3-2) (Grette Associates 2014d) to construct rail lines and coal handling facilities. Because the wetland would be permanently filled, there is no requirement for buffers. Construction of the Proposed Action would not directly affect wetlands north of Industrial Way or the majority of wetlands at the east end of the study area.

Table 4.3-4. Wetland and Other Waters Impacts from the Proposed Action

Wetland/Other Waters	Cowardin Classification	Category	Impact Type	Impact Area
A	PFO	III	Fill	6.28
C	PEM/PFO	III	Fill	3.38
Y	PEM/PSS	III	Fill	0.57
Z	PEM	III	Fill	11.22
P2	PEM	IV	Fill	2.65
Total				**24.10**

Notes:
PFO = palustrine forested; PEM = palustrine emergent; PSS = palustrine scrub-shrub

Figure 4.3-2. Wetlands Affected by the Proposed Action



There are jurisdictional wetlands north of Industrial Way, which are outside the project area. These wetlands are considered Category III and IV wetlands (Grette Associates 2014b). The Cowlitz County Code (CCC) Critical Areas Ordinance 19.15.120.C (4)(a) requires buffers around wetlands, and buffers for Category III and IV wetlands can range from 25 to 150 feet depending on the wetland function and land use intensity. However, CCC 19.15.120.C (4)(a) does not require wetland buffers to extend beyond existing natural or human-made barriers (e.g., a paved road), which isolate the area of the wetland resource. Industrial Way serves as this human-made barrier for those off-site wetlands to the north of Industrial Way, and the associated buffers do not extend beyond that point. Therefore, construction of the Proposed Action would not result in impacts on these adjacent wetland buffers (Grette Associates 2014d).

In addition, construction would permanently fill 5.17 acres of ditches that convey stormwater runoff (Grette Associates 2014d), including the eastern half of the Interceptor/U Ditch, portions of the ditch along the south edge of Industrial Way on the BPA parcel, and interior drainage ditches (Grette Associates 2014d). Refer to Section 4.2, *Surface Water and Floodplains*, for more information on ditches and other surface waters.

Permanent Loss of Wetland Functions

Placement of fill material to construct the proposed coal export terminal would result in the permanent total loss of wetland functions across 24.10 acres of wetlands (Table 4.3-4). The functions most affected would be water quality and wildlife habitat, as evidenced by the rating system scores for the affected wetlands (Grette Associates 2014d). Wetland scores for the Category III wetlands are highest for the water quality and wildlife habitat functions. Wetland scores for Wetland P2 (the only Category IV wetland) were low for all three functions.

All water quality and hydrology functions would be lost from Wetlands A, C, Z, and P2, with a portion of those functions lost in Wetland Y. Construction of the Proposed Action would not displace water into surrounding areas, and stormwater runoff currently discharging into these wetlands would be redirected into an on-site stormwater treatment facility. Stormwater that currently discharges into Wetland Y through Outfall 005 would be rerouted to proposed stormwater facilities (refer to Section 4.2, *Surface Water and Floodplains,* for more information). However, since this is a minor source of hydrology compared with groundwater and surface water from ditches, it is expected that hydrology in the unfilled portion of Wetland Y would not be affected (Grette Associates 2014d).

While wetlands in the study area do provide some wildlife habitat, as described in Section 4.8, *Wildlife*, this function is limited (Grette Associates 2014d). Construction of the Proposed Action would destroy all habitat functions in filled wetlands. Construction would also destroy a forested portion of Wetland Y, which would reduce that wetland's habitat value from moderate to low.

Construction—Indirect Impacts

Construction of the Proposed Action would permanently fill 0.57 acre of Wetland Y, leaving 2.83 acres of Wetland Y unfilled and intact. The primary indirect impact on this wetland would be the degradation or alteration of wetland functions. While other indirect impacts, such as sedimentation from stormwater runoff and fuel spills, could also occur, implementation of best management practices, such as silt fencing, would be required by various federal, state, and local permits to minimize impacts.

Alteration or Degradation of Wetland Functions

Construction could alter or degrade wildlife and hydrologic functions in Wetland Y. These indirect impacts are expected to be minor given Wetland Y's low rating for each of these functions. Wildlife use would likely be slightly reduced due to a smaller habitat area. Additionally, Wetland Y would no longer have nearby habitat connectivity with Wetland A (which would be filled), further reducing Wetland Y's functionality.

Wetland Y's hydrologic function is not expected to change much as a result of construction because it is located in a low area and hydrology is driven primarily by groundwater and precipitation. Temporary fluctuations in groundwater could occur during construction activities if any excavating activities take place near Wetland Y. However, if this impact were to occur it would be temporary, and Wetland Y's currently low hydrologic functional rating would not be significantly altered. Indirect construction impacts on water quality functions are unlikely because the wetland would be protected by adherence to a Stormwater Pollution Prevention Plan and NPDES Construction Stormwater Permit conditions.

Operations—Direct Impacts

The Proposed Action would have no direct impacts on wetlands during operations.

Operations—Indirect Impacts

Wetland Y vegetation would likely be affected by coal dust. The impact of coal dust on vegetation would depend on dust load, climatic conditions, and physical characteristics of the vegetation. Impacts could include blocked stomata, which would reduce respiration and/or decrease transpiration; altered leaf surface reflectance and light absorption; and increased leaf temperature due to optical properties of the dust (Chaston and Doley 2006; Doley 2006:38; Farmer 1993). Section 4.6, *Vegetation*, and the *SEPA Vegetation Technical Report* (ICF 2017), summarize studies of the impacts of dust deposition on vegetation. Coal dust deposition is discussed further in Chapter 5, Sections 5.6, *Air Quality*, and 5.7, *Coal Dust.*

4.3.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal and would continue with current and future increased operations in the study area for the Proposed Action. The study area could be developed for other industrial uses including an expanded bulk product terminal or other industrial uses. If the study area is developed for another use, these activities may require permits from Ecology and the Corps. Wetlands would continue to provide functions as described in Section 4.3.4, *Existing Conditions*.

4.3.6 Required Permits

Permits to place fill in wetlands or other waters of the United States are required by federal, state, and local jurisdictions responsible for protecting waterways and water quality.

Permits for the Proposed Action would likely include the following.

- **Clean Water Act Authorization, Section 404—U.S. Army Corps of Engineers.** Construction and operation of the Proposed Action would affect waters of the United States, including wetlands. Department of the Army authorization from the Corps under Section 404 of the Clean Water Act would be required.
- **Clean Water Act Section 401 Water Quality Certification—Washington State Department of Ecology.** An Individual Water Quality Certification from Ecology under Section 401 of the Clean Water Act and a National Pollution Discharge Elimination System permit under Section 402 of the Clean Water Act would also be required for the Proposed Action.
- **Critical Areas Permit—Cowlitz County Department of Building and Planning.** Development in designated critical areas, including wetlands, requires a Critical Areas Permit from the Cowlitz County Department of Building and Planning.

Other permits and approvals not specific to wetlands may be required, but associated with the Proposed Action's location along the Columbia River, such as shoreline permits pursuant to the State Shoreline Management Act, Cowlitz County Shoreline Master Program, and City of Longview Shoreline Master Program.

4.3.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce and compensate for impacts related to wetlands from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

Wetlands mitigation falls under the jurisdiction of the Corps, Ecology, and Cowlitz County and will be coordinated through the National Environmental Policy Act (NEPA) and permitting processes.

4.3.7.1 Applicant Mitigation

The Applicant would implement the following measures to mitigate impacts on wetlands.

MM WTL-1. Prepare a Comprehensive Mitigation Plan

The Applicant will prepare a comprehensive mitigation plan in coordination with the Corps, Ecology, and Cowlitz County to address the impacts on the 24.1 acres of wetlands affected by placement of fill from the Proposed Action. The comprehensive mitigation plan will be prepared as part of the permitting process for the Proposed Action. The mitigation plan will address the general requirements for mitigation planning consistent with all current local, state, and federal guidance and regulations. These requirements must be met before applicable permits are issued.

Mitigation actions may be implemented at one or several locations to ensure that the range of ecological functions are provided to offset identified, unavoidable project impacts and the types of wetland functions affected by the Proposed Action. The mitigation actions may include Applicant-sponsored (i.e., permittee-responsible) mitigation or use of credits from existing or proposed mitigation banks (Grette Associates 2014d). Any Applicant-sponsored mitigation will be consistent with requirements as stipulated by the Corps, Ecology, or Cowlitz County, which could include, but is not limited to, use of ratios or a credit-debit analysis.

CCC 19.15.170 E(5) and the 2006 interagency guidance identify mitigation ratios that prescribe the acreage needed to compensate for unavoidable impacts on wetlands, depending on the type of mitigation and category of the affected wetland and the mitigation wetland. As required by agencies, the appropriate ratios will be followed for the preparation of the mitigation plan (Grette Associates 2014d). Mitigation will be developed consistent with current local, state, and federal guidance and regulations. Approval of the mitigation plan by the agencies will depend on a number of factors.

Examples of mitigation could include, but would not be limited to, the following.

- Wetland mitigation bank credits.
- Off-site permittee-responsible wetland mitigation (e.g., wetland creation, enhancement, rehabilitation).

4.3.8 Unavoidable and Significant Adverse Environmental Impacts

Compliance with laws and implementation of the mitigation measures described above would reduce and compensate for impacts on wetlands. There would therefore be no unavoidable and significant adverse environmental impacts on wetlands.

4.4 Groundwater

Groundwater, often stored in aquifers[1] formed of permeable rock or soil material, provides water for human and environmental well-being. Groundwater quality refers to the physical, chemical, biological, and aesthetic characteristics of water, which are used to measure the ability of water to support aquatic life and human uses. Groundwater quality can be degraded by contaminants introduced by domestic, construction, industrial, and agricultural practices.

This section describes the groundwater resources in the study area. It then describes impacts on groundwater that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

4.4.1 Regulatory Setting

Laws and regulations relevant to groundwater are summarized in Table 4.4-1.

Table 4.4-1. Regulations, Statutes, and Guidelines for Groundwater

Regulation, Statute, Guideline	Description
Federal	
Clean Water Act (33 USC 1251, *et seq*.)	Establishes the basic structure for regulating discharges of pollutants into waters of the United States and regulating quality standards for surface waters but not groundwater.
Safe Drinking Water Act	Requires the protection of groundwater and groundwater sources used for drinking water. Also, requires every state to develop a wellhead protection program.
National Pollutant Discharge Elimination System Permit	Authorized by the Clean Water Act, the permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Surface waters in the study area interacts with groundwater.
State	
Water Quality Standards for Groundwaters of the State of Washington (WAC-173-200)	Groundwater standards intended to preserve a level of quality for groundwater capable of meeting current state and federal safe drinking water standards.
Water Code (RCW 90.03)	Establishes rules for regulating and controlling water rights, and defines beneficial uses.
Regulation of Public Groundwaters (RCW 90.44)	Regulates and controls groundwater. Extends application of surface water statutes (RCW 90.03) to groundwater.

[1] An aquifer consists of underground layers of rock that are saturated with water that can be brought to the surface through natural springs or by pumping.

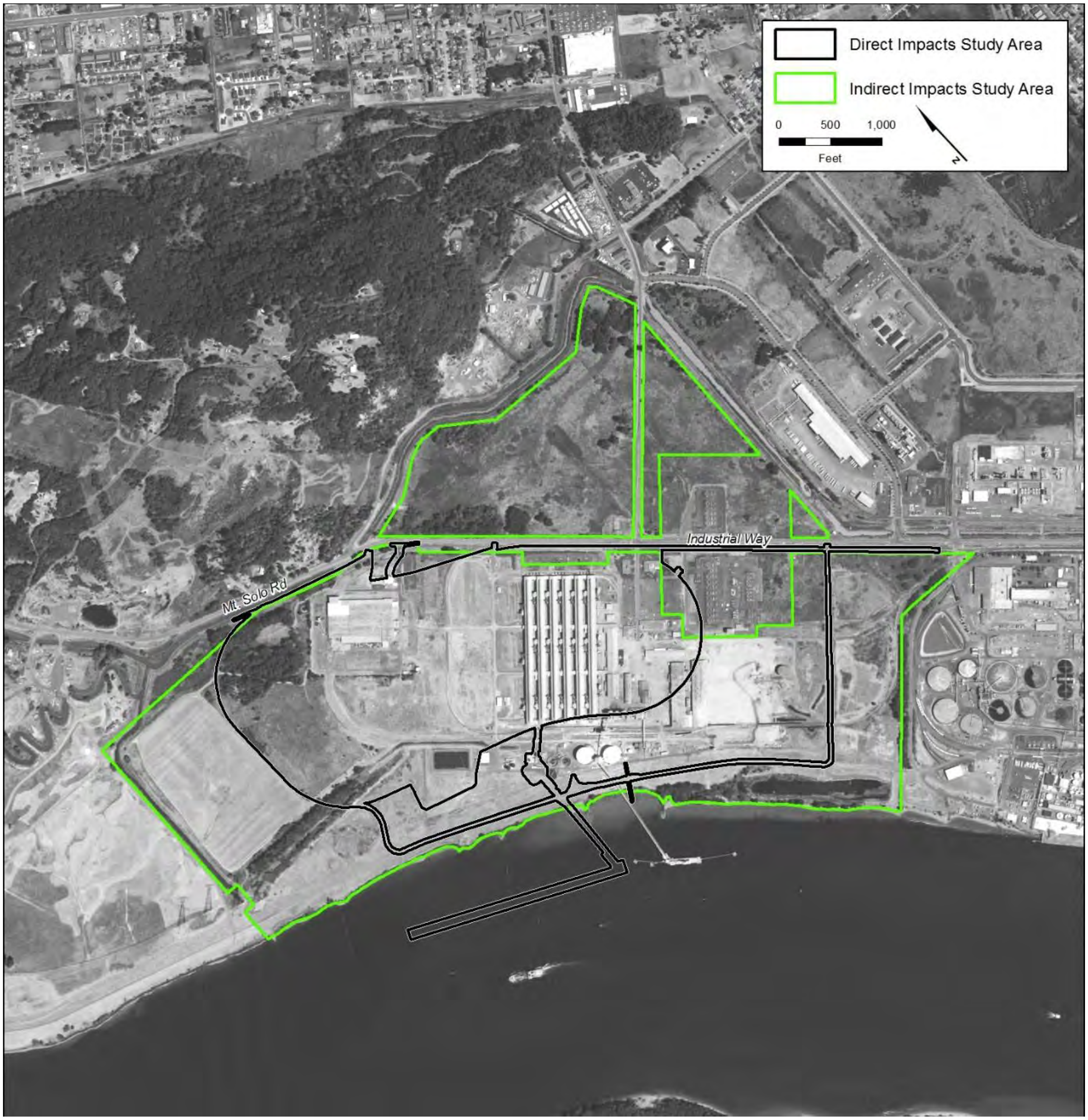
Regulation, Statute, Guideline	Description
Drinking Water/Source Water Protection (RCW 43.20.050)	Requires that the Washington State Department of Health assure safe and reliable public drinking water supplies in cooperation with local health departments and water purveyors.
Model Toxics Control Act (RCW 70.105D)	Requires potentially liable persons to assume responsibility for cleaning up contaminated sites.
State Water Pollution Control Law (RCW 90.48)	Grants Ecology the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland water, salt waters, water courses, and other surface and groundwater in the state.
Water Resources Act of 1971 (RCW 90.54)	Sets forth fundamental policies for the state to insure that waters of the state are protected and fully utilized for the greatest benefit.
Washington State Oil and Hazardous Substance Spill Prevention and Response (RCW 90.56)	Requires notification of releases of hazardous substances and establishes procedures for response and cleanup.
Model Toxic Control Act Cleanup Regulations (WAC 173-340)	Establishes procedures for investigation and site cleanup actions. Requires potentially liable persons to assume responsibility for cleaning up contaminated sites.
Local	
Cowlitz County Critical Areas Ordinance (CCC 19.15)	Designates critical areas and development regulations to assure the conservation of such areas in accordance with best available science.
Longview Water Supply Protection Ordinance (LMC 17.100)	Establishes a Wellhead Protection Program to minimize the risk of groundwater contamination.

Notes:
USC = United States Code; WAC = Washington Administrative Code; RCW = Revised Code of Washington; Ecology = Washington State Department of Ecology; LMC = Longview Municipal Code

4.4.2 Study Area

The study area for direct impacts on groundwater is the project area. The study area for indirect impacts is the 540-acre Applicant's leased area (Figure 4.4-1).

Figure 4.4-1. Groundwater Study Areas



4.4.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on groundwater associated with the construction and operation of the Proposed Action and No-Action Alternative.

4.4.3.1 Information Sources

The following sources of information were used to identify and analyze the potential impacts of the Proposed Action and No-Action Alternative on groundwater in the study area.

- *Remedial Investigation Report* (Anchor Environmental 2007)
- *Former Reynolds Metals Reduction Plant—Longview, Draft Remedial Investigation and Feasibility Study* (Anchor QEA 2014)
- *Millennium Coal Export Terminal Longview, Washington, Water Resources Report* (URS Corporation 2014a)
- *Millennium Coal Export Terminal Longview, Washington, Water Resource Report* (URS Corporation 2014b)
- *Millennium Coal Export Terminal Longview, Washington, Surface Water Memorandum* (URS Corporation 2014c)
- *Millennium Coal Export Terminal Longview, Washington Surface Water Memorandum, Second Supplement to Water Resource Report Water Collection and Drainage* (URS Corporation 2014d)
- *Mint Farm Regional Water Treatment Plant, Preliminary Design Report, Part 2A, Hydrogeologic Characterization* (City of Longview 2010)
- Other scientific literature as cited in this section

4.4.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on groundwater. Although the indirect impacts study area includes the extent of the Applicant's leased area, impacts on groundwater would be limited to the project area and along the Reynolds Lead railroad within the watershed. For direct impacts, the analysis assumes best management practices were incorporated into the design, construction, and operation of the Proposed Action.

Potential groundwater impacts have been evaluated regarding groundwater discharge and recharge, groundwater quality, and groundwater withdrawal. The assessment of impacts is based on the assumption that the Proposed Action would include the following actions and authorizations.

- National Pollution Discharge Elimination System (NPDES) Construction Stormwater Permit and Industrial Stormwater Permit for stormwater discharges.
- Remediation of any existing soil and groundwater contamination in the Applicant's leased area prior to and concurrently with project construction.
- Long-term monitoring as part of the remediation of the existing groundwater contamination to verify remedy effectiveness and natural attenuation of groundwater contamination.

4.4.4 Existing Conditions

This section describes the existing environmental conditions in the study area related to groundwater that could be affected by the construction and operation of the Proposed Action and No-Action Alternative.

4.4.4.1 Groundwater Resources

The study area is in Water Resource Inventory Area (WRIA) 25, also known as the Grays-Elochoman watershed. This watershed encompasses approximately 296,000 acres and is defined by five subbasins: Grays River, Skamokawa Creek, Elochoman River, Abernathy/Germany Creek, and the Coal Creek/Longview Slough. The project area is within the Longview-Kelso basin, a topographic and structural depression formed by the Cascadia subduction zone (Anchor 2013 in URS Corporation 2014a). The Longview-Kelso basin is composed of unconsolidated alluvium (silt, fine-grained sand, and clay) underlain by alluvium (coarse-grained sand and gravel). Groundwater resources in the study areas include an upper alluvium aquifer (i.e., shallow aquifer) and a deeper confined aquifer from which industries, small farms, and domestic well users withdraw groundwater. An aquifer is the underground soil or rock through which groundwater can easily move.

The amount of groundwater that can flow through soil or rock depends on the size of the spaces in the soil or rock and how well the spaces are connected. Aquifers that consist of gravel, sand, sandstone, or fractured rock such as limestone are relatively permeable (or porous) materials and allow water to flow through. A confining, impervious unit consisting of clay and silt ranging in thickness from approximately 100 to 200 feet separates the two aquifer systems below the project area. The confining unit becomes appreciably thinner beyond the project area, to the north and east near residential areas. Shallow groundwater is hydraulically connected with the Columbia River. Preliminary hydrogeologic investigations conducted for the City of Longview indicate that shallow, unconfined groundwater does not contribute significantly to the deeper aquifer as the lower aquifer is primarily recharged by deeper aquifers below the Columbia River (Anchor QEA 2014). The project area is not considered a significant source of groundwater recharge by infiltration because of the low recharge rates of the soil in the study area (URS Corporation 2014c).

Shallow Aquifer

Groundwater in the shallow aquifer is found at depths less than 5 feet below the ground surface (bgs) (Anchor QEA 2014). Groundwater flow in the shallow aquifer in the study area is complex due to the competing influences of the Consolidated Diking and Improvement District (CDID #1) system and, to a lesser extent, the tidally influenced Columbia River (Anchor QEA 2014). Groundwater and stormwater discharged to the CDID #1 ditches are pumped from these ditches by the CDID #1 to maintain surface-water levels below those in the Columbia River. Water from CDID #1 is discharged to the Columbia River. A CDID #1 pump station is located near the southwest corner of the project-area boundary.

Deep Aquifer

The deep aquifer is approximately 200 feet bgs, with sand coarsening to gravel to a depth of 400 feet bgs (Anchor QEA 2014). The deep aquifer is a source of drinking water in the study area. Recharge to the deep aquifer in the project area is expected to be driven primarily by deeper aquifers below the Columbia River and insignificantly from shallow, unconfined aquifers (Anchor QEA 2014). Discharge from the deep aquifer is from seepage back to the Columbia River, direct discharge to the shallow aquifer, and pumpage from wells (URS Corporation 2014a).

Mint Farm Regional Water Treatment Plant

The Mint Farm Regional Water Treatment Plant is approximately 6,000 feet east of the eastern boundary of the project area. While the direct impacts study area does not extend to the Mint Farm Regional Water Treatment Plant, the indirect impacts study area includes the treatment plant, and both the direct and indirect impacts study areas include the treatment plant's Wellhead Protection Area (i.e., the 5-year Wellhead Protection Plan Source Area); thus, the Mint Farm Regional Water Treatment Plant is considered. The wellhead protection area is based on the extent of the Columbia River recharge of the deep aquifer flows according to the hydrological investigations performed for the Mint Farm Regional Treatment Plant. The treatment plant consists of four 4,000-gallons-per-minute (gpm) groundwater wells and supplies the City of Longview and the Beacon Hill Water and Sewer District with municipal water. The plant draws from the deep aquifer, recharged by the Columbia River. Kennedy/Jenks Consultants (2010) completed a water quality and environmental risk assessment as part of the preliminary design report for the Mint Farm Regional Water Treatment Plant. The risk assessment included sampling and water quality analysis of the groundwater from the deeper aquifer of six wells. This study found no chemicals in the groundwater above human health screening levels. Kennedy/Jenks Consultants (2012) repeated the water quality analysis from the same wells in November 2012 and found manganese and iron at levels above the Washington State Department of Health secondary water quality standards and arsenic in one of the wells but at levels below thresholds established by the U.S. Environmental Protection Agency (EPA) for drinking water quality standards. Groundwater gradients and monitoring well locations at the Mint Farm Regional Water Treatment Plant are shown in Figures 4.4-2 and 4.4-3.

4.4.4.2 Surface Water Interaction with Groundwater

This section addresses how and where surface water interacts with groundwater in the study areas.

Columbia River

The Columbia River flows along the entire south/southwest boundary of the project area. Tidal influences on groundwater tend to propagate farthest in the coarse-grained deep aquifer and, to a much lesser degree, in the shallow aquifer (Anchor QEA 2014).

Consolidated Dike Improvement District #1 Ditch System

The CDID #1 system was developed to control local flooding and depress the groundwater elevation in lower elevation areas (including the project area) near the Columbia River. Specifically, the system was designed to protect life, property, and environment from external flooding and internal flooding (flooding due to storm runoff from lands adjacent to and inside the levee system). Water levels in the CDID #1 ditches are maintained below the water surface elevation of the Columbia River, which influences groundwater flow direction in the shallow aquifer. At the project area this results in a flow of shallow groundwater away from the Columbia River (to the north, east, and west) (Figure 4.4-4) and toward the CDID #1 ditches (Anchor QEA 2014), except for one localized area: groundwater flow south of the axis of the Columbia River levee is toward the Columbia River (Anchor Environmental 2007). Groundwater that discharges into the CDID #1 ditches and stormwater that is collected in the CDID #1 ditches are actively pumped by the CDID #1 system to the Columbia River through a network of pump stations and valves to maintain water levels below the level of the Columbia River.

Figure 4.4-2. Shallow Aquifer Groundwater Gradients and Monitoring Well Locations

Figure 4.4-3. Deep Aquifer Groundwater Gradients and Monitoring Well Locations

Figure 4.4-4. Groundwater Gradients and Flow Direction

SOURCE: Drawing prepared from Alta Survey dated November 11, 2010. Aerial image from November, 2010.
VERTICAL DATUM: NAVD88, Feet.

NOTE:
1. All elevations were measured in October 2011.
2. Groundwater and surface water elevation measurements collected between 0936 and 1448 on October 22, 2011.
3. Groundwater collected by measuring from point of known elevation (top of casing) to the water surface with an electronic depth-to-water indicator.
4. Surface water collected by measuring from point of known elevation to the water surface with an electronic depth-to-water indicator.

Source: Anchor Environmental 2007

LEGEND:
- Applicant's Leased Area
- Approximate Ordinary High Water Line
- CDID UP△ Surface Water Measurement
- Groundwater Flow Direction
- Groundwater Elevation Contour in Feet
- 4.14 Groundwater or Surface Water Elevation (NAVD88)
- G2S ⊕ Shallow Groundwater Well
- RL-1D ☒ Deeper Groundwater Well
- R-1S/R-1D ▣ Paired Shallow/Deeper Groundwater Well

0 500
Feet

Some groundwater from the deep aquifer may be discharged into the CDID #1 ditches because an upward vertical gradient also exists in areas near the ditches, causing groundwater in the deep aquifer to move upward into the shallow aquifer (Anchor Environmental 2007).

Drainage Basins and Stormwater System

The on-site drainage system collects, treats, and discharges stormwater under the Applicant's Individual Industrial NDPES Permit WA-000008-6 for the existing bulk product terminal. Stormwater is collected from 12 drainage basins and is discharged as treated stormwater to CDID #1 ditches and the Columbia River via four outfalls (Section 4.2, *Surface Water and Floodplains,* Figure 4.2-3). A fifth outfall, Outfall 004, has been closed since 1991. The major collection and treatment systems, drainage basins, outfalls, and discharge locations currently managed under the NPDES program are described in more detail in the *SEPA Surface Water and Floodplains Technical Report* (ICF 2017a), and in Section 4.2, *Surface Water and Floodplains*.

4.4.4.3 Groundwater Quality

Local groundwater quality in the study area has no identified pollutant concentrations above human health screening levels for drinking water. Samples taken from the study area identified manganese, iron, and arsenic levels above the Washington State Department of Health secondary water quality standards but at levels below thresholds established by the U.S. Environmental Protection Agency (EPA) for drinking water quality standards. These levels were found to be naturally occurring and are characteristic of the regional water supply aquifer (Anchor QEA 2014a).

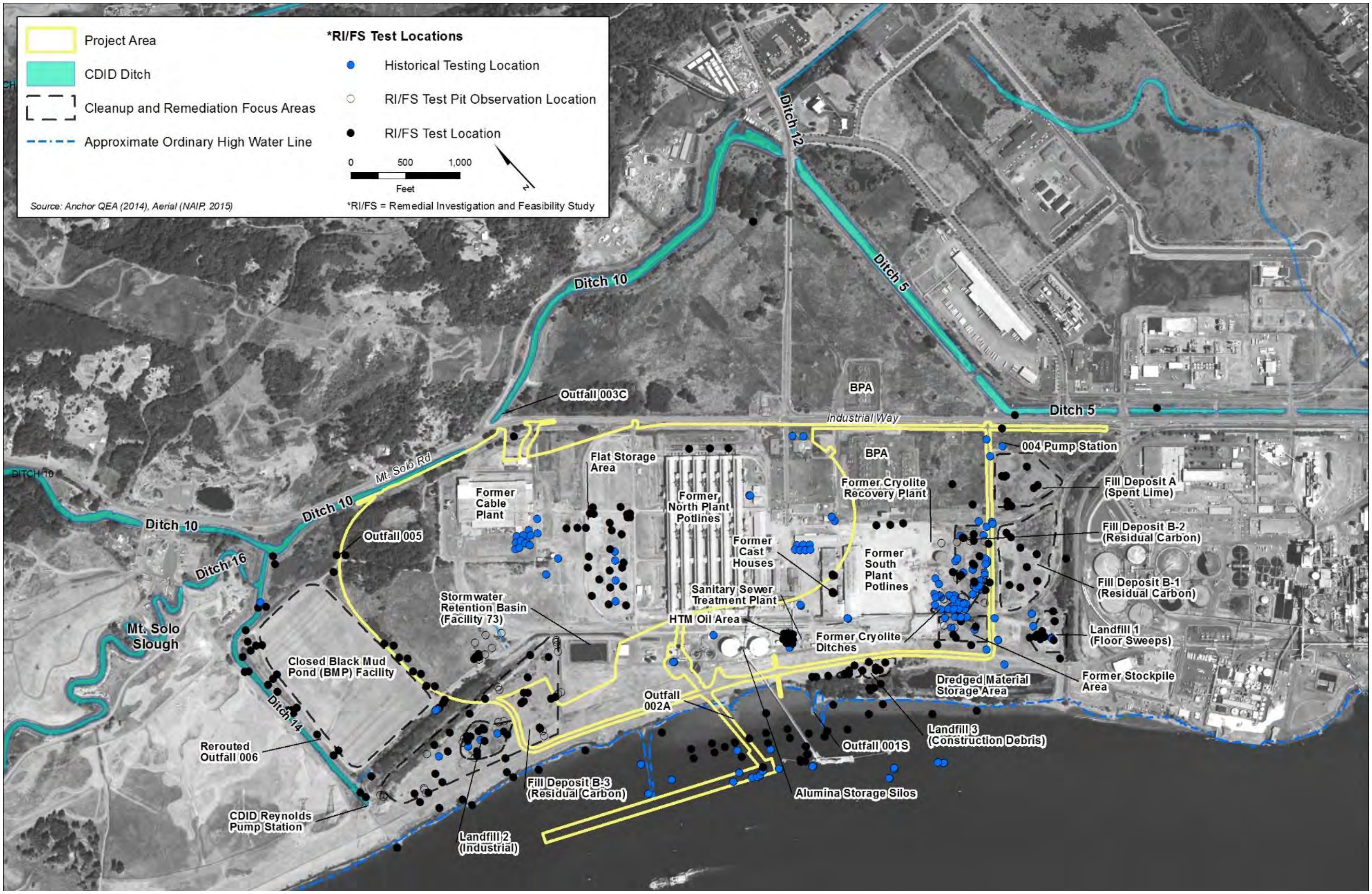
Groundwater Contamination

Historical operations in the study area have included the operation of various facilities, including an aluminum production facility, a cable plant, cryolite recovery, and industrial landfills (Figure 4.4-5).[2] Chapter 3, Section 3.6, *Hazardous Materials*, provides a history of contamination in the study areas. In the project area, groundwater samples show presence of cyanide, fluoride, polycyclic aromatic hydrocarbons, heavy metals and petroleum hydrocarbons.

In January 2015, a remedial investigation/feasibility study (RI/FS) (Anchor QEA 2014) was prepared per the requirements of the Washington State Model Toxics Control Act (MTCA), which is administered by the Washington State Department of Ecology (Ecology). The RI/FS provides a detailed description of cleanup and remedial actions in the study area (Anchor QEA 2014). Figure 4.4-5 shows the locations of previous cleanup and removal activities and remedial investigation focus areas.

[2] Landfills include six areas referred to as Landfills and Fill Deposits that were associated with the operation of the Reynolds aluminum smelter and were used for depositing such things as industrial waste, residual carbon, construction debris, floor sweeps and spent lime. Cleanup of these features is ongoing as a separate project.

Figure 4.4-5. Remedial Investigation Environmental Testing (Geologic, Hydrogeologic, and Geochemical) Locations



Source Areas and Chemicals of Concern (Deep and Shallow Aquifers)

Cyanide

Groundwater cyanide concentrations in the study area are very low and have been decreasing over time. Free cyanide concentrations in all samples taken in the western portion of the study areas were below the groundwater screening level of 0.2 milligram per liter.

Groundwater cyanide concentrations in samples collected in the eastern portion of the study area have also been decreasing over time. One groundwater sample, located near the Former Stockpile Area in the southeast corner of the study area in Figure 4.4-5, exceeded the groundwater Maximum Contaminant Level in 2006, but concentrations decreased significantly by the 2011 and 2012 sampling events. Free cyanide[3] concentrations in most of the eastern portion of the study area were below the groundwater screening level.

Fluoride

Fluoride concentrations in most of the Applicant's leased area are below groundwater screening levels. The exceptions are the shallow groundwater located in or immediately adjacent to Landfills 1 and 2 and fill deposits A, B-1, B-2 and B-3. Surface-water monitoring suggests that the fluoride present in the shallow groundwater is not affecting water quality in the adjacent CDID Ditches 10, 5, or 14 (Anchor QEA 2014).

Carcinogenic Polycyclic Aromatic Hydrocarbons

Carcinogenic polycyclic aromatic hydrocarbon (CPAH) concentrations from the western portion of the Applicant's leased area do not exceed groundwater screening levels. In the eastern portion of the Applicant's leased area, and outside the project area boundaries, CPAH concentrations were below groundwater screening levels in all locations except for wells located immediately within or adjacent to fill deposits. Three localized areas (purple circles on Figure 4.4-6) include wells located immediately adjacent to Landfill 1 and Fill Deposit B-2. CPAH concentrations in wells located farther downgradient were lower than the groundwater screening level and the surface water screening level.

Polychlorinated Biphenyls

No polychlorinated biphenyls (PCBs) were detected in any of the groundwater samples analyzed.

Heavy Metals

Test findings indicate that groundwater heavy metals concentrations are below applicable screening levels.

Volatile Organic Compounds

No volatile organic compounds were detected in any of the groundwater samples analyzed.

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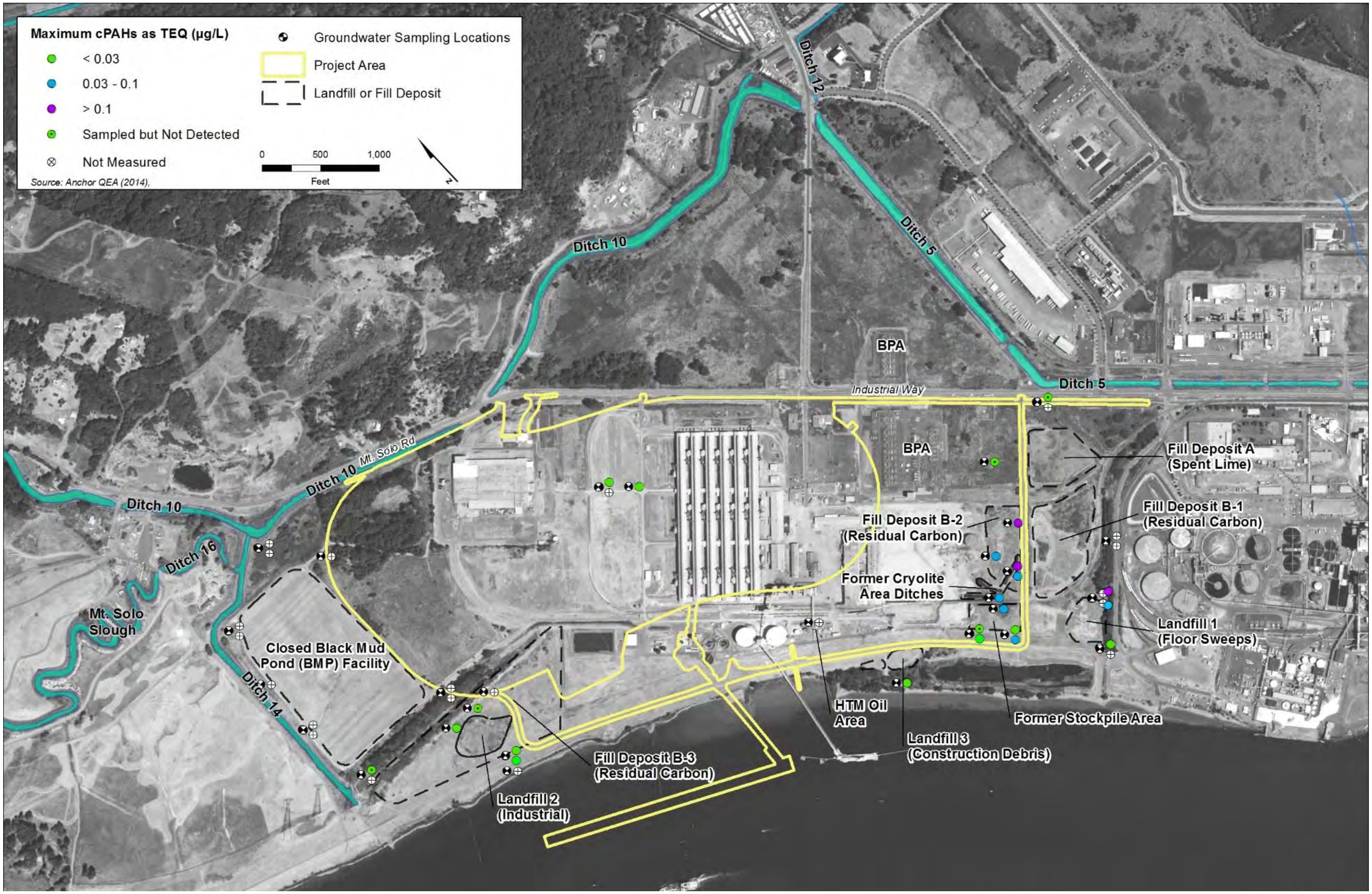
[3] Free cyanide refers to the sum of hydrogen cyanide (HCN) and cyanide ion (CN-) in a sample. Free cyanide is bioavailable and toxic to organisms in aquatic environments.

Figure 4.4-6. 2007–2012 Groundwater Testing Results (Total CPAHs as Toxic Equivalents)



Total Petroleum Hydrocarbons

The RI/FS testing program included analysis for total petroleum hydrocarbons (TPHs) in the HTM Oil Area (Figure 4.4.-5). All samples collected were below groundwater screening levels.

Distribution of Chemicals of Concern

Fluoride and cyanide levels found in the shallow groundwater within or immediately adjacent to Landfills 1, 2, and 3 have limited mobility and are not affecting downgradient groundwater (Anchor QEA 2014). Groundwater contaminated with fluoride and cyanide could occur during leaching when soils or solid media come into contact with the groundwater. However, the upward hydraulic gradients in the shallow aquifer cause dispersion of fluoride and cyanide and prevent migration into the north-south groundwater flows. This subsequently protects groundwater, surface water, and the Columbia River and limits fluoride and cyanide from traveling to the CDID #1 ditches. Fluoride and cyanide concentrations have been decreasing over time, since the closure of the former Reynolds Metal Company facility (Reynolds facility). It is unlikely that fluoride and cyanide in the study area affect the surrounding groundwater (Anchor QEA 2014).

Final Cleanup Actions

A draft MTCA Cleanup Action Plan for the study area, released in January 2016, describes the proposed cleanup actions that would protect human health and the environment, meet state cleanup standards, and comply with other applicable state and federal laws. Cleanup standards would be consistent with the current and anticipated future land use. Ecology's comment period on the draft MTCA Cleanup Action Plan ended March 18, 2016, and issuance of a final plan is pending. Although a final Cleanup Action Plan has not been determined, this section discusses the site-specific cleanup action requirements applicable to all the cleanup alternatives.

Table 4.4-2 shows the proposed cleanup levels, remediation levels, and conditional points of compliance for groundwater to be implemented as part of the Cleanup Action Plan (Anchor QEA 2014). Cleanup levels were based on MTCA equations or Applicable or Relevant and Appropriate Requirements (ARARs) to protect groundwater resources for the highest beneficial use (i.e., drinking water) (Anchor QEA 2014).

Table 4.4-2. Groundwater Cleanup Standards

Chemical of Potential Concern	Groundwater Cleanup Level	Protection Basis	Point of Compliance
Fluoride (dissolved)	4 mg/L	State Drinking Water MCL	Conditional point of compliance at property line and groundwater-ditch boundary
Free cyanide (dissolved)	200 μg/L	State Drinking Water MCL	Wells adjacent to where remedial action will occur
CPAHs	0.1 μg/L	MTCA Method A Standard Value	
TPH-D	500 μg/L	MTCA Method A Standard Value	
TPH-O	500 μg/L	MTCA Method A Standard Value	

Notes:
Source: Anchor QEA 2014
mg/L = milligrams per liter; MCL = Maximum Contaminant Level; μg/L = micrograms per liter;
CPAHs = carcinogenic polycyclic aromatic hydrocarbons; MTCA = Model Toxics Control Act; TPH-D = total petroleum hydrocarbon – diesel; TPH-O = total petroleum hydrocarbon – oil

4.4.4.4 Water Rights for the Project Area

The project area land owner, Northwest Alloys, holds several historical water rights to extract groundwater from the deep aquifer. The Applicant has a ground lease with Northwest Alloys that includes use of water rights. When issued, the total instantaneous withdrawal volume allowance under these water rights was 23,150 gpm and the total annual withdrawal allowance was 31,367 acre-feet per year (AFY) (Table 4.4-3). It is estimated the Applicant has an existing demand of 1.53 million gallons per day or approximately 1,063 gpm (Chaney pers. comm.). This is within the volume of the water rights that were issued in 1941, 1966, and 1967.[4] However, water rights relinquish back to the State of Washington if water rights are not used for 5 consecutive years without good cause (RCW 90.14.160). If the historical water rights have been relinquished, new water rights would need to be applied for by the Applicant or Northwest Alloys under the normal regulatory process.

[4] The Applicant is responsible for maintaining water rights. The EIS process did not verify whether water rights are current.

Table 4.4-3. Northwest Alloys' Water Rights Claims and Certificates

Record Number	Certificate Number	Withdrawal Instantaneous (gpm)	Withdrawal Annual (AFY)	Priority Date
Claims				
G2-006572CL	-	2,500	2,340	1941
G2-006573CL	-	2,500	2,340	1941
G2-006574CL	-	2,500	1,614	1941
Certificates				
G2-*02244CWRIS	01571	2,500	4,033	1966
G2-*08309CWRIS	06184	2,500	4,000	1966
G2-*08310CWRIS	06185	2,500	4,000	1966
G2-*08367CWRIS	06186	3,000	4,800	1966
G2-*08368CWRIS	06187	3,000	4,800	1966
G2-*09127CWRIS	06427	2,150	3,440	1967
Total		**23,150**	**31,367**	

Notes:
Source: URS Corporation 2014b.
gpm = gallons per minute; AFY = acre-feet per year

4.4.5 Impacts

This section describes the potential direct and indirect impacts related to groundwater that would result from construction and operation of the Proposed Action and the No-Action Alternative.[5]

4.4.5.1 Proposed Action

This section describes the potential impacts that could occur in the study areas as a result of construction and operation of the Proposed Action. All wastewater and stormwater generated in the project area and potentially discharged from the project area after treatment would be evaluated and characterized by the state. Once the water to be discharged has been accurately evaluated and characterized by the state, the specific standards for water discharged from the project area are then defined and the type of NPDES permit would be determined and issued.

Construction site preparation activities would involve preloading and installation of vertical wick drains to aid in the consolidation of low consistency silt and low-density sand (i.e., unconsolidated materials). Wick drains would direct groundwater from the shallow aquifer upward toward the surface during preloading, where it would discharge. Water discharged from the wick drains would be captured, tested for contaminants, and treated prior to discharge to any surface waters.

Process water supply for construction and operation of the Proposed Action would come from two sources: the on-site water management system during the wet season, and onsite groundwater wells during the dry season. Process water uses on the project area would include dust control, equipment

[5] Acreages presented in the impacts analysis were calculated using Geographic Information System (GIS), thus, specific acreage of impacts are an estimate of area based on the best available information.

washdown, and cleanup. Water for dust suppression would be applied on the main stockpiles, within unloading and conveying systems, and at the docks.

Construction activities that could impact groundwater include the following.

- Disturbance of surface soils during construction
- Release of hazardous and non-hazardous materials during construction
- Disturbance of previously contaminated sites
- Use of groundwater for dust control

Operational activities that could affect groundwater include the following.

- Alteration of surface runoff patterns
- Use of groundwater for dust control, equipment washdown, and cleanup

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Affect Groundwater Recharge during Construction

Construction of the Proposed Action would involve preloading and installing vertical wick drains that would direct groundwater from the shallow aquifer upward toward the surface during preloading, where it would discharge. Ground-disturbing activities (excavations, grading, filling, trenching, backfilling, and compaction) could temporarily disrupt the existing drainage and groundwater recharge patterns in the study area. The study area is not considered a major source of groundwater recharge of the deep aquifer. During construction, drainage and groundwater recharge patterns are expected to be similar to those of the existing conditions, with wick drain effluent and runoff directed to collection and treatment facilities and minimal infiltration to groundwater of the deep aquifer. Therefore, construction of the Proposed Action would not be expected to have a measurable impact on groundwater recharge patterns of the deep aquifer.

The shallow water aquifer in the project area is only minimally recharged by stormwater through surface infiltration due to the low recharge rates of soils in the study area (URS Corporation 2014c). During construction, impervious surfaces would be sloped to convey stormwater to collection sumps on the project area. The collected stormwater would then be conveyed to water collection facilities and discharged through a monitored internal outfall to existing facilities in the project area for treatment prior to discharge to the Columbia River (Outfall 002A). Therefore, construction of the terminal at the project area would be expected to slightly reduce groundwater recharge in the shallow aquifer. For more information on the NPDES Construction Stormwater Permit for the Proposed Action, see Section 4.5, *Water Quality*, and the *SEPA Water Quality Technical Report* (ICF 2017b).

Degrade Groundwater Quality during Construction

Any construction-related contaminant released on the ground could infiltrate and temporarily degrade groundwater quality if the contaminant were to reach groundwater. This would be a concern primarily for the shallow aquifer but not the deep aquifer because there is a confining, impervious soil unit consisting of clay and silt that separates the two aquifer systems, and the deep aquifer is primarily recharged by deeper aquifers below the Columbia River (Anchor QEA 2014) rather than surface infiltration. Poured concrete, cement, mortars, and other cement- or lime-containing construction material could alter the pH of stormwater, which could infiltrate the ground and affect the shallow aquifer water quality. Petro-chemicals could also be released through leaks and spills, which could infiltrate the ground and potentially reach groundwater. However, the likelihood of a large contaminant spill would be low with implementation of the best management practices that would be required as part of the NPDES Construction Stormwater Permit. In addition, cleanup efforts would begin immediately after a contaminant release, to prevent large amounts of contaminant from reaching groundwater and impairing water quality. By using prevention measures and best management practices, construction is not expected to degrade groundwater as a result of a contaminant release and no long-term effects are anticipated. Best management practices would include, but would not be limited to the following.

- **BMP C153.** Material delivery, storage and containment would be used to prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage.
- **BMP C154**. A concrete washout area would be constructed near the entrance to the project area to prevent or reduce the discharge of pollutants to groundwater or stormwater from concrete waste.

Site preparation activities would involve preloading and installation of vertical wick drains to aid in the consolidation of low consistency silt and low-density sand (i.e., unconsolidated materials). Wick drains would direct groundwater from the shallow aquifer upward toward the surface during preloading, where it would discharge. These activities could take place adjacent to areas where known groundwater contamination exists, and the contaminated groundwater could penetrate these areas. However, the permeability of the soil materials affected by preloading would be relatively low, and thus, would not be particularly susceptible to the infiltration of contaminated groundwater. Water discharged from the wick drains would be captured, tested for contaminants, and properly managed, and, if allowable, it would be treated prior to discharge to any surface waters. By adhering to best management practices, construction is not expected to degrade groundwater as a result of preloading and vertical wick drains and no long-term effects are anticipated.

Construction of the Proposed Action could encounter previously contaminated areas currently identified in the MTCA Cleanup Action Plan, which could degrade groundwater quality. However, with the exception of two small areas—the eastern corner of the Flat Storage Area and the northeastern portion of Fill Deposit B-3 (Figure 4.4-5)—cleanup actions are not recommended in the draft Cleanup Action Plan within the project area. For the Flat Storage Area and Fill Deposit B-3, construction and remediation activities would be coordinated to prevent spread of contamination or environmental impacts. Fluoride and cyanide levels found in shallow groundwater have limited mobility and do not affect downgradient groundwater or surface water quality. Therefore, construction of the Proposed Action is not expected to degrade groundwater as a result of disturbing previously contaminated areas.

Construction of the Proposed Action would be unlikely to affect the wellfield at the Mint Farm Industrial Park, which is located upgradient and approximately 1.14 miles (6,000 feet) away from the project area. However, the project area is in Zone 2 of the Mint Farm Industrial Park's wellhead protection and sanitary control areas (Figure 4.4-7).[6] The wellfield draws water from the deep aquifer, which is protected by a confining, impervious soil unit consisting of clay and silt that separates the two aquifer systems, and the deep aquifer is primarily recharged by deeper aquifers below the Columbia River. So it would be unlikely that contaminants from a spill would reach the groundwater withdrawn by the wellfield.

Affect Groundwater Supply during Construction

Construction of the Proposed Action would require groundwater from on-site wells for dust suppression. The maximum amount of water that would be used for dust suppression is estimated to be 40,000 gallons per day (44.8 AFY). Combined with demand from existing activities in the project area of 1,994 AFY, the total demand for groundwater during construction would be approximately 2,039 AFY. As stated previously, Northwest Alloys holds water rights that originally authorized extraction from on-site wells of approximately 23,150 gpm or 31,367 AFY. The EIS does not verify the amount of Northwest Alloys' water rights; verification will occur outside of the environmental review process. Water demand for construction-related activities and existing operations would together represent approximately 6.5% of the original Northwest Alloys' groundwater extraction rights, which would be an increase of approximately 2% over current groundwater extraction. Therefore, construction of the Proposed Action would have a negligible impact on groundwater supply.

Excavation activities could intersect groundwater in low-lying areas, which could result in temporary fluctuations in shallow groundwater in the immediate area. Dewatering effluent would be pumped to temporary containment tanks for settling, where it would be tested for pollutants before being discharged to receiving waters. If pollutants are encountered during testing, dewatering would be suspended and Ecology would be notified. Contaminated water would be treated before being discharged to receiving waters.

Construction—Indirect Impacts

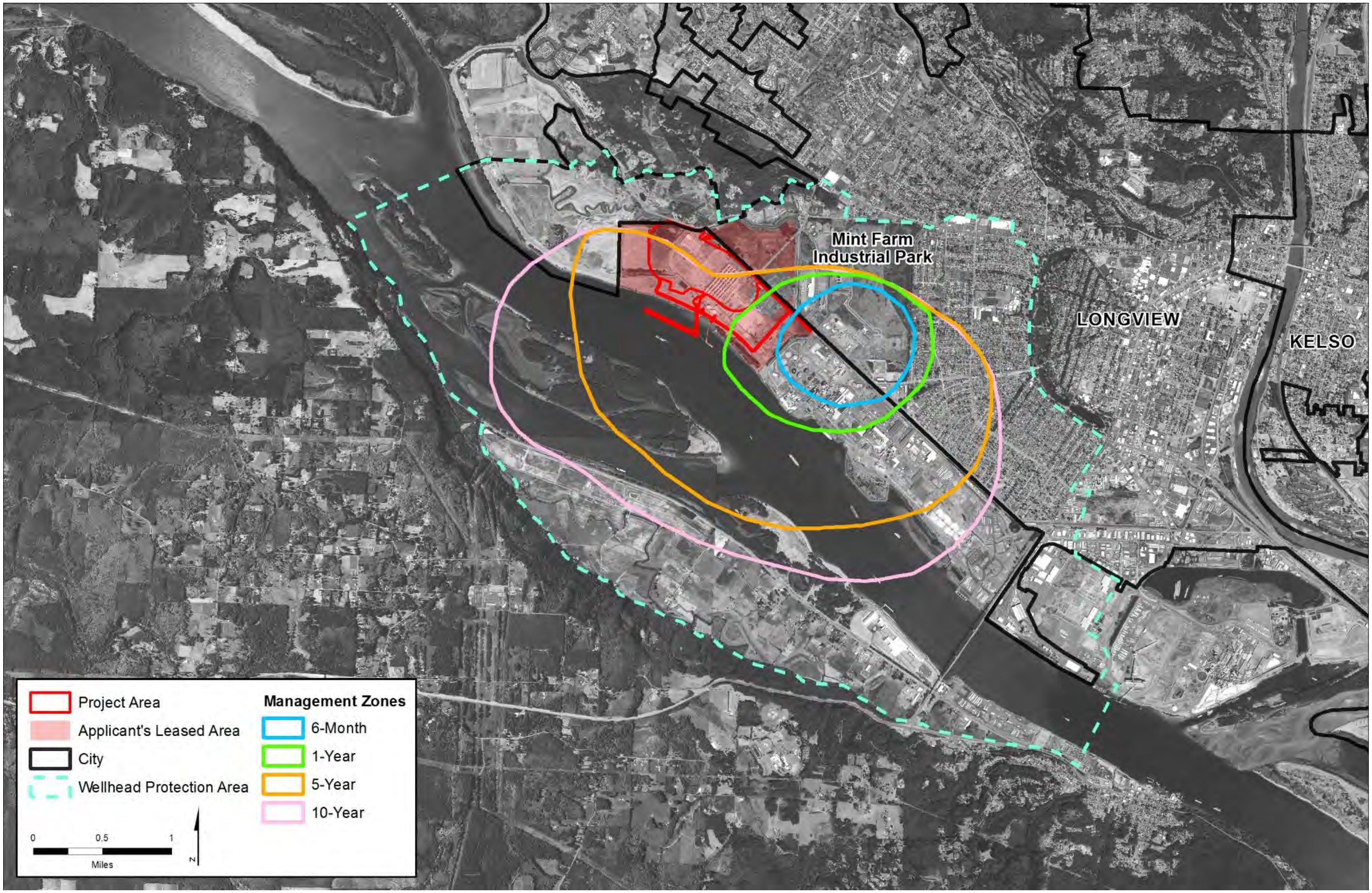
Construction of the Proposed Action would not result in indirect impacts on groundwater because construction would be limited to the project area and would not occur later in time or be farther removed in terms of distance than the direct impacts.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

[6] In Washington State, wellhead protection areas are based on horizontal time-of-travel rates for groundwater. Zone 2 areas are based on a 5-year time-of-travel for groundwater.

Figure 4.4-7. City of Longview Wellhead Protection Area



Affect Groundwater Recharge during Operations

Operation of the terminal could permanently reduce infiltration due to soil compaction and new impermeable surfaces, such as coal stockpile pads, roads, or buildings.[7] The project area would occupy some of the existing drainage basins in the project area (Figure 4.2-3), effectively eliminating a portion of the runoff presently handled under the Applicant's existing NPDES Industrial Stormwater Permit.

The Applicant would be required to obtain an NPDES Industrial Stormwater Permit for stormwater collection and discharge. However, the project area is not an important source of groundwater recharge due to relatively impermeable soils (URS Corporation 2014c). In addition, runoff is currently collected in a ditch system and operating the proposed terminal would not substantively change these conditions; the primary source of shallow groundwater recharge in the project area would continue to be the Columbia River, and the direction and volume of groundwater recharge from the Columbia River is expected to be relatively constant. Overall, operation of the terminal under the On-Site Alternative is not expected to substantially change shallow groundwater recharge volumes or patterns in the project area.

Operations would not be expected to measurably affect groundwater recharge for the deeper aquifer because the deep aquifer is primarily recharged by deeper aquifers below the Columbia River (Anchor QEA 2014).

Degrade Groundwater Quality during Operations

Contaminants and coal dust generated during operations could degrade groundwater quality if contaminated runoff were to infiltrate the ground and reach groundwater. However, as described under the previous impact discussion, the project area is not considered a significant source of groundwater recharge through infiltration because of the low recharge rates of the soil characteristics in the study area (URS Corporation 2014c), limiting contaminant movement into the ground. In addition, runoff from the study area, and contaminants within that runoff, would be directed to on-site drainage systems, treated, and possibly reused on site or discharged in accordance with an NPDES Industrial Stormwater Permit for the export terminal. Water reused on site would be brought to Washington State Class A Reclaimed Water standards (URS Corporation 2014c). Excess water not reused on site would be further treated and tested prior to being routed to outfalls regulated by an NPDES Permit and discharged to the Columbia River. Discharge of water to the Columbia River during operation of the Proposed Action would mostly occur during the rainy season from fall through spring when excess surface water would be more likely to be generated on site.

Furthermore, as discussed in Section 4.5, *Water Quality*, the following project design and best management practices would be part of the Proposed Action design to maximize the protection of surface-water quality (and thus, groundwater via infiltration).

- Enclosed conveyor galleries (approximately one-third of the conveyors would be enclosed).
- Enclosed rotary unloader building and transfer towers.

[7] The project area covers 190 acres which is currently mostly developed with impervious surfaces. During operations, all area within the 190 acres is considered impervious for water management.

- Washdown collection sumps for settlement of sediment.
- Regular cleanout and maintenance of washdown collection sumps.
- Containment around refueling, fuel storage, chemicals, and hazardous materials.
- Oil/water separators on drainage systems and vehicle washdown pad.
- Requirement that all employees and contractors receive training, appropriate to their work activities, in the best management practices.
- Design of docks to contain spillage, with rainfall runoff and washdown water contained and pumped to the upland water treatment facilities.
- Design of systems to collect and treat all runoff and washdown water for on-site reuse (dust suppression, washdown water or fire system needs) or discharge off site.

Since water collected during operations would be treated before reuse or discharge to the Columbia River and would be unlikely to infiltrate, groundwater quality would not likely be affected by operation of the Proposed Action.

The potential for coal dust to affect groundwater would be relatively low because of the low permeability of the soils in the study area (URS Corporation 2014c), the propensity for soil to filter out coal dust suspended in water, and treatment of on-site stormwater runoff. It would be unlikely that coal dust would come into contact with groundwater.

The potential for toxic constituents of coal to reach groundwater is also relatively low. Toxic constituents of coal include CPAHs 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 (see Section 4.5, *Water Quality*, for coal constituents of Powder River and Uinta Basin coal). The potential risk for exposure to toxic chemicals contained in coal would be relatively low as these chemicals tend to be bound in the matrix structure and not quickly or easily leached. See Section 4.5, *Water Quality*, and Chapter 5, Section 5.7, *Coal Dust*, for more information.

Operation of the Proposed Action is not expected to encounter or disturb previously contaminated areas being addressed by the MTCA Cleanup Action Plan. If contaminated areas are encountered, remediation activities would be carried out in accordance with relevant regulations and coordinated to avoid exposure to the environment.

Overall, operation of the proposed coal export terminal is not expected to degrade groundwater quality due to the low recharge rates of soil in the project area. Surface runoff treatment would minimize any infiltration of contaminant-laden runoff into the ground.

Affect Groundwater Supply during Operations

Process water, i.e., water that would be used during operations for dust control, and equipment washdown would be supplied from two sources: the on-site water management system during the wet season and on-site groundwater wells during the dry season.

The on-site water management system would provide process water in the following ways.

- Stormwater and surface water (washdown water) would be collected from the stockpile areas, rail loop, office areas, docks, and other paved surfaces in the project area and directed to a series of vegetated ditches and ponds, then to a collection basin or sump.
- The collected water would be pumped to an onsite treatment facility consisting of retention pond(s) with flocculent added to promote settling as required.
- The water would then be pumped to a surface storage pond. The surface storage pond would have an approximate capacity of 3.6 million gallons (MG), including a reserve of 0.36 MG for fire suppression.

Approximately 1,200 gpm during the wet season and 2,000 gpm during the dry season (approximately 2,034 AFY) would normally be required for dust suppression. On-site groundwater wells would provide approximately 635 gpm (1,025 AFY) to maintain minimum water levels in the storage pond to meet process water demands during the dry season. Water from the storage pond could also be used for the fire hydrant, sprinklers and deluge systems, watering of landscaping and other non-recyclable uses. Northwest Alloys holds water rights that originally authorized extraction of 23,150 gpm up to a total volume of 31,367 AFY. The EIS does not verify the amount of Northwest Alloys' water rights; verification will occur outside of the environmental review process. Combined with the groundwater demand from existing activities in the study area (approximately 1,994 AFY), operation of the Proposed Action would require approximately 3,019 AFY, an increase of approximately 51% over existing groundwater demands. The total demand accounts for less than 10% of the maximum pumping limit allowed under original water rights. Therefore, operation of the Proposed Action would have a negligible impact on groundwater supply. The Applicant would ensure that water rights are current before withdrawing any water for construction or operations; water rights would be maintained for ongoing groundwater use during operation of the Proposed Action. If stormwater is collected and used for a beneficial use, a Water Right Permit would be required in accordance with Chapter 90.03 RCW.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts on groundwater related to facility operations in the direct impacts study area and increased rail traffic (up to 240 unit trains[8] arriving and departing per month) on the BNSF Spur and Reynolds Lead within the direct and indirect impacts study areas. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

Degrade Groundwater Quality during Operations

The Proposed Action likely would not affect groundwater at the wellfield at the Mint Farm Industrial Park because the wellfield draws water from the deep aquifer and, as previously mentioned, there is a confining impervious layer of clay and silt separating the two aquifers. Therefore, it would be unlikely contaminants from a spill during operations would reach the groundwater aquifers tapped by the wellfield. The majority of the study area is located in Zone 2

[8] A unit train is a train in which all cars carry the same commodity and are shipped from the same origin to the same destination. Proposed Action-related unit trains would consist of approximately 125 rail cars and three locomotives.

of the Mint Farm Industrial Park's wellhead protection and sanitary control areas (Figure 4.4-7). Although it would be highly unlikely a contaminant would reach the deep aquifer, should a spill or contaminant release occur during operations, cleanup would occur rapidly. In addition, surface water generated within the study area would be collected and reused on site or treated before being discharged to the Columbia River, further minimizing the potential for contaminants to infiltrate the ground.

Degrade Groundwater Quality as a Result of a Train Collision or Derailment

Spills of fuel or other potentially hazardous materials could occur along the rail spur if rail cars were to collide and/or derail within the study area. Materials released onto the ground as a result of a fuel spill could degrade groundwater quality. As discussed in Chapter 3, Section 3.6, *Hazardous Materials*, if a release of hazardous materials or fuel spill occurred, the rail operator would implement emergency response and cleanup actions as required by Occupational Safety and Health Administration rules (29 Code of Federal Regulations [CFR] 1910.120), the Washington State Oil and Hazardous Substance Spill Prevention and Response regulations (Revised Code of Washington [RCW] 90.56), and/or the Model Toxic Control Act Cleanup Regulations (Chapter 173-340 Washington Administrative Code [WAC]). In addition, Federal Railroad Administration accident reporting requirements (49 CFR 225) include measures to prevent a spill of fuel or other potentially hazardous material from affecting groundwater quality through quick response, containment and cleanup. A spill or release of hazardous materials or fuels would not be expected to affect groundwater.

4.4.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal and would continue with current operations in the project area. The project area could be developed for other industrial uses including an expanded bulk product terminal or other industrial uses that would not require a permit from the U.S. Army Corps of Engineers (Corps) (i.e., would not affect waters of the United States). Because existing industrial import and export activities would be expanded, potential impacts on water quality of groundwater would be similar to those described for the Proposed Action regarding potential oils and grease spills from equipment or other raw materials shipped from the coal export terminal. An NPDES Industrial Stormwater Permit would be required to regulate stormwater discharges to the Columbia River, which would maintain water quality of groundwater.

Any new or expanded industrial uses would trigger a new NPDES or modified permit. Upland buildings could be demolished and replaced for new industrial uses. Ground disturbance would not result in any impacts on waters of the United States and would not require a permit from the Corps. Any new impervious surface area would generate stormwater, but all stormwater would be collected and treated to meet state and federal water quality requirements prior to discharge to the Columbia River. Groundwater recharge in the study area is primarily from the Columbia River, thus maintaining water quality in the Columbia River would be expected to maintain water quality of groundwater within the study area.

4.4.6 Required Permits

The following required permits would be required for groundwater.

- **Cowlitz County Critical Areas Permit—Cowlitz County**. The Cowlitz County Critical Areas permit would be needed to address compliance with the County's Critical Areas Ordinance related to the presence and protection of Critical Aquifer Recharge Areas located on site.
- **Clean Water Act Section 401 Water Quality Certification—Washington State Department of Ecology.** This certification would be required to ensure impacts from construction and operation of the Proposed Action to groundwater quality would not violate state water quality standards.
- **National Pollution Discharge Elimination System Construction Stormwater Permit—Washington State Department of Ecology.** The NPDES Construction Stormwater Permit would be required for stormwater discharges during construction of the Proposed Action. All wastewater and stormwater generated in the project area and potentially discharged from the project area after treatment would be evaluated and characterized by the state. Once the water to be discharged has been accurately evaluated and characterized by the state, the specific standards for water discharged from the project area would be defined and the type of NPDES permit would be determined and issued.
- **National Pollution Discharge Elimination System Industrial Stormwater Permit—Washington State Department of Ecology**. The NPDES Industrial Stormwater Permit would be required for stormwater discharges related to operation of the Proposed Action. All wastewater and stormwater generated in the project area and potentially discharged from the project area after treatment would be evaluated and characterized by the state. Once the water to be discharged has been accurately evaluated and characterized by the state, the specific standards for water discharged from the project area would be defined and the type of NPDES permit would be determined and issued.
- **Water Rights—Washington State Department of Ecology.** The Applicant will need to ensure the original water rights are valid and in good standing prior to using those rights. If the water rights are valid, it is the Applicant's or Northwest Alloys' responsibility to maintain those water rights in good standing. If these water rights are partially or fully relinquished, the Applicant must apply for and obtain the necessary water rights to legally put water to beneficial use at the project site. If stormwater is collected and reused for a beneficial use, a Water Right Permit would be required in accordance with Chapter 90.03 RCW.

4.4.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to groundwater from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

4.4.7.1 Applicant Mitigation

The Applicant will implement the following measure to mitigate impacts on groundwater.

MM WQ-1. Locate Spill Kits Near Main Construction and Operation Areas

The Applicant will locate spill response kits throughout the project area during construction and operations. The spill response kits will contain response equipment and personal protective equipment appropriate for hazardous materials that will be stored and used during construction and operations. Site personnel will be trained in the storage, inventory, and deployment of items in the spill response kits. Spill response kits will be checked a minimum of four times per year to ensure proper-functioning condition, and will otherwise be maintained and replaced per manufacturer recommendations. Should a spill response kit be deployed, the Applicant will notify Cowlitz County and Ecology immediately. The Applicant will submit a map indicating the types and locations of spill response kits to Cowlitz County and Ecology for approval prior to beginning construction and operations.

4.4.8 Unavoidable and Significant Adverse Environmental Impacts

Compliance with laws and implementation of mitigation measures and design features described above would reduce impacts on groundwater. There would be no unavoidable and significant adverse environmental impacts on groundwater.

4.5 Water Quality

Surface water is used for a wide range of purposes, including wildlife habitat, industrial process water, drinking water, irrigation, flood control, and recreational activities. The quality of these resources refers to the physical, chemical, biological, and aesthetic characteristics of the water body. Water quality can be degraded by contaminants introduced through domestic, industrial, and agricultural practices. Water quality impacts can occur with changes in turbidity, suspended sediment, and temperature, and the introduction of a variety of physical and chemical pollutants.

This section describes water quality in the study area. It then describes impacts on water quality that could result from construction and operation of the Proposed Action and No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

4.5.1 Regulatory Setting

Laws and regulations relevant to water quality are summarized in Table 4.5-1.

Table 4.5-1. Regulations, Statutes, and Guidelines for Water Quality

Regulation, Statute, Guideline	Description
Federal	
Clean Water Act (33 USC 1251 et seq.)	Authorizes EPA to establish the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.
Safe Drinking Water Act (42 USC 300f et seq.)	Requires the protection of groundwater and groundwater sources used for drinking water. Also, requires every state to develop a wellhead protection program. EPA is the responsible agency.
National Pollutant Discharge Elimination System Permit (40 CFR 122)	Controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Authorized by the Clean Water Act. EPA is the responsible agency but typically delegates authority to state resource agencies.
National Pollutant Discharge Elimination System Vessel General Permit	Regulates incidental discharges from the normal operation of vessels. These incidental discharges include, but are not limited to, ballast water, bilge water, graywater (e.g., water from sinks, showers), and antifoulant paints (and their leachate). Such discharges, if not adequately controlled, may result in negative environmental impacts via the addition of traditional pollutants or, in some cases, by contributing to the spread of aquatic invasive species. Authorized by the Clean Water Act. EPA is the responsible agency.

Regulation, Statute, Guideline	Description
Ballast Water Management (33 CFR 151)	Establishes ballast discharge standards and vessel requirements to meet those ballast discharge standards. The U.S. Coast Guard is the responsible agency. Such discharges, if not adequately controlled by these regulatory requirements, may result in the spread of organisms that may adversely affect the environment.
Washington State	
Clean Water Act Section 401 Water Quality Certification	Ecology issues Section 401 Water Quality Certification for activities, which may result in any discharge into waters of the state to ensure compliance with state water quality standards and other aquatic resources protection requirements under Ecology's authority as outlined in the federal Clean Water Act.
Drinking Water/Source Water Protection (RCW 43.20.050)	Ensures safe and reliable public drinking water supplies in cooperation with local health departments and water purveyors. Ecology is the responsible agency.
Model Toxics Control Act (RCW 70.105D)	Requires potentially liable persons to assume responsibility for cleaning up contaminated sites. Ecology is the responsible agency.
State Water Pollution Control Law (RCW 90.48)	Provides Ecology with the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland water, salt waters, watercourses, and other surface and groundwater in the state.
Water Resources Act of 1971 (RCW 90.54)	Sets forth fundamental policies for the state to ensure that waters of the state are protected and fully used for the greatest benefit. Ecology is the responsible agency.
Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A)	Establishes water quality standards for surface waters of the state of Washington. Ecology is the responsible agency.
Ballast Water Management (RCW 77.120)	Governs discharge of ballast water into waters of the state. Includes reporting and testing requirements. WDFW is the responsible agency.
National Pollutant Discharge Elimination System Permit Program (WAC 173-220)	Establishes state individual permit program for discharge of pollutants and other wastes and materials to surface waters of the state.
Model Toxics Control Act – Cleanup Regulation (WAC 173-340-300)	Requires reporting of hazardous substance releases if they may constitute a threat to human health or the environment.
Sediment Management Standards (WAC 173-204)	Establishes administrative procedural requirements and criteria to identify, screen, evaluate and prioritize, and cleanup contaminated surface sediment sites.
Washington State Oil and Hazardous Substance Spill Prevention and Response (RCW 90.56)	Requires notification of releases of hazardous substances and establishes procedures for response and cleanup
Oregon State	
Treatment Requirements and Performance Standards for Surface Water, Groundwater Under Direct Influence of Surface Water, and Groundwater (OAR 333-061-0032)	Establishes water quality standards for groundwater to meet current state and federal safe drinking water standards. Oregon DEQ is the responsible agency.
Oregon Drinking Water Quality Act (ORS 448.119 to 448.285; 454.235; and 454.255) (applicable to Columbia River)	Ensures safe and reliable public drinking water supplies in cooperation with local health departments and water purveyors. Oregon DEQ is the responsible agency.

Regulation, Statute, Guideline	Description
Water Quality Standards: Beneficial Uses, Policies, And Criteria for Oregon Oregon State Legislature: Turbidity Rule (OAR 340-041-0036)	Establishes the following turbidity standard: No more than a 10% cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity-causing activity. However, limited-duration activities to address an emergency, essential dredging, construction, or other legitimate activities that cause the standard to be exceeded may be authorized, provided all practicable turbidity control techniques have been applied. Oregon DEQ is the responsible agency.
Local	
Cowlitz County Stormwater Ordinance (CCC 16.22)	Establishes minimum standards to guide and advise all who make use of, contribute to, or alter the surface waters and stormwater drainage systems in the County.
Cowlitz County (CCC 19.15)	Requires the County to designate critical areas such as wetlands; aquifer recharge areas; geologically hazardous areas; fish and wildlife habitat; and frequently flooded areas; and adopt development regulations to assure the protection of such areas.
Cowlitz County Phase II Municipal Stormwater Management Plan	Requires Cowlitz County to develop a SWMP and update it at least annually. The SWMP incorporates best management practices to reduce the discharge of pollutants from the regulated area to the maximum extent practicable in order to protect water quality.
City of Longview Stormwater Ordinance	Establishes methods for controlling the introduction of runoff and pollutants into the municipal storm drain system (MS4) in order to comply with requirements of the Western Washington Phase II Municipal Stormwater NPDES Construction Stormwater Permit process.

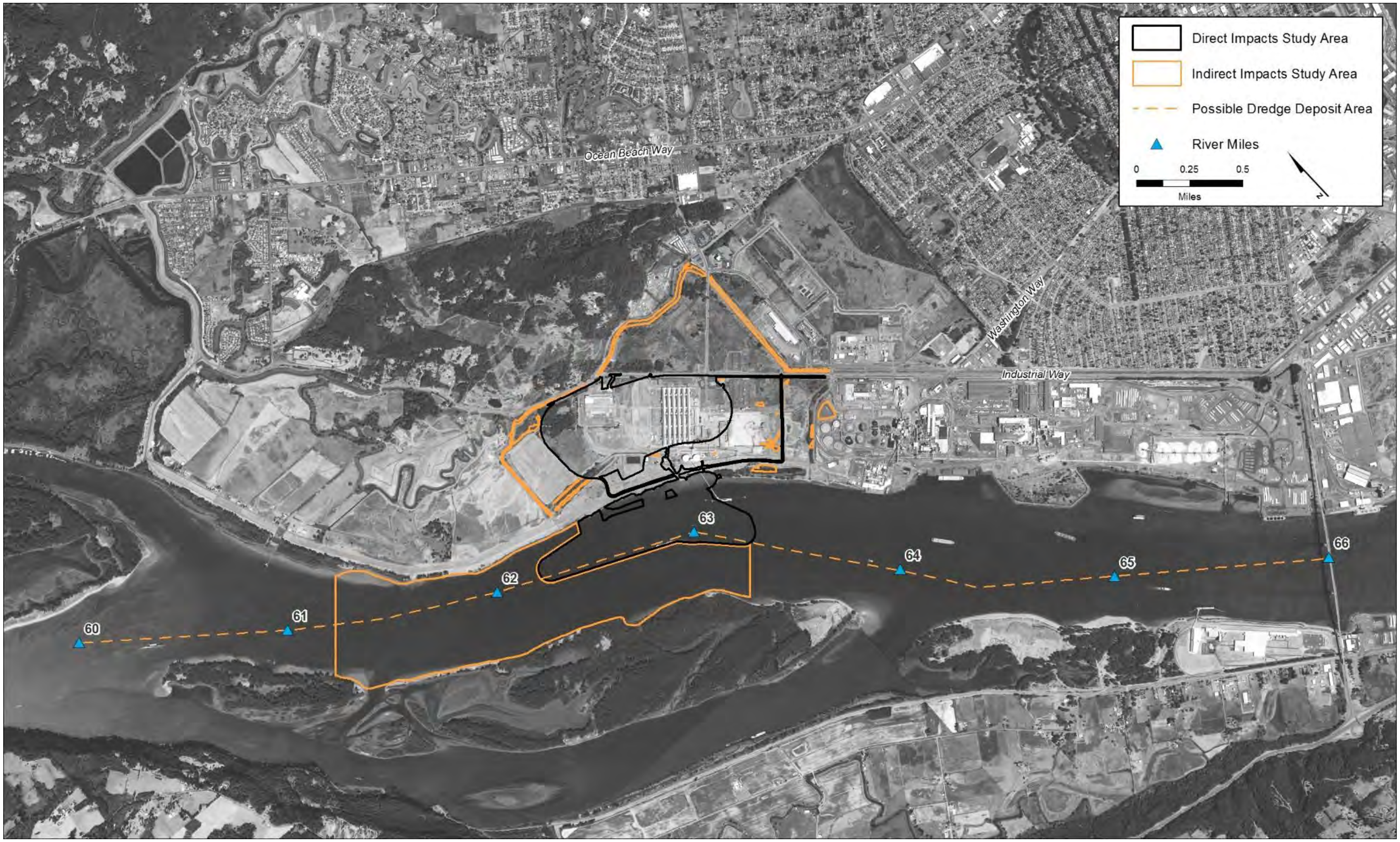
Notes:
USC = United States Code; EPA = U.S. Environmental Protection Agency; CFR = Code of Federal Regulations; RCW = Revised Code of Washington; Ecology = Washington State Department of Ecology; WAC = Washington Administrative Code; WDFW = Washington Department of Fish and Wildlife; OAR = Oregon Administrative Rules; Oregon DEQ = Oregon Department of Environmental Quality; ORS = Oregon Revised Statutes; CCC = Cowlitz County Code; SWMP = stormwater management plan

4.5.2 Study Area

The study area for direct impacts on water quality is the project area and an area extending 300 feet from the project area into the Columbia River. This portion of the study area accommodates the analysis of in-water construction and dredging impacts on water quality and sediment quality associated with suspended sediment and elevated turbidity. The study area also incorporates potential in-river dredged material disposal sites and the area extending 300 feet downstream of each disposal site (Figure 4.5-1).

The study area for indirect impacts on water quality incorporates the project area, the Consolidated Diking and Improvement District (CDID) #1 stormwater system drainage ditches adjacent to the project area, the Columbia River up to 1 mile downstream of the project area, and potential in-river dredged material disposal sites plus an area extending 300 feet downstream of each disposal site.

Figure 4.5-1. Water Quality Study Area



4.5.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on water quality associated with the construction and operation of the Proposed Action and No-Action Alternative.

4.5.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on water quality in the study area.

- Reports on baseline water conditions at the project area and Columbia River (Anchor QEA 2014; Oregon Department of Environmental Quality 2012; Washington State Department of Ecology 2014; Grette 2014a, 2014b, 2014c; URS Corporation 2014)
- Reports on the salmon populations in the Columbia River (Ewing 1999; National Marine Fisheries Service 2011)
- Report on toxics in the Columbia River (U.S. Environmental Protection Agency 2009)
- Beneficial and recreational uses of the Columbia River (Oregon Department of Environmental Quality 2003; Oregon State Marine Board 2012)

4.5.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on water quality.

The analysis of direct construction impacts was based on peak construction period, while operations impacts were based on maximum throughput capacity (up to 44 million metric tons per year). Potential water quality impacts were evaluated with respect to existing water quality conditions and Proposed Action-related water usage and discharge. The assessment of impacts also assumes the Proposed Action would comply with all laws and regulations regarding water quality and sediment quality including new state water quality standards, required National Pollution Discharge Elimination System (NPDES) permits, and verification of water rights. Potential impacts on water quality of groundwater resources are covered in Section 4.4, *Groundwater*. For direct impacts, the analysis assumes best management practices, as required by permits and identified in Appendix E, *Design Features*, were incorporated into the design, construction, and operation of the Proposed Action.

4.5.4 Existing Conditions

This section describes the existing environmental conditions in the study area related to water quality that could be affected by construction and operation of the Proposed Action and the No-Action Alternative.

The project area is located along the north shore of the Columbia River and lies within CDID #1. The project area is drained by a system of ditches, which provide treatment of stormwater before it is discharged to the Columbia River and CDID #1 (Ditches #10 and #14).

4.5.4.1 Project Area Characteristics

The water quality characteristics of the project area are described in this section.

Drainage

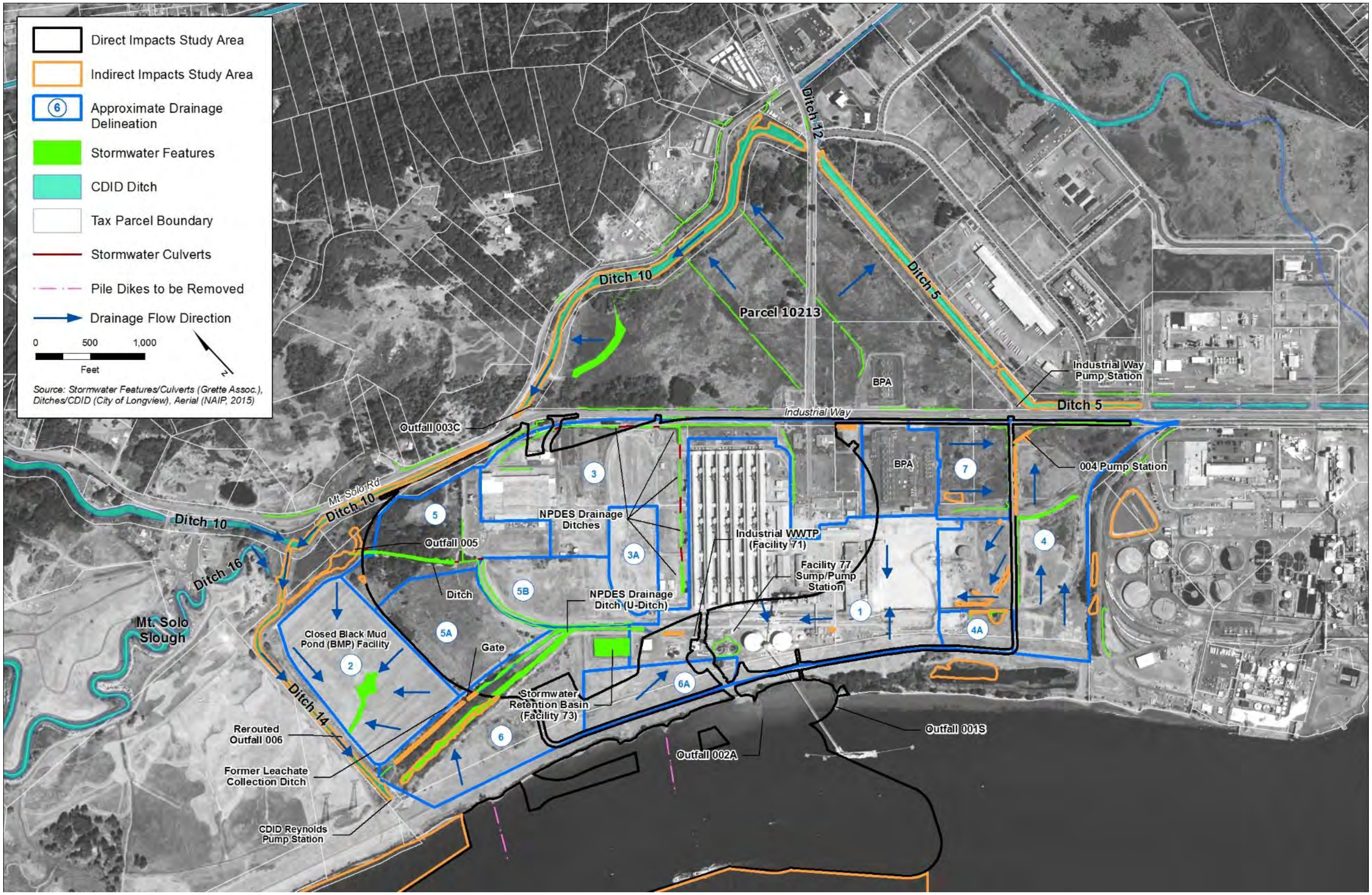
Stormwater and shallow groundwater drainage for the project area are controlled by a system of ditches, pump stations, treatment facilities, and outfalls, shown in Figure 4.5-2. All of these facilities operate under a single NPDES Industrial permit. Project area drainage is either held on site until it evaporates, discharged to surrounding CDID #1 ditches (Ditches 10 and 14), collected, treated and discharged through Outfall 002A to the Columbia River.

The following is a brief description of drainage components in the Applicant's leased area.

- **Sheet flow and infiltration.** Subbasins 4A, 5, 5A, 5B, 6A, and 7 receive sheet flow from storm events where it subsequently infiltrates or evaporates.
- **Columbia River discharge.** Subbasins 1, 2, 3A, 4, and 6 are conveyed via pumped systems or gravity to Facility 73, where they are treated and then discharged to the Columbia River via Outfall 002A.
- **CDID #1 discharge.** Subbasin 3 flows through a vegetated ditch that discharges to Ditch 10 through Outfall 003C. During larger storm events, overflow from Subbasin 2 and Subbasin 5 can discharge to the CDID #1 ditch system. Subbasin 2 overflows would discharge to Ditch14 through Outfall 006. This is a designed overflow system and it is equipped with a high flow alarm to alert staff when it is activated. Subbasin 5 flows can enter a vegetated ditch that discharges to Ditch 10 through Outfall 005. Ultimately, all CDID #1 ditch flows discharge to the Columbia River.
- **Drainage features on Parcel 10213**. These features include three vegetated ditches, two unvegetated ditches, and a shallow depression, which may collect stormwater. Two of the vegetated ditches run north-south across the two larger portions of Parcel 10213. They are narrow and linear and convey stormwater to a culvert approximately 16 inches in diameter located at the north end of these ditches which then empties into Ditch 10. The third vegetated ditch consists of three segments of linear vegetated ditches adjacent to Industrial Way. These three ditches are connected by two culverts that are beneath the site's access roads. This feature likely collects stormwater from Industrial Way and adjacent areas and conveys it to Ditch 10.

  One unvegetated ditch runs parallel to Ditch 10 and consists of two sections of a narrow ditch that was likely constructed to intercept shallow groundwater that was affecting agricultural use of the site. This unvegetated ditch is several feet deep, near vertical along its sides, and is bisected by one of the vegetated ditches that runs parallel across the site; however, there is no surface hydrology connection between these two ditches. The other unvegetated ditch serves as the outlet channel for the stormwater pond. This ditch is located at the northeast end of the stormwater pond and conveys excess stormwater from the pond to Ditch 10 through a 16-inch culvert. All six features are privately owned and are not managed by CDID #1.

Figure 4.5-2. Drainage Features of the Proposed Action



Consolidated Diking Improvement District # 1

The project area is served by the CDID #1 system of levees and ditches, which protect the project area from flooding. Water from Ditches 5, 10, and 14 in the study area was tested in 2006, 2011, and 2012 to determine levels of cyanide and fluoride (contaminants associated with the site cleanup). Total Suspended Solids were also tested. The results showed that water quality standards were met and there were no water quality exceedances or violations of established Washington State water quality standards (Anchor QEA 2014). The entire CDID #1 ditch system discharges to the Columbia River.

Columbia River

The Columbia River flows along the southwest project area boundary. Near the project area, the river is fresh water but is tidally influenced. The project area is located at river mile 63. The river's discharge rate fluctuates with precipitation, snowmelt, and reservoir releases. Flows in the river range from a low of about 63,600 cubic feet per second (cfs) to a maximum flow of about 864,000 cfs depending on conditions in the watershed (U.S. Geological Survey 2014). The Columbia River's annual cycle is driven by snowmelt and the general climate of the Pacific Northwest, which produces high flows during the spring snowmelt period and low flows during the late summer and early fall. The river's flow, however, is highly managed through operation of the many hydroelectric and irrigation dams that exist throughout the basin. The average annual discharge ranges from about 120,000 cfs during a low water year to about 260,000 cfs during a high water year (Washington State Department of Ecology 2016a).

Surface water quality in the Columbia River is influenced by geology, point-source and nonpoint-source pollution, groundwater, and the natural flow regime. In 2009, the U.S. Environmental Protection Agency (EPA) listed the Columbia River in Washington's Water Resources Inventory Area (WRIA) 25 (which includes the project area) on the federal Clean Water Act Section 303(d) list as exceeding water quality criteria for certain parameters. Portions of the Columbia River within WRIA 25 are listed as a Category 4a for dioxin. If a water body is listed as Category 4a, it indicates that the water has identified pollution problems and that an approved total maximum daily load (TMDL) limit is actively being implemented for the listed water quality parameters.

4.5.4.2 Water Quality Characteristics and Criteria

Designated Beneficial Uses

Designated beneficial uses for a water body, as established in the Clean Water Act, are used to design protective water quality criteria, to assess the general health of surface waters, and to establish thresholds for future permit limits. Table 4.5-2 provides a list of the beneficial uses for the Columbia River as defined by the Washington State Department of Ecology (Ecology) and the Oregon Department of Environmental Quality (Oregon DEQ). A designated beneficial use provides a water body's assessed function or utility, and if a water body fails to meet the established water quality standards (see *Water Quality Impairments*), the water body's designated use can be adversely affected.

Table 4.5-2. Beneficial Uses for the Columbia River

Washington State Department of Ecology[a]	Oregon Department of Environmental Quality[b]
Domestic water supply	Public domestic water supply; private domestic water supply
Industrial water supply	Industrial water supply
Agricultural water supply	Irrigation
Stock water supply	Livestock watering
Spawning/rearing uses for aquatic life	Fish and aquatic life
Harvesting	Fishing; wildlife and hunting
Boating	Boating
Primary contact for recreation uses	Water contact recreation
Commerce/navigation	Commercial navigation and transportation
Aesthetics	Aesthetic quality

Notes:
[a] Washington State Department of Ecology (2012a) approved uses for the Columbia River from its mouth to river mile 309.3.
[b] Oregon Department of Environmental Quality (2003) approved uses for the Columbia River from its mouth to river mile 86 (2003).

Water Quality Impairments

The Columbia River faces water quality issues that endanger the health of important habitats found throughout the basin. Portions of the Columbia River are considered impaired for a number of water quality factors according to the EPA-approved 303(d) lists for Washington and Oregon. Table 4.5-3 shows the 303(d) listed impairments for water quality factors in the study area.

Table 4.5-3. 303(d) Listed Impairments for Surface Waters in the Study Area

Parameter	Washington		Oregon[c]
	Columbia River	Ditch 5	Columbia River
Arsenic	-	-	5
Bacteria	5[a]	-	-
DDE 4,4	-	-	5
Dioxin (2,3,7,8-TCDD)	-	-	4A[b]
Dioxin	4A[b]	-	-
Dissolved Oxygen	-	5	-
PCB	-	-	5
Temperature	5		
Total dissolved gas	-	-	4A[b]

Notes:
[a] Category 5 waters are impaired 303(d) waters, which means water quality standards have been violated for one or more pollutants and a TMDL or other water quality improvement is required.
[b] Category 4A listing indicates a TMDL has been developed and is actively being implemented.
[c] Oregon 2012 303(d) list is pending approval from EPA. The 2010 effective list for this segment of the Columbia River is the same as the 2014 list that is pending approval by EPA.
Sources: Washington State Department of Ecology 2016b; Oregon Department of Environmental Quality 2012
DDE = Dichlorodiphenyldichloroethylene; TCDD = Tetrachlorodibenzo-p-dioxin; PCB = polychlorinated biphenyl; TMDL = total maximum daily load

The State of Washington recently finalized its 2012 water quality assessment and 303(d) list of impaired waters. According to this 303(d) list, in the study area, the Washington state portion of the Columbia River is impaired (i.e., Category 5) for water temperature and bacteria (Washington State Department of Ecology 2016b). In addition, Ditch 5 in the study area is listed as impaired for dissolved oxygen. Oregon has listed the Columbia River in the study area as impaired for arsenic, dichlorodiphenyldichloroethylene (DDE) 4,4, and polychlorinated biphenyls (PCBs).

Sediment sampling from within, adjacent to, and upstream of the project area (to approximately river mile 68) has demonstrated that in deepwater areas of the Columbia River, sediments are typically composed of silty sands with a low proportion of fines and very low total organic carbon. Further, sediments sampled from deepwater areas in the vicinity of the project area have consistently met suitability requirements for flow lane disposal or beneficial use in the Columbia River (Grette 2014b: Appendix B). Sediment testing performed by the Applicant in the project area has revealed no exceedance of sediment-management standards at any nearshore or offshore location, except for in a localized area immediately adjacent to the existing Outfall 002A. Testing criteria were exceeded at one location downstream of the outfall, but did not exceed criteria for human health protection (Anchor QEA 2014 in Grette 2014b: Appendix B). The distribution of contamination was limited in area and depth to an isolated layer 6 inches thick, and the contamination source was identified as an historical discharge and not the result of an ongoing release (Grette 2014b: Appendix B). The affected sediment was removed and backfilled in November 2016.

The water quality impairments in the study area result from a variety of practices throughout the Columbia River basin that degrade water quality, primarily human activities. Elevated water temperatures, increased nutrient loading, reduced dissolved oxygen, and increased toxic contaminants in the basin pose risks to fish and wildlife, as well as to people. Sources of these contaminants include agricultural practices, urban and industrial practices, riparian practices, and climate change (National Marine Fisheries Service 2011). A summary of the water quality conditions of the greater Columbia River as a result of the basin-wide activities that can affect water quality are described in the following sections.

Baseline Water Quality Conditions

General baseline conditions for the broader Columbia River basin as well as the lower Columbia River and Estuary in the vicinity of the project area are described below.

Columbia River Basin

The four primary contaminants found in the broader Columbia River basin are mercury, dichlorodiphenyltrichloroethane (DDT) and its breakdown products, PCBs, and polybrominated diphenyl ether (PBDE) flame retardants. Other contaminants found in the basin include radionuclides, lead, pesticides, industrial chemicals, and newly emerging contaminants such as pharmaceuticals and personal care products (U.S. Environmental Protection Agency 2009).

Lower Columbia River and Estuary in Vicinity of the Project Area

The lower Columbia River and estuary is the 146-mile reach from the Bonneville Dam downstream to the Pacific Ocean. Monitoring results have shown high levels of contaminants such as PCBs, polyaromatic hydrocarbons (PAHs), DDT, and PBDEs in juvenile salmon tissue, water, and sediment.

Studies have shown that flame retardants and endocrine-disrupting compounds in water, sediment, fish, and osprey eggs increase downstream from Skamania to Longview (Lower Columbia Estuary Partnership 2015).

Trace metals such as aluminum, iron, and manganese are predominantly transported in the suspended/solid phase, whereas arsenic, barium, chromium, and copper are transported in the dissolved phase. Water temperatures in the lower Columbia are generally warmest in August, when daily mean water temperatures often exceed 20 degrees Celsius (^{0}C). In general, dissolved oxygen saturation is relatively high and turbidity is relatively low. Data collected on September 11, 2015, at river mile 53 located near the Beaver Army Terminal indicated an oxygen saturation of 85.5% (9.17 mg/l), temperature of 20.03^{0}C, and turbidity of 1.61 nephelometric turbidity units (NTU). For contrast, data collected just below the Bonneville Dam at river mile 145 indicated an oxygen saturation of 97.9% (10.5 milligrams per liter), temperature of 20.07^{0}C, and turbidity of 2.27 NTUs (Center for Coastal Margin Observation & Prediction 2015).

On a more localized basis near the project area, the following average values were recorded in the lower Columbia: oxygen saturation of 73.62% (7.9 milligrams per liter), temperature of 20.96^{0}C, and turbidity of 9.9 NTUs (Weyerhaeuser, NPDES Permit 0000124).

Water Quality Attributes

Water Clarity

Water clarity refers to the amount of light that can penetrate water. Water clarity is an important parameter for assessing water quality because lower clarity increases water temperatures and adversely affects photosynthesis. Suspended sediment can clog the gills of fish and reduce their resistance to disease, cause lower growth rates, and affect egg and larval development. While both suspended sediment concentration and turbidity are common metrics of water clarity, turbidity data are used to characterize baseline conditions.

Water clarity can vary greatly in the Columbia River. U.S. Geological Survey (USGS) provisional data from the 2014 water year, collected near Quincy, Oregon, reported elevated turbidity (U.S. Geological Survey 2015) that was generally higher than during the 2007 water year, when water clarity was rated as poor (U.S. Environmental Protection Agency 2007). However, elevated turbidity levels, or poor water clarity, in rivers such as the Columbia River, are a natural condition that occurs during storm events and periods of high seasonal runoff and does not necessarily mean the water quality conditions are poor.

Biological Indicators

EPA, in collaboration with the Lower Columbia Estuary Partnership, reported the following additional parameters in 2007 (U.S. Environmental Protection Agency 2007).

- **Dissolved nitrogen and phosphorus.** 100% of the estuarine area was rated good for dissolved nitrogen, while 70% of the estuarine area was rated fair for dissolved phosphorus.
- **Chlorophyll a.** 29% of the estuarine area was rated fair for this indicator, with the remaining 71% of the area rated good.
- **Dissolved oxygen.** 99% of the estuarine area rated good for this indicator.

- **Sediment quality.** 89% of the estuary as a whole rated good, while 11% was rated poor. The sediment quality index is rated based on three component indicators: sediment toxicity, sediment contaminants, and sediment total organic carbon. The estuarine area rated poor exceeded thresholds for one or more of these indicators.

Temperature

Water temperature is an important parameter for assessing baseline water quality. The Columbia River is impounded at many locations. These impoundments contribute to elevated water temperature by ponding water and increasing exposure to solar radiation. Although EPA and the Lower Columbia Estuary Partnership did not rate the Columbia River Estuary regarding water temperature, because water temperature affects the water's capacity for dissolved oxygen, if dissolved oxygen levels are considered good, water temperatures are also fairly good.

Chemical Indicators

USGS conducted a survey of water quality in the Columbia River estuary with data from 2004 and 2005. Major findings of this study are as follows (U.S. Geological Survey 2005).

- The median copper concentration was 1.0 microgram per liter, a level shown to have inhibitory effects on juvenile coho salmon.
- Of the 173 pesticides and degradation products analyzed, 29 were detected at least once, oftentimes with two or more products occurring in a sample together. Fourteen samples with multiple products were detected (no concentrations were provided).
- Of the 54 wastewater products analyzed, eight were detected at least once, usually at trace levels. The known endocrine disruptor bisphenol A was detected.
- Of the 24 pharmaceuticals analyzed, acetaminophen, a common analgesic, and diphenhydramine, a widely used antihistamine, were detected. This is an indicator of human sources of water contamination, likely from wastewater treatment plant effluent.
- During the seasonal samplings of suspended sediment at four sites, no organochlorine compounds or PAHs were detected.

Practices that Degrade Water Quality

Human activity has degraded water quality in the Columbia River estuary. Elevated water temperatures, increased nutrient loading, reduced dissolved oxygen, and increases in toxic contaminants pose risks to fish and wildlife, as well as to people. Sources of these contaminants include agricultural practices, urban and industrial practices, and riparian practices (National Marine Fisheries Service 2011).

Agricultural Practices

Agricultural practices contribute nutrients (nitrogen and phosphorus), sediment, and organic compounds (e.g., pesticides) and trace metals to runoff (U.S. Environmental Protection Agency 2014). Increased nutrient loads have been found to result in increased phytoplankton concentrations, increased turbidity, and depressed dissolved oxygen levels, especially in areas with lower flows and warmer water temperatures (Fenn et al. 2003). Increased sediment loads into surface waters can cause potential adverse impacts on aquatic resources. Common sediment impacts include deposition and scouring that can smother or dislodge benthic organisms; effects of turbidity (suspended sediment) which can affect aquatic organisms (e.g., clogging fish gills), alter water temperatures (by absorbing and scattering sunlight), and reduce light penetration which alters primary productivity and affects plants' ability to photosynthesize; and sediment binding to chemicals that can have toxic effects on organisms.

Banned pesticides, including DDT, persist in the environment, and pesticides currently in use continue to run off into the estuary (Ewing 1999). The pesticides atrazine, simazine, metolachlor, S-ethyl dipropylcarbamothioate, dimethyl tetrachloroterephthalate, and diuron are present at sites throughout the Columbia River estuary, often in combination (U.S. Environmental Protection Agency 2009). Pesticides have the potential to harm benthic invertebrates, fish, amphibians, and various stream microbes.

Trace metals can affect aquatic organisms depending on the metal, the species, and the environment in which it is deposited. Excessive concentrations of some metals can lead to dysfunction of the endocrine system, of reproduction, and growth. Moreover, those metals that can be accumulated in tissues and organs may adversely affect cellular functions by interacting with enzymes, which can lead to disturbances of growth, reproduction, the immune system, and metabolism (Jakimska et al. 2011).

Urban and Industrial Practices

Sources that affect water quality are separated into two groups: *point sources* and *non-point sources*. Point sources are easily identified by a concentrated outlet to a receiving water, where the origin of flow is single known source (e.g., municipal wastewater treatment plant). Non-point sources contribute from a variety of locations within a given area. Eventually, non-point sources can be concentrated to a single outlet to a receiving water, but each source is not known or difficult to determine (e.g., lawn fertilizer from one or many unknown homes within a watershed). Over 100 point sources discharge directly into this stretch of the Columbia River, including chemical plants, hydroelectric facilities, pulp and paper mills, municipal wastewater treatment plants, and seafood processors (Ewing 1999).

The largest point source discharger in the Columbia Basin is Portland's wastewater treatment plant (approximately 40 miles upstream of the project area). Nutrient loads from the plant account for 2% to 3% of the annual in-stream nutrient loads at the Beaver Army Terminal water quality sampling site in Quincy, Oregon. Effluent from existing pulp and paper mills also discharges dioxins and chlorinated phenols to the river (Ewing 1999). Pulp mill effluent is generally high in organic content and contains pollutants such as adsorbable organic halides, toxic dyes, bleaching agents, salts, acids, and alkalis. Heavy metals such as cadmium, copper, zinc, and chromium are often also present (Oberrecht 2014). Effluents from these point sources are regulated under NPDES permits, and violations can incur enforcement actions and fines.

Riparian Practices

Shoreline modifications, timber harvest, and agricultural activities in riparian zones, and residential, commercial, and industrial development along the Columbia River have resulted in a significant loss of riparian habitat function in the area (Ewing 1999). Healthy riparian habitat conditions (i.e., connected, forested riparian zones) could help to regulate water temperatures, depending on the size of the stream and the extent of shading, and contribute to aquatic habitat conditions and complexity (i.e., woody debris, bank stability, allochthonous inputs). In the study area, riparian habitat conditions and the functions provided by riparian habitat are generally degraded (Ewing 1999).

4.5.5 Impacts

This section describes the potential direct and indirect impacts related to water quality that would result from construction and operation of the Proposed Action and the No-Action Alternative. All wastewater and stormwater generated in the project area and potentially discharged from the project area after treatment would be evaluated and characterized by the state. Once the water to be discharged has been accurately evaluated and characterized by the state, the specific standards for water discharged from the project area would be defined and the type of NPDES permit would be determined and issued.

4.5.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area as a result of construction and operation of the Proposed Action.

Construction activities that could affect water quality include the following.

- Ground disturbance associated with construction
- Delivering, handling, and storing construction materials and waste
- Using heavy construction equipment
- In- and above-water work and dredging activities and disposal
- Demolishing existing structures
- Preloading ground for coal stockpiles

Operational activities that could affect water quality include the following.

- Coal spills from rail unloading and vessel loading
- Transport of airborne fugitive coal dust from stockpiles or rail cars
- Operating and maintaining heavy equipment and machinery
- Maintenance dredging and disposal
- Unloading of 8 trains a day
- Loading of 70 ships a month

The Applicant has identified the following design features and best management practices to be implemented as part of the Proposed Action, and were considered when evaluating potential impacts of the Proposed Action. These would be evaluated during the NPDES permit process.

- **BMP C200: Interceptor Dike and Swale**. A ridge of compacted soil, or a ridge with an upslope swale, would be provided at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. The dike and/or swale would be used to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This would be used to prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

- The pads and berms would be made of low permeability engineered material. The use of low permeability engineered materials for formation of the pads and berms would control water from entering subsurface soil or groundwater.
- The stockyard and berms would be graded to allow the water to drain and be collected for treatment and reuse.
- Drainage systems would be designed such that runoff within the project area would be collected for treatment before reuse or discharge. Best management practices that would be part of the coal export terminal's design to maximize the availability of water for reuse include the following.
  - Enclosed conveyor galleries
  - Enclosed rotary unloader building and transfer towers
  - Washdown collection sumps for settlement of sediment
  - Regular cleanout and maintenance of washdown collection sumps
  - Containment around refueling, fuel storage, chemicals and hazardous materials
  - Oil/water separators on drainage systems and vehicle washdown pad
  - Requirement that all employees and contractors receive training, appropriate to their work activities, in the site best management practices
  - Design of docks to contain spillage, with rainfall runoff and washdown water contained and pumped to the upland water treatment facilities
  - Design of system to collect and treat all runoff and washdown water for either reuse for onsite (dust suppression, washdown water or fire system's needs) or discharged off site
  - The wharf area would be sealed to capture the washdown water and stormwater runoff, preventing it from flowing to the River without treatment.
- Stormwater, sediment, and erosion control best management practices would be installed in accordance with the Stormwater Management Manual for Western Washington and Cowlitz County. Water quality management would be performed in accordance with the requirements of the NPDES Construction and Industrial Stormwater Permits. The site's SWPPP would provide details of the site best management practices.
  - Drainage systems would be designed such that runoff within the construction site would be collected and treated as necessary before reuse or discharge.
  - The treatment facility could treat surface runoff and process/construction waters with capacity to store the water for reuse.
- **BMP C153: Material Delivery, Storage and Containment.** Material delivery, storage and containment best management practices would be used to prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage:
  - Storage of hazardous materials on site would be minimized to the extent feasible.
  - Materials would be stored in a designated area, and secondary containment would be installed where needed.

- Refueling would occur in designated areas with appropriate spill control measures.

- Typical construction best management practices for working over, in, and near water would be applied, including checking equipment for leaks and other problems that could result in discharge of petroleum-based products, hydraulic fluid, or other material to the Columbia River.
- **BMP C154: Concrete Washout Area.** Concrete waste and washout waters would be either carried out off site or disposed of in a designated facility on site designed to contain the waste and washout water.
- Based on site grading and drainage areas, five water quality ponds (Wetponds) would treat runoff based on Ecology's requirements. In general, the ponds would be sized for treatment of the volume and flow from the water quality design storm event (72% of the 2-year storm). Additional storage would be provided within the coal storage area so that the runoff is always treated within the stockyard area, even for larger storm events. The ponds would be designed to provide settlement as the water passes through. Subsequently, water released from these ponds would be conveyed downstream to the existing pump station outfall 002A that discharges into the Columbia River via an existing 30-inch steel pressure line. The ponds that would treat runoff from the coal stockyard would harvest water for circulation around the site for multiple uses, including dust control measures. Ecology's criteria would be used as the basis of design, which uses the Western Washington Hydrology Model (WWHM) computer simulation for facility sizing. Because of the flat nature of the site, some surface ponding would occur in both the yard areas and open conveyance systems. The piped conveyance systems would be sloped at 0.50% minimum.
  - The surface drainage system and features would be designed and constructed in accordance with the *Stormwater Management Manual for Western Washington.*
- The water treatment facility would be designed to treat all surface runoff and process water with capacity to store the water for reuse. Treatment would be as required to meet reuse quality or Ecology's requirements for offsite discharge.
- Additional water storage would be provided within the coal storage area in the event of a larger storm event. Water volumes exceeding the demands for reuse would be discharged off site via the existing outfall 002A into the Columbia River. Water released off site would be treated and would meet the requirements of Ecology and required discharge permits.
- The water system would be designed and constructed in accordance with or consideration of the latest edition of the following standards, where applicable:
  - International Building Code (IBC)
  - National Fire Protection Association (NFPA)
  - Washington State Department of Ecology Stormwater Design Manual
  - United States Department of Health – Occupational Safety and Health Standards
  - Washington State Department of Health
  - In the event of conflict between codes and technical specification, the requirements would be reviewed and a decision made on the action to be implemented with agency of jurisdiction

- Where possible, pile extraction equipment would be kept out of the water to avoid “pinching” pile below the water line to minimize creosote release during extraction.
- Piles would be removed slowly so as to minimize sediment disturbance and turbidity in the water column.
- Prior to pile extraction, the operator would “wake up” the pile to break the friction between the pile and substrate to minimize sediment disturbance. During pile removal and pile driving, a containment boom would be placed around the perimeter of the work area to capture wood debris and other materials released into the waters as a result of construction activities. All accumulated debris would be collected and disposed of upland at an approved disposal site. Absorbent pads would be deployed should any sheen be observed.
- The work surface on barge deck or pier would include a containment basin for pile and any sediment removed during pulling. Any sediment collected in the containment basin would be disposed of at an appropriate upland facility, as would all components of the basin (e.g., straw bales, geotextile fabric) and all pile removed.
- Upon removal from substrate the pile would be moved expeditiously from the water into the containment basin. The pile would not be shaken, hosed-off, stripped or scraped off, left hanging to drip or any other action intended to clean or remove adhering material from the pile.
- Project construction would limit the impact of turbidity to a defined temporary area of mixing and would otherwise comply with Washington Administrative Code (WAC) 173-201A.
- All dredged material would be contained within a barge prior to any flow lane disposal; dredged material would not be stockpiled on the riverbed.
- The contractor would remove any floating oil, sheen, or debris within the work area as necessary to prevent loss of materials from the site. The Contractor would be responsible for retrieval of any floating oil, sheen, or debris from the work area and any damages resulting from the loss.
- Flow lane disposal would occur using a bottom-dump barge or hopper dredge. These systems release material below the surface, minimizing surface turbidity.
- For work adjacent to water, proper erosion control measures would be installed prior to any clearing, grading, demolition, or construction activities to prevent the uncontrolled discharge of turbid water or sediments into waters of the state. Erosion-control structures or devices would be regularly maintained and inspected to ensure their proper functioning throughout this project.
- Project construction would be completed in compliance with Washington State Water Quality Standards WAC 173-201A, including but not limited to prohibitions on discharge of oil, fuel, or chemicals into state waters, property maintenance of equipment to prevent spills, and appropriate spill response including corrective actions and reporting as outlined in permits and authorizations (Clean Water Act Section 404, Rivers and Harbors Act Section 10, Hydraulic Project Approval, Clean Water Act Section 401 Water Quality Certification)
- The contractor would have a spill containment kit, including oil-absorbent materials, on site to be used in the event of a spill or if any oil product is observed in the water.
- All fuel and chemicals would be kept, stored, handled, and used in a fashion, which assure no opportunity for entry of such fuel and chemicals into the water.

- The contractor would use tarps or other containment methods when cutting, drilling, or performing over-water construction that might generate a discharge to prevent debris, sawdust, concrete and asphalt rubble, and other materials from entering the water.
- No land-based construction equipment would enter any shoreline body of water except as authorized.
- Equipment would have properly functioning mufflers, engine-intake silencers, and engine closures according to federal standards; the contractor would inspect fuel hoses, oil or fuel transfer valves, and fittings on a regular basis for drips or leaks to prevent spills into the surface water.

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Construction projects in Washington State that include clearing, grading, and excavating activities that disturb one or more acres and discharge stormwater to surface waters of the state are required to obtain an NPDES Construction Stormwater Permit from Ecology. Prior to the issuance of permits, sites with known contaminated soils or groundwater are required to provide a list of contaminants with concentrations, depths found and boring locations shown on a map with an overlay of where excavation or construction may occur. Additional alternative best management practices may be necessary based on the contaminants and how contaminated construction stormwater would be treated. The state permit requires preparing a Temporary Erosion and Sediment Control (TESC) plan, a construction stormwater pollution prevention plan (SWPPP) and best management practices to avoid and minimize the risk of erosion. Guidance for the design and implementation of these best management practices would be sourced from the Ecology *2012 Stormwater Management Manual for Western Washington* (Washington State Department of Ecology 2012b) including but not limited to those developed by the Applicant (Section 4.5.7, *Proposed Mitigation Measures*). The selected best management practices would represent the best available technology that is economically achievable and the best conventional pollutant-control technology to reduce pollutants. Best management practices would include a wide variety of measures to reduce pollutants in stormwater and other nonpoint source runoff. Construction practices would include measures to avoid and minimize erosion of soils associated with land disturbance and subsequent discharge of sediment-laden stormwater to adjacent surface waters. The Applicant-developed measures were considered when evaluating the potential direct impacts associated with construction.

Temporary Discharges to Increase Surface Water Turbidity Because of Upland Soil Disturbance

Construction of the Proposed Action would include ground-disturbing activities that would expose soils and generate soil stockpiles. Rain could erode soil and carry it to adjacent waterways, such as the Columbia River and CDID #1 ditches, and temporarily increase turbidity. However, the potential for erosion during most ground-disturbing activities is considered low because the project area is relatively level and appropriate erosion and sediment control measures would be required by regulatory agencies.

The CDID #1 ditches collect water from roads, parking lots, yards, and other land uses that contribute to elevated turbidity levels and pollutants that are discharged to the Columbia River. Both Ecology and Oregon DEQ have standards for turbidity increases as a result of construction. These include the Water Quality Standards for Surface Waters of the State of Washington; Water Quality Standards: Beneficial Uses, Policies, and Criteria for Oregon; and Oregon State Legislature: Turbidity Rule. Runoff from the project area would be required to meet the terms and conditions of all permits issued for the Proposed Action; thus, during construction, the Proposed Action would be expected to maintain water quality conditions in the receiving waters, but could even provide some improvement to the quality of water discharged from the site to the CDID #1 ditches. Overall, the construction activities associated with the Proposed Action would not be expected to cause a measurable effect on water clarity, water quality, or biological indicators or affect designated beneficial uses.

The Applicant has identified the following design features and best management practices to be implemented as part of the Proposed Action, which were considered when evaluating potential impacts of temporary discharges to surface waters. These are some of the BMPs that would be used through the adaptive management process and would be evaluated during the NPDES process.

- **BMP C105: Stabilized Construction Entrance/Exit.** BMP C105 would be installed and maintained through the duration of demolition, site preparation, preloading, and construction.
- **BMP C106: Wheel Wash.** BMP C106 would be installed and used at the entrance of the project area to prevent sediment from being tracked off site.
- **BMP C107: Construction Road/Parking Area Stabilization.** Per BMP C107, roads, parking areas, and other on-site vehicle transportation routes would be stabilized to reduce erosion caused by construction traffic or runoff.
- **BMP C140: Dust Control**. BMP C140 would be used to prevent wind transport of dust from disturbed soil surfaces. Either water or polyacrylamide would be used prevent soil erosion.
- **BMP C153: Material Delivery, Storage and Containment**. BMP C153 would be used to prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage.
    - Storage of hazardous materials onsite would be minimized to the extent feasible.
    - Materials would be stored in a designated area, and secondary containment would be installed where needed.
    - Refueling would occur in designated areas with appropriate spill control measures.
- **BMP C154: Concrete Washout Area**. BMP C154 would be constructed near the entrance to the project area to prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting washout off site, or performing on-site washout in a designated area to prevent pollutants from entering surface waters or groundwater.
- **BMP C162: Scheduling**. BMP C162 would reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

- **BMP C200: Interceptor Dike and Swale**. Per BMP C200, a ridge of compacted soil or a ridge with an upslope swale would be provided at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. The dike or swale would be used to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This would be used to prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.
- **BMP C203: Water Bars**. Per BMP C203, a small ditch or ridge of material would be constructed diagonally across roads as needed to prevent gullying.
- **BMP C207: Check Dams**. BMP C207 would be constructed to reduce the velocity of concentrated flow and dissipate energy at the check dam.
- **BMP C209: Outlet Protection**. BMP C209 would prevent scour at conveyance outlets and minimize the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.
- **BMP C220: Storm Drain Inlet Protection**. BMP C220 would be installed at several locations across the project area to prevent coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.
- **BMP C233: Silt Fence**. BMP C233 would be constructed around the entire project area to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.
- **BMP C241: Temporary Sediment Pond(s)**. BMP C241 would be designed and constructed to remove sediment from runoff originating from disturbed areas of the project area.

Temporarily Release Contaminants Associated with Equipment and Material Use

Handling construction materials and operating construction equipment have the potential to introduce pollutants such as fuel, oil, hydraulic fluid, grease, paints, solvents, and cleaning agents and could degrade water quality if improperly handled. Construction waste such as metal, welding waste, and uncured concrete can also degrade water quality and be harmful to aquatic organisms (Washington State Department of Ecology 2014).

Development and implementation of site-specific construction SWPPP, that includes best management practices for material handling and construction waste management, would reduce the potential for water quality impacts from these sources. Typical SWPPP best management practices that would help prevent releases to surface waters include the following.

- All fuel and chemicals would be stored and handled properly to ensure no opportunity for entry into the water.
- No land-based construction equipment would enter any shoreline body of water except as authorized.
- Equipment would have properly functioning engine closures (i.e., hydraulic, fuel, lubricant reservoirs) according to federal standards; the contractor would inspect fuel hoses, oil or fuel transfer valves, and fittings on a regular basis for drips or leaks to prevent spills into the surface water.

- The contractor would have a spill containment kit on site, including oil-absorbent materials, to be used in the event of a spill or if any oil product is observed in the water.

If a spill were to occur during construction, the amount likely would be typically less than 50 gallons, and response time would be relatively quick on site. A fuel truck would visit the site as needed. The frequency would vary based on usage and could range from once or twice per day to once or twice per week. The trucks would have a capacity of 3,000 to 4,000 gallons. A spill could have potential impacts on water quality if the spill were to reach surface waters, which could affect aquatic species and habitats. (Sections 4.7, *Fish*, and 4.8, *Wildlife*, provide additional information on this potential impact.)

Construction activities would involve preloading and installing of vertical wick drains to aid in the consolidation of low consistency silt and low-density sand (i.e., unconsolidated materials). Wick drains would direct groundwater from the shallow aquifer upward toward the surface during preloading, where it would discharge. Water discharged from the wick drains would be captured, tested for contaminants, and treated prior to discharge to any surface waters. Although water discharged from the wick drains is not anticipated to be contaminated, it would be tested to ensure any contaminated water is not discharged, thus no impact on water quality is anticipated. Refer to Section 4.4, *Groundwater*, for further information regarding water discharged from wick drains.

Temporarily Mobilize Pollutants or Increase Turbidity from In-Water Work and Dredging

Construction of the Proposed Action would require dredging an estimated 500,000 cubic yards of sediment from the river to provide site access from the Columbia River navigation channel and berthing at Docks 2 and 3. The work necessary to construct the approach trestle and Docks 2 and 3 would require in-water work that could resuspend pollutants and sediment and increase turbidity. Dredging would permanently deepen a 48-acre area to a target depth of -43 feet CRD with a 2-foot overdredge allowance. The deepening would require dredging of up to approximately 16 feet (vertically) of sediment. The dredging permit would require testing of the sediment and suitability determination for flow lane disposal.

Dredging and in-water work would result in temporary increases in suspended sediment and turbidity. As described previously, sediments sampled from deepwater areas in the project vicinity have consistently met suitability requirements for flow lane disposal or beneficial use in the Columbia River (Grette 2014c). Thus, 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. However, prior to obtaining a dredging permit, the Applicant would conduct site-specific sediment sampling to characterize the proposed dredge material and ensure compliance with the dredged materials management plan (Grette 2014c). If flow lane disposal is approved, the disposal area for dredged materials would require approximately 80 to 110 acres. The actual acreage and specific location of the disposal site would be determined by the permitting agencies. Recent authorizations for flow lane disposal of dredged materials in the Columbia River in the vicinity of the project area were generally in or adjacent to the navigation channel between approximately river miles 60 and 66 (Grette 2014b).

Standard best management practices for working in aquatic areas would be followed to maintain acceptable construction water-quality conditions, including but not limited to maintaining appropriate standards for construction-related turbidity (including during active dredging and flow lane disposal if used), minimizing the risks of unintended discharges of materials such as fuel or hydraulic fluid, and managing construction debris. In addition, typical construction best management practices for working over, in, and near water would be applied, including checking equipment for leaks and other problems that could result in discharge of petroleum-based products, hydraulic fluid, or other material to the Columbia River.

The following best management practices relate to in-water work during the construction period.

- The contractor would use tarps or other containment methods when cutting, drilling, or performing over-water construction that might generate a discharge to prevent debris, sawdust, concrete and asphalt rubble, and other materials from entering the water.
- The contractor would retrieve any floating debris generated during construction using a skiff and a net. Debris would be disposed of at an appropriate upland facility. If necessary, a floating boom would be installed to collect any floated debris generated during in-water operations.

Construction of the approach trestle and Docks 2 and 3 would require both in-water and over-water work. In-water work windows would avoid and minimize impacts on various natural resources, most notably federally protected fish species (Section 4.7, *Fish*). In-water construction would primarily involve dredging, pile driving, and removal of pile dikes and would use barge-based equipment and purpose-built vessels, although some work would likely be supported from land. A total of 610 of the 630 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 (4,312 square feet) of river bottom. The construction would also remove 225 feet of the deepest portion of timber pile dikes (Grette 2014a).

Some sediments disturbed during dredging activities would be expected to move down current and monitoring requirements would be identified in the dredge permit. The period of increased turbidity at the project area is anticipated to be relatively brief, as the bed material is primarily silty sands with low proportions of fines and organic material, thus reducing the potential to increase turbidity as compared to silty mud or sediments with high concentrations of organic material.

The following best management practices would avoid and minimize potential impacts from pile removal and installation activities.

- The contractor would remove piles slowly to minimize sediment disturbance and turbidity in the water column.
- Prior to pile extraction the contractor would "wake up[1]" the pile to break the friction between the pile and substrate to minimize sediment disturbance.

Release of creosote would occur from the removal of existing creosote-treated timber piles associated with two pile dikes. Creosote is composed of more than 300 chemicals, including PAHs, which have been shown to be fatal to marine life (Washington State Department of Natural Resources 2008). Creosote contamination could be exacerbated by removal of piles that

[1] "Waking up" the pile consists of vibration of the pile to break the skin friction bond between the pile and soil. This allows the pile to be extracted without pulling out a large block of soil.

have been buried in a zone generally depleted of oxygen and water, which leaves the creosote highly volatile when re-exposed to water. Droplets of previously unexposed creosote would be released from the piling into the surrounding sediments.

The removal of creosote-treated piling would result in temporary suspension of sediments and a potential long-term increase in the exposure of creosote in the project area. To minimize this impact, the contractor would follow the following standard best management practices for removal of creosote-treated wooden piles.

- **Pile removal.** If possible, the contractor would use vibratory extraction, the preferred method of pile removal. A major creosote release to the environment could occur if equipment (bucket, steel cable, vibratory hammer) pinches the creosoted piling below the water line. Therefore, the contractor would keep the extraction equipment out of the water to the extent practicable to remove the piling. Cutting would be necessary if the pile were to break off at or near the riverbed, which means it could not be removed without excavation. Pile cutoff would be an acceptable alternative if vibratory extraction or pulling were not feasible. The piling would be cut 2 feet below the riverbed, and the subsequent hole would be capped/filled with clean sand.
- **Disposal of creosote treated piling, sediment, and construction residue.** The contractor would place the pulled pile in a containment basin to capture any adhering sediment immediately after the pile is removed. Containment basins typically have continuous sidewalls and controls as necessary (e.g., straw bales, oil absorbent boom, plastic sheeting) to contain all removed materials and prevent re-entry into the water. The type and location (e.g., barge, land) of the containment basin would be determined when the contractor's work plan is developed. Cut-up piling, sediments, construction residue, and plastic sheeting from the containment basin would be packed into a container and disposed of at a facility in compliance with federal and state regulations.

Above-water work would include installing the pile-supported elements of the dock structures and coal-handling infrastructure and equipment. Some concrete components (such as the dock decking, crane rail supports, and pile caps) would need to be cast in place. Appropriate techniques and best management practices, such as the use of a bib, would minimize the potential for wet or uncured concrete to come in contact with the Columbia River.

Materials handling infrastructure and equipment, such as shiploaders and conveyors, would be delivered by barge and offloaded by crane directly to the docks and trestle. Barges would not offload materials or equipment to any area below the ordinary high water mark of the Columbia River. As much as practicable, infrastructure would be prefabricated so that above-water work would consist largely of installation and assembly.

Impacts on water quality from in- and over-water work would be addressed in the Water Quality Monitoring and Protection Plan to be prepared by the Applicant and approved by Ecology. Impacts on water quality from dredging would be minimized with the preparation and implementation of a dredging plan in compliance with the dredged material management program (DMMP) as required by state agencies (Ecology and Washington State Department of Natural Resources) and federal agencies (the U.S. Army Corps of Engineers [Corps] and EPA). Adhering to a plan developed in compliance with DMMP would minimize water-quality impacts, ensuring that potential impacts are temporary and localized in nature. No long-term changes in the baseline conditions in the study area would be expected to occur.

Temporarily Introduce Hazardous or Toxic Materials from Demolition Activities

Demolition of the existing structures in the project area (i.e., cable plant building, potline buildings, and small ancillary structures) has the potential to affect water quality by disturbing soil or building parts and debris that could contain hazardous or toxic materials such as asbestos, lead, and concrete dust, which could cause harm to aquatic environments and organisms.

This impact would be minimized by the collection and removal of all concrete and other structural debris and the collection and treatment of all stormwater from the site prior to discharge to surface waters. The implementation of best management practices in compliance with the NPDES Construction Stormwater Permit that would be obtained for the Proposed Action would reduce the potential for demolition-related pollutants to enter and contaminate surface waters. Overall, the demolition activities associated with the Proposed Action would not be expected to cause a measurable effect on water quality or biological indicators, or affect designated beneficial uses.

Construction—Indirect Impacts

Construction of the Proposed Action would not result in indirect impacts on water quality because construction impacts would be limited to the project area and would not occur later in time or farther removed in distance than the direct impacts.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Introduce Contaminants from Coal Spills and Coal Dust

Proposed Action-related trains would hold approximately 122 tons of coal per car and there would be 125 cars per train; there would be 8 loaded trains and 8 empty coal trains per day under the Proposed Action. An average of 70 ships a month would move coal for the Proposed Action. The Panamax class vessels, with an average capacity of 65,000 deadweight tonnage would be used to transfer the coal to its final destination (Maritime Connector 2015).

Coal and coal dust could enter the Columbia River directly or via the surrounding drainage channels from spills during loading or unloading or through airborne transport of coal dust during operations. The extent of average annual coal dust deposition was modeled and mapped (Chapter 5, Section 5.7, *Coal Dust*, Figure 5.7-3). Coal dust is anticipated to deposit a maximum of 0.40 grams per square meter per month (g/m^2/month) in or adjacent to the project area. This amount of deposition is well below the benchmark for dust nuisance impacts (2.0 g/m^2/month), which is defined as the level of dust deposition that affects the aesthetics, look, or cleanliness of surfaces. Annually, coal dust is anticipated to deposit a maximum of 1.99 grams per square meter per year (g/m^2/year) in or adjacent to the project area, including Docks 2 and 3 in the Columbia River. Additional information on these deposition levels is found in Chapter 5, Section 5.7, *Coal Dust*; the spatial extent of the maximum annual coal dust deposition near the project area is shown in Figure 5.7-3.

At sufficient quantities, coal and coal dust in marine and estuarine environments have similar adverse effects as elevated levels of suspended sediments on water quality (Ahrens and Morrisey 2005). During periods of lower flow, a smaller amount of coal dust could have a greater impact on water quality. Impacts include increased turbidity, which can interfere with photosynthesis and increase water temperatures (Ahrens and Morrisey 2005). Coal and coal dust in the water column can also affect marine organisms through abrasion of tissue and smothering and clogging of respiratory and feeding organs (Ahrens and Morrisey 2005). However, at a maximum deposition rate of 1.99 g/m^2/year adjacent to the project area, and at the minimum flow[2] recorded over the 23-year period of record for 1 day, coal dust deposition directly into the river (assumed to be an area of approximately 3 million square meters [1.16 square miles]) in the study area would result in a change in suspended sediment concentration of less than 1 part per 10 billion (0.000075 milligrams per liter [mg/L]). This change would not be measureable and is not anticipated to increase turbidity or water temperature, or affect marine organism functions (e.g., respiration, feeding).

Coal and coal dust captured in water runoff (e.g., from precipitation that falls on the stockpile areas and water used for dust suppression) would be collected within the stockpile pads (low-permeable surfaces allowing minimal infiltration), conveyed within an enclosed stormwater system, and treated at Facility 73 in settling ponds before being discharged from the site. Some settled coal dust from the project area could discharge to the Columbia River through the CDID #1 system. If coal dust from the project area accumulated without being disturbed throughout the dry season (assumed to be 120 days), the anticipated change in suspended sediment concentration in the Columbia River within the study area for the minimum recorded flow over 1 day would be approximately 0.0192 mg/L. This change would not be measureable and likely would not increase turbidity or water temperature, or affect marine organism functions (e.g., respiration, feeding). The coal export terminal would employ dust suppression systems throughout the terminal, including the tandem rotary dumpers, all conveyors, stockpile pads, surge bins, transfer towers, and trestle. Approximately one-third of the conveyor belts would be closed, as would the shiploaders, to limit the release of coal dust. The dust suppression system would employ sprayers, sprinklers and foggers to capture coal dust. Dust suppression water would be collected and conveyed through the stormwater collection, conveyance and treatment system. Once treated, the water would either be reused or, if not needed (i.e., sufficient water is stored in the on-site water storage pond), discharged to the Columbia River. All water discharged to the Columbia River would be required to meet specific water quality standards that would be outlined in the NPDES permit, prior to discharge. If stormwater is collected and used for industrial beneficial use (such as dust control), a Water Rights Permit would be required in accordance with Chapter 90.03 RCW 90.03.

Coal contains trace amounts of toxic elements. Coal has a heterogeneous chemical composition; therefore, specific impacts related to the toxic contaminants of coal are highly dependent on coal composition and source (Ahrens and Morrisey 2005). The majority of coal transloaded at the proposed coal export terminal is expected to be mined in the Powder River Basin, with lesser amounts of coal being sourced from the Uinta Basin in Utah and Colorado. Trace elements of environmental concern (TEEC) in Powder River and Uinta Basin coal include antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium, and

[2] The minimum recorded flow at the Columbia at Beavery Army Terminal, Quincy, Oregon, is 65,600 cubic feet per second (1969 to 2014).

uranium. Table 4.5-4 presents the average concentrations of each TEEC sampled in parts per million. However, at a maximum coal dust deposition rate of 1.99 g/m^2/year adjacent to the project area and at the minimum flow recorded over the 23-year period of record for 1 day, TEEC deposition directly into the Columbia River (assumed to be an area of approximately 3 million square meters [1.16 square miles]) in the study area would result in unmeasurable changes in concentration for each of the elements of concern on the order of 0.0000000000001 to 0.000000000000001 g/L, or 0.0000001 to 0.000000001 ppb. If coal dust from the project area accumulated without being disturbed throughout the dry season (assumed to be 120 days long), the anticipated change in TEEC concentration for the minimum recorded flow over one day would be on the order of 0.0000000001 to 0.000000000001 g/L, or 0.0001 to 0.000001 ppb. Again, this change would not be measureable and is not anticipated to affect human health or affect marine organism functions (respiration, feeding).

Table 4.5-4. Average Concentration of Trace Elements in Wyodak and Big George Coalbeds, Powder River Basin, Wyoming and Miscellaneous Uinta Basin Coalbeds in Colorado Plateau

Trace Element of Environmental Concern	Average Concentration in Sampled Coal (ppm)	
	Powder River Basin[a,b]	Uinta Basin[b]
Antimony	0.10	0.7
Arsenic	1.43	2.2
Beryllium	0.18	1.5
Cadmium	0.06	0.1
Chromium	2.63	6.1
Cobalt	1.93	2.0
Lead	1.26	13.9
Manganese	10.05	28.2
Nickel	1.58	4.5
Selenium	0.57	1.4
Uranium	0.46	1.8

Notes:
[a] U.S. Geological Survey 2007
[b] Pierce and Dennen 2009

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 potentially leach from coal to the pore water of sediments. One review of coal dust's chemical composition (U.S. Geological Survey 2007) suggests that the risk of exposure to concentrations of toxic materials (e.g., PAHs and trace metals) from coal are low because the concentrations are low and the chemicals bound to coal are not easily leached. Another study by Ross et al. (2004) found virtually no desorption of any PAH in coal and that the bioavailability of coal-derived PAHs usually was too low to be measured. Furthermore, the type of coal anticipated to be exported from the coal export terminal is alkaline, low in sulfur and trace metals and 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, coal dust from operation of the Proposed Action is not expected to have a demonstrable effect on water quality. 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.

Coal spilling into the Columbia River could occur during vessel loading operations. Cleanup efforts would be implemented quickly and it would be expected that the majority of the spilled coal would be recovered. Coal dust particles would likely be transported downstream by river flow and either carried out to sea or distributed over a sufficiently broad area that a measurable increase in concentrations of toxic chemicals in the Columbia River would be unlikely. The deposition of coal dust could be as high as 1.99 g/m^2/year adjacent to the project area. However, toxic chemicals in coal dust tend to be bound to the matrix structure of the coal and not quickly or easily leached and would not, therefore, be expected to result in a significant increase in chemical indicators in the Columbia River. They would also not be expected to cause a measurable impact on water quality or biological indicators, or affect designated beneficial uses.

An evaluation of a potential coal spill and potential impacts associated with coal dust are described in the Chapter 5, Section 5.7, *Coal Dust*, and the *SEPA Coal Technical Report* (ICF 2017). Because the rate of coal dust deposition is so low, it is likely unmeasurable and the concentration of TEEC is assumed to be low. Therefore, impacts of dispersed coal, coal dust, and coal dust constituents on water quality are anticipated to be low.

Rail cars carrying coal would have to be treated with topping agents or surfactants to the surface of loaded coal to control dust. These agents generally comprise glue (polyvinyl acetate), alkyl alcohol, guar gum, or vegetable oils mixed with water. These chemicals could enter the Columbia River directly from spills during loading or unloading; however, they have been found to be nontoxic and would not introduce pollutants of concern (Agency for Toxic Substances and Disease Registry 1992).

Introduce Contaminants from Maintenance and Operations

Potential contaminants, including diesel fuel, oils, grease, and other fluids would be required for the operation and maintenance of heavy equipment and machinery used to transport, store, move, and load coal at the coal export terminal. Normal operations and maintenance activities in the project area would not result in a direct discharge of pollutants or process water into surface waters. Most operation-related impacts would result from spills of potentially hazardous materials, such as petroleum products or industrial solvents, either directly into surface waters or in locations where they could be transported and discharged to surface water or groundwater. While a release is likely to be relatively small (less than 50 gallons), locomotives have a fuel capacity of 5,000 gallons and could potentially release fuel during operations. Also, fuel trucks would visit the site as required during operations. The frequency would vary based on usage and could range from once or twice per day to once or twice per week. Fuel trucks typically have a 3,000-to-4,000-gallon capacity. A spill could have potential impacts on water quality. A spill that occurred in the project area would be contained, conveyed, and treated within the proposed stormwater system and would not be discharged to surface waters outside the project area. A spill would be responded to under federal and state laws. The Applicant would be required to manage contaminated stormwater in accordance with the requirements of the NPDES Industrial Stormwater Permit and avoid and minimize impacts on water quality.

Maintenance dredging for Docks 2 and 3 would be expected to occur every few years, or as needed following extreme-flow and sediment-deposition events, with areas and volumes considerably smaller than the initial dredge action. Maintenance dredging impacts on water quality would be similar to those discussed for dredging during construction, but to a lesser degree because maintenance dredging volumes would be smaller than the initial dredging action during construction based on the estimated accretion rates described below. A dredging plan, as discussed for construction dredging, would be prepared for each future maintenance dredging event.

Cargo vessels calling at Docks 2 and 3 would require the use of two tugboats to assist with docking and undocking, as described Chapter 5, Section 5.4, *Vessel Transportation*. Once a vessel powers down in preparation for docking, it generally does not engage its main propeller; there are specific conditions (e.g., especially strong currents) or circumstances (e.g., if the vessel requires a quick adjustment) under which the vessel may briefly engage the propeller, but these are not the norm (Gill pers. comm.). Thus, typical cargo vessel operations would not be expected to cause propeller wash-related scour of the side slopes or bottom of the dredge prism. Propeller wash from tugboats would be nearer to the surface and would thus have less potential to result in scour or erosion of bottom sediments within the dredge prism.

The following factors would further reduce the likelihood of temporary, localized increases in turbidity from propeller wash. The berthing basin would be dredged to a depth that could accommodate the largest vessels calling at Docks 2 and 3, the dredge prism would tie into the navigation channel, Docks 2 and 3 would be parallel to the navigation channel, the slopes would be dredged at a 3:1 (horizontal to vertical) slope, and the sediment would comprise the coarse sediment substrates typical of the mainstem Columbia River.

Sediment accretion in the proposed dredge prism would most likely occur as a result 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. Specific data are unavailable for the proposed new dredging basin; therefore, the rate of accretion (i.e., gradual deposition and build-up of sediment) 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-foot range) and annual accretion volume is approximately 11,675 y^3 (4,670 to 23,350 y^3 range). 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). Similarly to construction-related dredging, long-term changes in study area baseline conditions likely would not persist as a result of maintenance dredging.

Introduce Contaminants from Stormwater Runoff

Stormwater would be managed in accordance with the requirements of an NPDES Industrial Stormwater Permit for water management facilities of the coal export terminal. Contaminants such as oil and grease, coal dust, and other chemicals could accumulate on the ground and facility surfaces and become constituents of site stormwater. All stormwater runoff would be collected for treatment before reuse or discharge to the Columbia River. If stormwater is collected and reused for a beneficial industrial use, a Water Right Permit would be required in accordance with Chapter 90.03 Revised Code of Washington (RCW).

Coal particulates would be removed from stormwater by allowing the coal dust to settle out in settling ponds. The coal dust would be removed from the stormwater ponds and placed back in the coal stockpile area during regular maintenance of the stormwater ponds. Other solids accumulated in the treatment systems not acceptable for reuse would be periodically collected and disposed of at an appropriate off-site disposal site.

As shown in Table 4.5-3, the Columbia River is listed as impaired for a number of pollutants. Some of these pollutants may be introduced from stormwater runoff from the project area, but the NPDES Industrial Stormwater Permit would require that all water quality standards are met prior to stormwater discharge to the Columbia River. Arsenic and fecal coliform (indicator bacteria) were detected during monitoring of existing outfalls that would drain the project area (Anchor QEA 2014). These pollutants would likely continue to be introduced as a result of the Proposed Action, although maximum reported outfall concentrations for these pollutants fall below established water-quality standards. Continued discharges at existing levels would not cause a measureable increase in chemical indicators in the Columbia River and would not cause a measurable impact on water quality or biological indicators or affect designated beneficial uses. Any changes in concentrations of these pollutants that may occur during operations would be addressed under the NPDES Industrial Stormwater Permit to ensure water quality standards continue to be met post discharge to the Columbia River.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Introduce Contaminants from Coal Spills and Coal Dust

Potential impacts related to introducing contaminants from coal spills and coal dust during rail and vessel transport would be the same as those described under *Operations—Direct Impacts*.

Introduce Contaminants from Maintenance and Operations

Potential impacts related to introducing contaminants from maintenance and operations during rail and vessel transport would be the same as those described under *Operations—Direct Impacts*.

Introduce Contaminants from Vessel or Rail Transport

Coal would be transported to the coal export terminal via rail, then loaded onto vessels and transported to its final destination in Asia. Water quality could be indirectly affected as a result of transportation of coal within the study area. Details regarding vessel operations are available in Chapter 5, Section 5.4, *Vessel Transportation*. Details regarding a release of hazardous materials during rail operations and collision or derailment are discussed in Chapter 3, Section 3.6, *Hazardous Materials*.).

- **Propeller wash.** Propeller wash increases the potential for scour and erosion of the sides and bottom of the navigation channel, and thus, could cause temporary, localized increase in turbidity. During transit of the Columbia River to and from Docks 2 and 3, the large propellers on cargo vessels would create turbulence close to the river bottom that could erode bottom sediments. The propeller wash from tugboats transiting to and from Docks 2 and 3 to assist cargo vessels would be nearer the surface and would, thus, have less potential to result in scour or erosion of bottom sediments.

Counihan et al. (2014) surveyed sediment contaminants in several reaches of the lower Columbia River (including a reach adjacent to the study area) and found that contaminant presence and concentrations in the deeper parts of the river channel, which includes the navigation channel, are lower than other areas of the river channel. The Columbia River navigation channel is routinely dredged, and the study found that the deepest parts of the river channel have erosional deposition patterns where flows are the greatest, sediment transport is high, and coarser sediments are found. These coarser sediments require more energy to mobilize and become suspended. Areas closer to the shoreline were found to be depositional areas with higher amounts of fine sediments, which were found to correlate with the higher presence and concentration of contaminants compared to the deeper erosional areas with coarse sediments. These sediments outside of the navigation channel would be unlikely to be affected by vessels transiting within the navigation channel. Therefore, it is unlikely that contaminant resuspension would be an issue given the low potential for turbidity from vessel movements in the study area and lower occurrence and concentrations of contaminants in the navigation channel.

- **Ballast water.** Ballast water could contain materials that degrade surface waters. Common contaminants include invasive marine plants and animals, bacteria, and pathogens that could result in harm or displace native aquatic species. However, the likelihood of such occurrences is considered low because Proposed Action-related vessels would be required to adhere to the state and federal regulations that control discharge and water quality of ballast water. Oversight of federal ballast water regulations is provided by the U.S. Coast Guard and EPA, and Washington State regulations are administered by WDFW. Specifically, Proposed Action-related vessels would be required to implement one of the following ballast water management methods per U.S. Coast Guard ballast discharge regulations (33 CFR 151.2025): install a ballast water management system, use only water from a U.S. public water system, not discharge ballast water, or discharge ballast to a facility onshore or to another vessel for treatment. Regardless of the ballast water management option selected by vessel operators, all ballast water discharge must meet the U.S. Coast Guard ballast discharge standards (33 CFR 151.2030) and EPA NPDES Vessel General Permit standards. In addition, the Washington State ballast discharge regulations (RCW 77.120.040) include reporting, monitoring, and sampling requirements of ballast water, and all vessels must submit nonindigenous species ballast water monitoring data. WDFW may also board and inspect vessels under WAC 220-150-033 without advance notice to provide technical assistance, assess compliance, and enforce the requirements of Washington State ballast water management program laws and regulations. All vessel operators would be required to comply with federal and state ballast regulations or risk penalties for violations.
- **Spills from vessel.** Coal and fuel spills could occur if the cargo tanks on a vessel are ruptured during such events as a grounding or collision; however, the potential for a vessel rupture incident is low. Chapter 5, Section 5.4, *Vessel Transportation*, evaluates the risk of vessel-related incidents. Chapter 3, Section 3.6, *Hazardous Materials*, also discusses actions to be taken for emergency response and cleanup. A spill from a vessel could have significant

potential impacts on water quality based on the location, quantity spilled, and response actions taken.

- **Day-to-day rail operations.** Day-to-day rail operations could release contaminants to stormwater, including coal dust, metals, hydraulic and brake fluid, oil, and grease from track lubrication. As discussed in Chapter 3, Section 3.6, *Hazardous Materials*, if a release of hazardous materials were to occur, the rail operator would implement emergency response and cleanup actions per the Federal Railroad Administration requirements and state law, including Washington State regulations under RCW 90.56. Chapter 3, Section 3.6, *Hazardous Materials*, also discusses actions to be taken for emergency response and cleanup.
- **Spill from collision or derailment of train.** Fuel or hazardous material spills could occur if trains or rail cars collide or derail. As discussed in Chapter 3, Section 3.6, *Hazardous Materials*, if a release of hazardous materials were to occur, the rail operator would implement emergency response and cleanup actions as required by the Federal Railroad Administration requirements and state law, including Washington State regulations under RCW 90.56. Chapter 3, Section 3.6, *Hazardous Materials*, also discusses actions to be taken for emergency response and cleanup. Spills of coal from a rail car could affect water quality based on the location, quantity spilled, and response actions taken.

4.5.5.2 No-Action Alternative

Under the No-Action Alternative, current operations would continue, and the existing bulk product terminal would be expanded. Because existing industrial import and export activities would be expanded, impacts on water quality would be similar to those described for the Proposed Action regarding potential oils and grease spills from equipment or other raw materials shipped from the terminal. The existing NPDES permit would remain in place, maintaining the water quality of existing stormwater discharges. Maintenance dredging at Dock 1 would continue in accordance with a future maintenance dredging permit, with dredging occurring every 2 to 3 years.

Any new or expanded industrial uses would trigger a new or modified NPDES permit. Upland buildings could be demolished and replaced for new industrial uses. Ground disturbance would not result in any impacts on waters of the United States and would not require a permit from the Corps. Any new impervious surface area would generate stormwater, but all stormwater would be collected and treated to meet state and federal water quality requirements prior to discharge to the Columbia River.

4.5.6 Required Permits

The Proposed Action would require the following permits for water quality.

- **NPDES Construction Stormwater Permit—Washington State Department of Ecology**. The construction of the Proposed Action would result in more than 1 acre of ground disturbance and would require a construction stormwater permit. As part of the NPDES permit process, stormwater and wastewater generated on the site would be evaluated and characterized, after which the specific language and type of NDPES permit would be determined.
- **NPDES Industrial Stormwater Permit—Washington State Department of Ecology**. The Proposed Action would result in industrial activities such as the operation of a transportation facility or bulk station and terminal and would require an industrial stormwater permit. All

wastewater and stormwater generated in the project area, and potentially discharged from the project area after treatment, would be evaluated and characterized by the state. Once the water to be discharged has been accurately evaluated and characterized by the state, the specific standards for water discharged from the project area would be defined and the type of NPDES permit would be determined and issued.

- **Water Rights—Washington State Department of Ecology.** The Applicant would need to ensure its original water rights are current prior to using those rights. If the Applicant's water rights are current, the Applicant must maintain those water rights. If the Applicant's water rights are partially or fully relinquished, the Applicant must apply for and obtain the necessary water rights. If stormwater is collected and reused for a beneficial use, a Water Right Permit would be required in accordance with Chapter 90.03 RCW.
- **Clean Water Act Section 404—U.S. Army Corps of Engineers**. Construction of the Proposed Action would require Department of the Army authorization from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.
- **Clean Water Act Section 401—Washington State Department of Ecology**. An Individual Water Quality Certification from Ecology under Section 401 of the Clean Water Act would be required for construction of the Proposed Action.
- **Rivers and Harbors Act—U.S. Army Corps of Engineers**. Construction of the Proposed Action would require Department of the Army authorization from the U.S. Army Corps of Engineers under Section 10 of the Rivers and Harbors Act. The Rivers and Harbors Act authorizes the Corps to protect commerce in navigable streams and waterways of the United States by regulating various activities in such waters. Section 10 of the RHA (33 USC 403) specifically regulates construction, excavation, or deposition of materials in, over, or under navigable waters, and any work that would affect the course, location, condition, or capacity of those waters.
- **Hydraulic Project Approval—Washington Department of Fish and Wildlife**. The Proposed Action would require a Hydraulic Project Approval from WDFW because project elements would affect and cross the shoreline of the Columbia River. The approval would consider impacts on riparian and shoreline/bank vegetation in issuance and conditions of the permit, including for the installation of the proposed docks and piles, as well as for project-related dredging activities and other project-related in-water work.

4.5.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to water quality from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

4.5.7.1 Applicant Mitigation

The Applicant will implement the following measures to mitigate impacts on water quality.

MM WQ-1. Locate Spill Response Kits Near Main Construction and Operations Areas.

The Applicant will locate spill response kits throughout the project area during construction and operations. The spill response kits will contain response equipment and personal protective equipment appropriate for hazardous materials that will be stored and used during construction and operations. Site personnel will be trained in the storage, inventory, and deployment of items in the spill response kits. Spill response kits will be checked a minimum of four times per year to ensure proper-functioning condition, and will otherwise be maintained and replaced per manufacturer recommendations. Should a spill response kit be deployed, the Applicant will notify Cowlitz County and Ecology immediately. The Applicant will submit a map indicating the types and locations of spill response kits to Cowlitz County and Ecology for approval prior to beginning construction and operations.

MM WQ-2. Develop and Implement a Coal Spill Containment and Cleanup Plan.

To limit the exposure of spilled coal to the terrestrial, aquatic, and built environments during coal handling, the Applicant will develop a containment and cleanup plan. The plan will be reviewed by Cowlitz County and Ecology and implemented prior to beginning export terminal operations. In the event of a coal spill in the aquatic environment by the Applicant during export terminal operations, action will be taken based on the specific coal spill, and the Applicant will develop a cleanup and monitoring plan consistent with the approved containment and cleanup plan. This plan will include water quality and sediment monitoring to determine the potential impact of the coal spill on the aquatic habitat and aquatic species. The Applicant will develop the cleanup and monitoring plan in coordination with Cowlitz County, Ecology, and the Corps. The cleanup and monitoring will be similar in scope to the monitoring completed for the Aquatic Impact Assessment (Borealis Environmental Consulting 2015) associated with a coal spill in British Columbia, Canada in 2014.

MM CDUST-1. Monitor and Reduce Coal Dust Emissions in the Project Area.

To address coal dust emissions, the Applicant will monitor coal dust during operation of the Proposed Action at locations approved by the Southwest Clean Air Agency (SWCAA). A method for measuring coal dust concentration and deposition will be defined by SWCAA. If coal dust levels exceed nuisance levels, as determined by SWCAA, the Applicant will take further action to reduce coal dust emissions. Potential locations to monitor coal dust concentration and deposition will be along the facility fence line in close proximity to the coal piles, where the rail line enters the facility and operation of the rotary dumper occurs, and at a location near the closest residences to the project area, if agreed to by the property owner(s). The Applicant will conduct monthly reviews of the concentration and deposition data and maintain a record of data for at least 5 years after full operations, unless otherwise determined by SWCAA. If measured concentrations exceed PM air quality standards, the Applicant will report this information to SWCAA, Cowlitz County and Ecology. The Applicant will gather 1 year of fence line data on particulate matter (PM) 2.5 and PM10 prior to beginning operations and maintain the data as reference. This data will be reported to SWCAA, Cowlitz County, and Ecology.

MM CDUST-3. Reduce Coal Dust Emissions from Rail Cars.

To address coal dust emissions, the Applicant will not receive coal trains unless surfactant has been applied at the BNSF Railway Company (BNSF) surfactant facility in Pasco, Washington for BNSF trains traveling through Pasco. While other measures to control emissions are allowed by BNSF, those measures were not analyzed in this EIS and would require additional environmental review. For trains that will not have surfactant applied at the BNSF surfactant facility in Pasco, before beginning operations, the Applicant will work with rail companies to implement advanced technology for application of surfactants along the rail routes for Proposed Action-related trains.

4.5.8 Unavoidable and Significant Adverse Environmental Impacts

Compliance with laws and implementation of the measures and design features described above would reduce impacts on water quality. There would be no unavoidable and significant adverse environmental impacts on water quality.

4.6 Vegetation

Vegetation is the foundation of most aquatic and terrestrial ecosystems. Among other functions, plants release oxygen and sequester carbon, provide wildlife habitat and food, affect soil development, and can increase slope stability. Plants are involved in the regulation of biogeochemical cycles such as the movement and filtration of water, carbon, and nitrogen. Plants can also have cultural, spiritual, and psychological benefits for humans.

This section describes vegetation in the study area. It then describes impacts on vegetation that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

4.6.1 Regulatory Setting

Laws and regulations relevant to vegetation are summarized in Table 4.6-1.

Table 4.6-1. Regulations, Statutes, and Guidelines for Vegetation

Regulation, Statute, Guideline	Description
Federal	
Clean Water Act (33 USC 1251, *et seq*.)	Authorizes EPA to establish the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Regulates activities in streams, wetlands, and other aquatic resources, including integral vegetated components.
Endangered Species Act (16 USC 1531-1544)	Provides for the conservation of species listed as threatened or endangered and the habitat upon which they depend. Section 7 of the ESA requires federal agencies to consult with USFWS and/or NMFS to ensure a federal action is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of designated critical habitat.
State	
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 (RCW 90.58)	Requires cities and counties (through their Shoreline Master Programs) to protect shoreline natural resources against adverse impacts.
State Water Pollution Control Act (RCW90.48)	Provides Ecology with the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland water, salt waters, watercourses, and other surface and groundwater in the state.
Washington Natural Resource Damage Assessment (RCW 90.56.370)	Holds parties responsible for spilling oil into state waters liable for damages resulting from injuries to public resources.

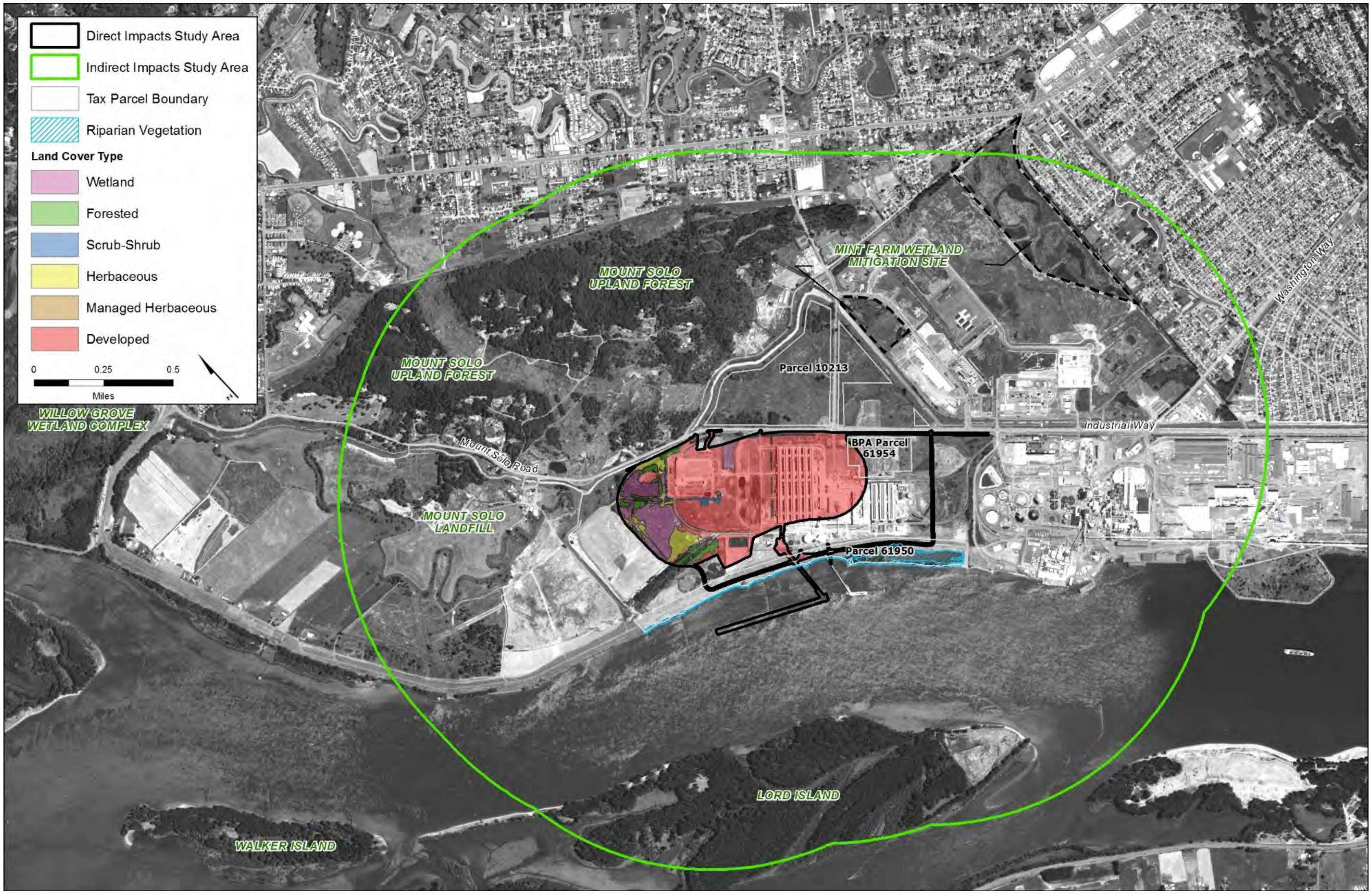
Regulation, Statute, Guideline	Description
Oil Spill Natural Resource Damage Assessment (WAC 173-183)	Establishes procedures for convening a resource damage assessment committee and screening of resource damages resulting from oil spills to determine which damage assessment to use. Provides for determining damages in cases where the compensation schedule is selected as the damage assessment method to apply.
Washington Natural Area Preserves Act	Establishes the Washington Natural Heritage Program to identify candidates for natural areas designated to preserve special-status plant species and regionally important or unique plant communities. Authorizes the program to track plant species and high-quality natural ecosystems in the state and to designate plants with a state status as threatened, sensitive, or endangered. WDNR is the implementing agency.
Washington State Noxious Weed Control Act (RCW 17.10, WAC 16-750)	Establishes noxious weed control boards, which designate certain plant species as Class A, B, or C noxious weeds. Authorizes the management, control, and/or elimination of noxious weed populations in the state.
Washington State Hydraulic Code (WAC 220-110)	WDFW issues a hydraulic project approval for certain construction projects or activities in or near state waters. Considers effects on riparian and shoreline or bank vegetation in issuance and conditions of the permit.
Clean Water Act Section 401 Water Quality Certification	Ecology issues Section 401 Water Quality Certification for in-water construction activities to ensure compliance with state water quality standards and other aquatic resources protection requirements under Ecology's authority as outlined in the federal Clean Water Act.
Local	
Cowlitz County Critical Areas Protection Ordinance (19.15)	Requires the County to designate critical areas, including vegetation in wetlands and their buffers.
City of Longview Critical Areas Ordinance (17.10.140)	Regulates activities within and adjacent to critical areas including 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 Shoreline Master Program (CCC 19.20)	Regulates development in the shoreline, including the shoreline of the Columbia River, a Shoreline of Statewide Significance.

Notes:
USC = United States Code; ESA = federal Endangered Species Act; EPA = U.S. Environmental Protection Agency; USFWS = U.S. Fish and Wildlife Service; NMFS = National Marine Fisheries Service; WDFW = Washington Department of Fish and Wildlife; RCW = Revised Code of Washington; WAC = Washington Administrative Code

4.6.2 Study Area

The study area for direct impacts on vegetation is the 190-acre project area plus additional elements (e.g., access roads, docks, and rail line), a total of 212 acres, as shown in Figure 4.6-1.

Figure 4.6-1. Vegetation Study Area



The indirect impacts study area for vegetation related to operations in the project area is the area within 1 mile of the project area, for a total of 4,401 acres (Figure 4.6-1). This area considers the extent to which potential coal dust deposition (Chapter 5, Section 5.7, *Coal Dust*) could affect vegetation during operations.

Further vegetation indirect impact study areas were also established for vessel and rail traffic associated with the Proposed Action. These include the lower Columbia River to evaluate the potential impacts on shoreline vegetation resulting from Proposed Action-related vessels transiting the Columbia River and rail routes for Proposed Action-related trains in Cowlitz County and Washington State to evaluate the potential impacts that could occur because of a coal spill. Wetland vegetation is discussed in more detail in Section 4.3, *Wetlands*.

4.6.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on vegetation associated with the construction and operation of the Proposed Action and No-Action Alternative.

4.6.3.1 Information Sources

The following sources of information were used to describe the existing conditions relevant to vegetation and identify the potential impacts of the Proposed Action and No-Action Alternative on vegetation in the study area.

- Two site visits conducted by ICF biologists on April 8, 2014, and December 11, 2014.
- Historical aerial photos from 1994 and 2014 accessed through Google Earth Professional, a 2010 aerial photo provided by ESRI, and a 2012 aerial photo from the North Agriculture Imagery Program.
- Reports prepared by Grette Associates for the Applicant as part of the permit application materials (Grette 2014a through 2014i).
- U.S. Fish and Wildlife Service (USFWS) (2015) Information for Planning and Conservation, online database.
- 2011 National Land Cover Database (Homer et al. 2015) to describe land cover classes in the indirect impacts study area. Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) spatial data provided by WDFW on May 5, 2014, for the study area (Washington Department of Fish and Wildlife 2014).
- The Washington State Department of Natural Resources (WDNR) Natural Heritage Program Information System (Washington State Department of Natural Resources 2015) list of known occurrences of rare plants in Cowlitz County, Washington, and details regarding their occurrence, habitat, and range.

4.6.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on vegetation. A full description of analysis methods is provided in the *SEPA Vegetation Technical Report* (ICF 2017).

- Five land cover types (developed lands, uplands, wetlands, riparian lands, and open water) were mapped to describe vegetation for the direct impacts study area based on site visits, aerial photographs, federal databases, and information provided by the applicant. Vegetation cover within these land cover types was then characterized (e.g., forested, scrub-shrub, herbaceous, and managed herbaceous). Land cover type mapping was adjusted based on field observations.
- Land cover types in the indirect impacts study area within 1 mile of the project area are described based on the 2011 National Land Cover Database GIS data (Homer et al. 2015); land cover classifications described in these data consist of open water, developed, forest, shrub, herbaceous, barren land, agriculture (planted/cultivated and hay/pasture), and wetlands.
- Direct impacts on vegetation from construction of the Proposed Action would result when portions of the study area are cleared to construct the coal export terminal and associated infrastructure. These impacts were quantified by overlaying the study area on the land cover map. The approximate acreage of each affected cover type was calculated and expressed as a percentage of all cover types in the study area.
- Direct and indirect impacts from operations are qualitatively described, including the impact mechanism, potential impacts, duration (i.e., temporary or permanent), and likelihood of occurrence.

For the purposes 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).

4.6.4 Existing Conditions

This section describes the existing environmental conditions in the study areas related to vegetation that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

4.6.4.1 Direct Impacts Study Area

The following land cover types are found in the direct impacts study area.

Developed Lands

Developed lands account for 151.14 acres (71%) of the direct impacts study area. Developed lands are those areas where the majority of the vegetation has been removed and replaced with pavement, buildings, or other types of infrastructure. Developed lands also include disturbed areas of land comprising widely scattered patches of invasive shrubs such as Himalayan blackberry (*Rubus armeniacus*) and Scotch broom (*Cytisus scoparius*). These areas are typically found on higher mounds and around derelict structures and equipment. Developed lands include all of the areas previously developed by the former Reynolds Metals Company facility (Reynolds facility) and the Bonneville Power Administration (BPA) and Cowlitz County Public Utility District substations. Named features and facilities described below are shown in Figure 4.2-3 in Section 4.2, *Surface Water*. Wetlands discussed below are shown in Section 4.3, *Wetlands*, Figures 4.3-1 through 4.3-4.

Uplands

Uplands are undeveloped vegetated areas that do not exhibit wetland characteristics. Uplands account for 26.26 acres (12%) of the direct impacts study area and consist of the following vegetation types.

- **Forested uplands.** Forested uplands are areas where trees more than 16 feet high provide more than 20% canopy cover (Multi-Resolution Land Characteristic Consortium 2011). Approximately 8.90 acres (4%) of the direct impacts study area were identified as forested uplands. On the former Reynolds facility, forested uplands occur around Wetlands A, C, and Y between the closed Black Mud Pond (BMP) facility and the former cable plant and along the U-Ditch and Interceptor Ditch. Dominant trees in the uplands adjacent to Wetlands A, C, and Y include black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), some Pacific willow (*Salix lucida*), and Oregon ash (*Fraxinus latifolia*). Common shrubs include Himalayan blackberry, red elderberry (*Sambucus racemosa*), and sweetbriar rose (*Rosa rubiginosa*), with black cottonwood and Oregon ash saplings also present. Dominant trees in the forested corridor along the U-Ditch and Interceptor Ditch include black cottonwood, red alder (*Alnus rubra*), and some Oregon ash along the ditch banks. Himalayan blackberry is the most common plant in the shrub layer, but has been recently cleared from some areas on the western end of the U-Ditch. Red osier-dogwood (*Cornus sericea*) is also common. Several types and sizes of fallen trees are present in this forested corridor, as are various snags. Reed canarygrass (*Phalaris arundinacea*) is common in the herbaceous layer in all of these forested upland areas.

  Forested uplands in the direct impacts study area also include a small area (0.05 acre) of forest in the riparian zone along the Columbia River between the ordinary high water mark (OHWM) and the top of the Consolidated Diking Improvement District (CDID) #1 levee.

- **Scrub-shrub uplands.** Scrub-shrub uplands are areas with more than 20% canopy cover of shrubs or small trees that are less than 16 feet high (Multi-Resolution Land Characteristic Consortium 2011). Approximately 2.11 acres (1%) of the direct impacts study area were identified as scrub-shrub uplands. Scrub-shrub uplands on the former Reynolds facility occur around the former cable plant and north of the closed BMP facility around Wetland Y. Common species in these areas include young black cottonwood, willows, and Himalayan blackberry. Reed canarygrass is also common in the herbaceous layer.

- **Unmanaged herbaceous uplands.** Unmanaged herbaceous uplands are areas dominated by native and nonnative grasses and forbs and not maintained or managed (e.g., mowed) on a regular basis. Approximately 10.88 acres (5%) of the direct impacts study area were identified as unmanaged herbaceous uplands. These areas occur on the former Reynolds facility and BPA Parcel 61954. Unmanaged herbaceous uplands in the direct impacts study area occur along the CDID #1 Ditch 10 to the northwest of the former cable plant; in the former borrow area to the east of the closed BMP facility; and in the southeastern portion of the direct impacts study area along the Reynolds Lead spur. These areas are primarily dominated by reed canarygrass. Unmanaged herbaceous uplands on BPA Parcel 61954 are located in a transmission line easement to the northwest of the Longview Substation. This area is dominated by species similar to those listed above for the direct impacts study area, as well as Himalayan blackberry.

- **Managed herbaceous uplands.** Managed herbaceous uplands are areas regularly managed by mowing, grazing, or other activities. Approximately 4.37 acres (2%) of this cover type occur on the former Reynolds facility, CDID #1 levee, lawns around the administrative and maintenance buildings, and caps of the closed BMP facility. All of these areas are dominated by grasses and forbs that are regularly mown. Species present include reed canarygrass, haired bentgrass (*Agrostis scabra*), colonial bentgrass (*Agrostis capillaris*), broadleaf plantain (*Plantago major*), orchard grass (*Dactylis* spp.), short-awn foxtail (*Alopecurus aequalis*), western bittercress (*Cardamine oligosperma*), blue wildrye (*Elymus glaucus*), common horsetail (*Equisetum arvense*), Queen Anne's lace (*Daucus carota*), scouring rush (*Equisetum hyemale affinis*), bedstraw (*Galium aparine*), velvetgrass (*Holcus lanatus*), perennial ryegrass (*Lolium perenne*), Kentucky bluegrass (*Poa pratensis*), and American vetch (*Vicia Americana*).

Wetlands

Wetlands exhibit the wetland vegetation, soil, and hydrology characteristics defined in the federal wetland delineation manual and account for 26.93 acres (11%) of the direct impacts study area. The most prevalent wetland type is herbaceous wetlands, followed by forested wetlands and scrub-shrub wetlands. Section 4.3, *Wetlands*, discusses wetlands and wetland vegetation in detail.

Open Water

Open water accounts for 10.78 acres (5%) of the direct impacts study area and consist of the Columbia River and various ditches and ponds. This land cover is described in more detail in Sections 4.2, *Surface Water and Floodplains*, and 4.8, *Wildlife*, as an aquatic habitat. These areas support vegetation along their perimeters, typically including native plants as well as noxious weeds. Curly pondweed (*Potamogeton crispus*) was observed at approximately -1 foot Columbia River Datum downstream of Dock 1 during a period of high visibility. The gently sloping portion of the shallow water habitat area between the east and west pile dikes near the project area may support a narrow band of sparse aquatic vegetation in the uppermost elevations where increased light penetration and reduced river velocity are present, relative to the deeper portions of the river in this area.

4.6.4.2 Indirect Impacts Study Area

Table 4.6-2 summarizes the areas and percent cover of land cover classes in the indirect impacts study area within 1 mile of the project area. Approximately 70% of the indirect impacts study area is occupied by developed lands, open water (primarily the Columbia River), and agricultural lands; the remaining 30% consists of forest, shrub, herbaceous, wetlands, and barren lands.

Land cover immediately surrounding the project area is similar to the project area, consisting primarily of developed areas, managed/unmanaged herbaceous areas, wetlands, and open water (the Columbia River). Riparian lands are found predominantly along the Columbia River between the OHWM and the top of the CDID #1 levee, and include vegetation adjacent to the active channel margin in riparian zones identified in the previous upland and shoreline habitat inventories (Grette Associates 2014e, 2014g, 2014h).

Table 4.6-2. Land Cover in the Indirect Impacts Study Area

Land Cover Classification	Area in Indirect Impacts Study Area (acres)	Percent Cover in Indirect Impacts Study Area
Developed	1631	37
Forest	347	8
Shrub	106	2
Herbaceous	62	2
Agriculture	573	13
Wetlands	719	16
Open water	880	20
Barren land	83	2
Total	**4401**	**100**

Notes:
Source: National Land Cover Data Base 2011 (Homer et al. 2015).

The riparian lands consist of three vegetation types: forest, scrub-shrub, and herbaceous.

- **Riparian forest.** Riparian forest extends in a band of varying width along most of the shoreline, with the widest areas found on the southern portion of the shoreline near the previous dredged material storage area. Dominant vegetation in this cover type includes black cottonwood and various willow trees, underlain by a mixture of native shrubs such, as red osier dogwood, and invasive shrubs, such as Himalayan blackberry and Scotch broom. Scattered accumulations of large woody material are present in these areas.
- **Riparian scrub-shrub.** Riparian scrub-shrub contains similar species to riparian forest. Two scrub-shrub riparian areas were found on BPA Parcel 61950 between the Columbia River and the levee. These areas are dominated by black cottonwood saplings, various willows, and nonnative vegetation including Himalayan blackberry and Scotch broom. Native and nonnative herbaceous species are also present.
- **Riparian herbaceous.** Riparian herbaceous areas are generally dominated by grasses and weeds including reed canarygrass, velvet grass, common horsetail, and broadleaf plantain. These sparse patches of herbaceous vegetation occur under the existing Dock 1 conveyor and trestle, and on sandy flats between the OHWM and the approximate elevation of mean higher high water.

The following areas in the indirect impacts study area contain higher quality vegetation communities and generally represent contiguous forest and other intact vegetation communities (Figure 4.6-1).

- **Mount Solo upland forest**. Mount Solo is a forested ridge north of the project area. It supports a large area (approximately 505 acres) of native forest intermixed with rural residential areas and some light industrial uses. This area is the largest inland forested area in the indirect impacts study area. Vegetation includes Douglas fir (*Pseudotsuga menziesii*), big leaf maple (*Acer macrophyllum*), red alder, and western hemlock (*Tsuga heterophylla*). It supports a diversity of native plant communities and provides habitat for a variety of wildlife species.

- **Mint Farm wetland mitigation sites**. Two compensatory wetland mitigation sites for the Mint Farm Industrial Park are located east of the project area. The Phase I mitigation site is 4.28 acres and is a complex of forested, scrub-shrub and emergent wetlands; the Phase II mitigation site is 67 acres and is a mixture of forested, scrub-shrub and emergent wetlands intermixed with forested uplands.
- **Lord Island**. Lord Island is located in the Columbia River near the project area. The 234-acre island was previously used for dredge material disposal. It is densely forested and bisected by various high-flow channels that support tidal marshes and shallow habitat areas. Vegetation on the island is largely native. Refer to Section 4.8, *Wildlife*, for habitats and wildlife of Lord Island.

4.6.4.3 Special-Status Plant Species

As shown in Table 4.6-3, there are 15 plant species with some type of federal or state status in Cowlitz County (Washington State Department of Natural Resources 2015).

Table 4.6-3. Known Occurrences of Threatened, Endangered, Sensitive, and Rare Plants in Cowlitz County

Scientific Name	Common Name	Federal Status[a]	State Status[b]	Historical Record[c]
Agoseris elata	Tall agoseris	--	S	C
Buxbaumia viridis	Buxbaumia moss	--	R1	C
Cimicifuga elata	Tall bugbane	SC	S	H
Corydalis aquae-gelidae	Clackamas corydalis	SC	S	C
Erythronium revolutum	Pink fawn-lily	--	S	C
Euonymus occidentalis var. *occidentalis*	Western wahoo	--	S	C
Isoetes nuttallii	Nuttall’s quillwort	--	S	C
Physostegia parviflora	Western false dragonhead	--	R1	H
Poa laxiflora	Loose-flowered bluegrass	--	S	C
Poa nervosa	Wheeler’s bluegrass	--	S	C
Salix sessilifolia	Soft-leaved willow	--	S	C
Sidalcea nelsoniana	Nelson’s checker-mallow	LT	E	C
Tetraphis geniculata	Tetraphis moss	--	R1	C
Utricularia gibba	Humped bladderwort	--	R1	C
Wolffia columbiana	Columbia water-meal	--	R1	C

Notes:

[a] Federal Status under the Endangered Species Act:
LT = Listed Threatened (likely to become endangered)
SC = Species of Concern. An unofficial status, the species appears to be in jeopardy, but insufficient information to support listing.

[b] State Status of plant species is determined by the Washington Natural Heritage Program. Factors considered include abundance, occurrence patterns, vulnerability, threats, existing protection, and taxonomic distinctness. Values include:
E = Endangered. In danger of becoming extinct or extirpated from Washington.
S = Sensitive. Vulnerable or declining and could become Endangered or Threatened in the state.
R1 = Review group 1. Of potential concern but needs more fieldwork to assign another rank.

[c] Historical Record refers to when the occurrence was documented:
C = Most recent sightings after 1977.
H = Most recent sighting before 1977.

Source: Washington State Department of Natural Resources 2014.

None of these species has been recorded in the direct or indirect study areas. The nearest record of occurrence of a special-status plant species is a documented siting of the obligate wetland species Columbia water-meal (*Wolffia columbiana*) approximately 1.5 miles northwest of the project area and outside of the direct and indirect study areas (Washington State Department of Natural Resources 2015).

The special-status plant species, and the preferred elevation, habitat and geographic range for each are provided in Table 4.6-4. As indicated in Table 4.6-4, of the 15 special-status plant species known to occur in Cowlitz County, six were identified as potentially occurring in the direct impacts study area, based on the presence of potentially suitable habitat. These species are Nelson's checker-mallow (*Sidalcea nelsoniana*), western wahoo (*Euonymus occidentalis* var *occidentalis*), western false dragonhead (*Physostegia parviflora*), loose-flowered bluegrass (*Poa laxiflora*), soft-leaved willow (*Salix sessilifolia*), and Columbia water-meal.

Table 4.6-4. Elevation, Habitat, and Geographic Range of Listed Threatened, Endangered, Sensitive, and Rare Plants in Cowlitz County

Common Name	Scientific Name	Elevation Range	Habitat	Geographic Range	Occurrence Relative to Project Area
Tall agoseris	*Agoseris elata*	500 to 7,800 feet	Found in meadows, prairies, open woods, and exposed rocky ridges. Occurs in areas with little to no canopy cover and assumed to be shade intolerant.	Throughout California, Oregon, and Washington.	Documented in northeastern Cowlitz County. Not likely to occur on the project area due to elevation.
Buxbaumia moss	*Buxbaumia viridis*	Low to subalpine elevations	Found in coniferous forests on well-rotted logs and peaty soil and humus.	Western North America including the western portion of Washington.	Documented in east-central Cowlitz County. Not likely to occur on the project area due to lack of suitable coniferous habitat.
Tall bugbane	*Cimicifuga elata*	100 to 2,800 feet, with majority below 700 feet	Occurs in or along margins of mixed mature or old growth forests, including mesic coniferous or mixed coniferous-deciduous stands. Frequently found on north or east-facing slopes.	Southwestern British Columbia to southern Oregon, west of Cascade range.	Documented in western Cowlitz County in areas along the Columbia River. Not likely to occur on the project area due to lack of appropriate forest habitat.
Clackamas corydalis	*Corydalis aquae-gelidae*	1,250 to 4,200 feet	Occurs in or near cold flowing water, including seeps and small streams; often occurring in stream channels. Moist shady woods in western hemlock (*Tsuga heterophylla*) and silver fir (*Abies amabilis)* zones. Prefers intermediate levels of overstory canopy closure.	Regionally endemic of Washington; Clackamas and Multnomah Counties in Oregon.	Documented in eastern Cowlitz County. Not likely to occur on the project area due to elevation and lack of suitable habitat.

Common Name	Scientific Name	Elevation Range	Habitat	Geographic Range	Occurrence Relative to Project Area
Pink fawn-lily	*Erythronium revolutum*	100 to 600 feet	Occurs in high-precipitation areas within 100 km of the coast, in moist soil in open or moderately shaded forests that provide full light at ground level. Habitats in Washington include swampy western redcedar (*Thuja plicata*)-lodgepole pine (*Pinus contorta*) forests, Sitka spruce (*Picea sitchensis*) woods on consolidated sand dunes, Sitka spruce-western hemlock forests, and shaded river bottoms.	Pacific coast region from southern British Columbia to northwestern California.	Documented in northwestern Cowlitz County. Not likely to occur on the project area due to lack of suitable coniferous forest habitat.
Western wahoo	*Euonymus occidentalis* var. *occidentalis*	20 to 600 feet	Occurs in moist woods and forested areas on west side of Cascades. Often found in shaded draws, riparian areas, and ravines. Sometimes found in grassy areas with scattered trees. In Washington, it typically occurs on fine sandy loam, silty loam, and silty clay loams.	British Columbia, western Washington, and Oregon, south to central California.	Documented in west-central Cowlitz County, potentially near the project area. Appropriate habitat may occur on and near the project area.
Nuttall's quillwort	*Isoetes nuttallii*	200 to 345 feet	Terrestrial species found in seasonally wet ground, seepages, temporary streams, and mud near vernal pools.	Southeast Vancouver Island, British Columbia to southern California.	Documented in west-central Cowlitz County, potentially near the project area. Not likely to occur on the project area due to elevation.

Common Name	Scientific Name	Elevation Range	Habitat	Geographic Range	Occurrence Relative to Project Area
Western false dragonhead	*Physostegia parviflora*	None provided	Occurs along shores of streams and lakes, marshes, and other low, wet places in the valleys and foothills.[a]	East of the Cascade summits, British Columbia south through Washington to the Columbia Gorge, then west to Portland, Oregon; east to Idaho and North Dakota.[a]	Most recent documentation in Cowlitz County is prior to 1977. Appropriate habitat may occur on and near the project area.
Loose-flowered bluegrass	*Poa laxiflora*	50 to 3,700 feet	Found on moss-covered rocks and logs, along streams and rivers, and on edges of wet meadows in moist shady woods.	Found in coastal Alaska, British Columbia, western Washington, and western Oregon.	Documented in northwestern Cowlitz County. Appropriate habitat may occur on and near the project area.
Wheeler's bluegrass	*Poa nervosa*	10 to 800 feet	Found in low-elevation wet habitats west of the Cascade crest in forest openings with minimal canopy cover, mossy rock outcrops, cliff crevices, and occasionally talus. Sites are often sparsely vegetated with little soil development.	Endemic from Vancouver Island, British Columbia, to northwest Oregon.	Documented in west-central Cowlitz County, potentially near project area. Unlikely to occur on the project area due to lack of preferred habitat elements.
Soft-leaved willow	*Salix sessilifolia*	None provided	Found in wet lowland habitats, including silty or sandy riverbanks, riparian forests, dredge spoils, sandy beaches, and at the upper edge of an intertidal zone.	Found in southern British Columbia to northern California.	Documented in northern Cowlitz County. Appropriate habitat may occur on or near the project area.
Nelson's checker-mallow	*Sidalcea nelsoniana*	None provided	Found in low-elevation meadows, prairie, or grassland, along fencerows, streams, and roadsides, drainage swales, and edges of plowed fields adjacent to wooded areas.	Regionally endemic of Benton County, Oregon, north to Lewis County, Washington, and from central Linn County, Oregon to just west of the crest of the Coast Range.	Documented in northwestern Cowlitz County. Appropriate habitat may occur on and near the project area.

Common Name	Scientific Name	Elevation Range	Habitat	Geographic Range	Occurrence Relative to Project Area
Tetraphis moss	*Tetraphis geniculata*	Sea level to subalpine elevations	Occurs on the cut or broken ends or lower half of large decay class rotten logs or stumps, and occasionally on peaty banks in moist coniferous forests.	From Alaska and British Columbia through western Washington and select sites in Oregon.	Not documented in Cowlitz County. Not likely to occur on project area due to lack of suitable coniferous habitat with logs and stumps.
Humped bladderwort	*Utricularia gibba*	160 to 490 feet	Occurs in lakes, lake edges, and muddy disturbed sites in the lowland zone.	Southern British Columbia south to California.	Documented in northern Cowlitz County. Not likely to occur on project area due to elevation.
Columbia water-meal	*Wolffia columbiana*	10 to 250 feet	Found in freshwater lakes, ponds, and slow streams.	From California to British Columbia, east to Quebec, and south to Florida, excluding the interior southwestern states.	Occurs within 1.5 miles of the project area; could occur in ponded habitats on or near the project area.

Notes:
[a] Herbarium, Burke Museum of Natural History and Culture 2014.
Source: Unless noted otherwise, this information came from the Washington State Department of Natural Resources, Washington Natural Heritage Program plant species fact sheets at http://www1.dnr.wa.gov/nhp/refdesk/lists/plantsxco/cowlitz.html.

4.6.4.4 Noxious Weeds

The project area supports plant species regulated as noxious weeds. Fourteen noxious weed species have been documented in the project area (Table 4.6-5) (Cowlitz County Noxious Weed Control Board 2015; Washington State Noxious Weed Control Board 2015). No species designated for Cowlitz County as Class A noxious weeds has been observed in the project area (Table 4.6-6 provides definitions for the noxious weed classifications). Six of the species identified in the project area (indigobush [*Amorpha fruticosa*], Scotch broom, policeman's helmet [*Impatiens glandulifera*], Eurasian water milfoil [*Myriophyllum spicatum*], parrotfeather [*Myriophyllum aquaticum*], and water primrose [*Ludwigia hexapetala*]) are considered Class B weeds, and identified as priorities for control, either by Washington State or Cowlitz County. The remaining eight species in the study area are listed Class C noxious weeds, a classification assigned to weeds that are not typically considered a priority for weed control because they are already widespread throughout the state. These species are Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), English ivy (*Hedera helix*), yellow-flag iris (*Iris pseudacorus*), reed canarygrass, Himalayan blackberry, common tansy (*Tanacetum vulgare*), and nonnative cattail.

Table 4.6-5. Noxious Weeds Identified in the Project Area

Noxious Weed Species			Classification		
Common Name	**Scientific Name**	**Location Observed[a,b,c]**	**State[d]**	**Cowlitz County[e]**	**State/County Priority Weed for Control[e]**
Indigobush	*Amorpha fruticosa*	Riparian[b]	B	B	Yes/No
Scotch broom	*Cytisus scoparius*	W/U[a, b]	B	B	No/Yes
Policeman's helmet	*Impatiens glandulifera*	W/U[a]	B	B	Yes/Yes
Eurasian water milfoil	*Myriophyllum spicatum*	W/OW[a]	B	B	Yes/No
Parrotfeather	*Myriophyllum aquaticum*	W/OW[a]	B	B	No/No
Water primrose	*Ludwigia hexapetala*	D[c]	B	B	No/No
Canada thistle	*Cirsium arvense*	W/U[a, b]	C	C	No/Yes
Bull thistle	*Cirsium vulgare*	W/U[a, b]	C	C	No/No
English ivy	*Hedera helix*	W/U[a, b]	C	C	No/No
Yellowflag iris	*Iris pseudacorus*	W/D[b]	C	C	No/No
Reed canarygrass	*Phalaris arundinacea*	W/U[a, b]	C	Not listed	No/No
Himalayan blackberry	*Rubus armeniacus*	U[a, b]	C	C	No/No
Common tansy	*Tanacetum vulgare*	U[a]	C	C	No/Yes
Nonnative cattail	*Typha* spp.	W[a, b]	C	C	No/No

Notes:
[a] *Appendix F: Noxious Weeds and Sensitive Plants* in Grette Associates 2014a. Location values: W = wetland; U = upland; D = Ditches; OW = open water
[b] Observations made by ICF during site investigations in April and December 2014.
[c] Observations by Washington State Noxious Weed Control Board (1999).
[d] State classification based on Washington State Noxious Weed Control Board 2015 Noxious Weed List.
[e] County classification and priority for weed control (state and county level) based on Proposed 2015 Cowlitz County Noxious Weed List (Cowlitz County Noxious Weed Control Board 2015).

Table 4.6-6. Washington State Noxious Weed Classification

Class	Definition
A	Nonnative species whose distribution in Washington is still limited. Preventing new infestations and eradicating existing infestations are the highest priority. Eradication of Class A plants is required by law.
B	Nonnative species presently limited to portions of the State. Species are designated for control in regions where they are not yet widespread. Preventing new infestations in these areas is a high priority. In regions where a Class B species is already abundant, control is decided at the local level, with containment as the primary goal.
C	Noxious weeds that are typically widespread in Washington or are of special interest to the state's agricultural industry. The Class C status allows counties to require control if locally desired. Other counties may choose to provide education or technical consultation.

Notes:
Source: Washington State Noxious Weed Control Board 2015.

4.6.5 Impacts

This section describes the potential direct and indirect impacts on vegetation that would result from construction and operation of the Proposed Action and the No-Action Alternative.

4.6.5.1 Proposed Action

This section describes the potential direct and indirect impacts related to vegetation that would result from construction and operation of the Proposed Action and the No-Action Alternative. Direct impacts could result from activities that directly disturb or damage vegetation including such actions as removing vegetation during clearing and grading activities and the physical and chemical management of vegetation and noxious weeds as part of routine facility maintenance. Indirect impacts include the future spread of noxious weeds into areas adjacent to the construction site and the associated changes in plant communities that could result from this activity.

Potential impacts on vegetation were also considered in terms of duration. Permanent impacts would modify vegetation cover types to such a degree that they would not return to their preconstruction state for the life of the project. Temporary vegetation impacts would result in the disturbance of vegetation cover types, but implementation of best management practices, project design components, regulatory requirements, or an on-site vegetation management plan would facilitate reestablishment of vegetation cover types similar to preproject conditions after construction is completed.

The following measures have been identified by the Applicant as measures that would be implemented during operations to suppress coal dust. These measures were considered part of the Proposed Action when evaluating the potential impacts on vegetation.

- The Applicant would implement best management practices and the following project components (and related activities) to avoid and minimize potential impacts associated with coal dust.
    - Conveyors would be:
        - Monitored for general status and washed down regularly.

        - Cleaned using high-pressure water in the collection and containment areas, including belts.
    - Transfer points would be:
        - Cleaned using high-pressure water as part of regular washdowns of underbelt plating, and water collection and containment system.
    - Rail car unloaders would:
        - Use dry fog and water spray systems to control dust.
    - Stockpiles would be:
        - Sprayed via a spray system controlled by local and remote weather stations.
        - Managed via a controlled dropper from the stackers to manage height of piles.
        - Cleaned along conveyor berms and sealed roadways.
    - Shiploading equipment would be:
        - Discharged below deck of vessel.
        - Cleaned and washed by high-pressure water.

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action would result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and docks, and constructing supporting infrastructure (e.g., conveyors and transfer towers).

Permanently Remove Vegetation

Clearing and grading would permanently alter or remove approximately 212 acres of land cover types from the direct impacts study area (Table 4.6-7). Most of the clearing would affect disturbed vegetation and weedy areas (Figure 4.6-2).

The majority of the total impact (71%) would occur in areas occupied by developed lands, typically consisting of areas of existing infrastructure and scattered grasses and weeds in and around the developed portions of the project area. Approximately 26.26 acres of upland vegetation would be removed, or 12% of the direct impacts study area. Herbaceous upland vegetation surrounding Wetlands A, C, and Z make up the majority of this acreage. These herbaceous upland areas are generally dominated by reed canarygrass. Approximately 8.90 acres of upland forest would be removed, with most impacts occurring around Wetland A and the areas surrounding the interception ditch and stormwater conveyance. These areas are dominated by native trees, primarily black cottonwood, red alder, Oregon ash, and Pacific willow trees, with an understory of mixed native and invasive shrubs dominated by red elderberry, sweetbriar rose, and Himalayan blackberry. The impacts would occur as a result of construction of the rail loop, stockpile pads, and a series of stacking and reclaim conveyors.

Table 4.6-7. Permanent Impacts by Land Cover and Vegetation Cover Type in the Direct Impacts Study Area

Land Cover Category	Vegetation Cover Type	Impacts in Direct Impacts Study Area (Acres)[b]	Percentage of Cover Type[c]
Developed land	**Developed land total**	**151.14**	**71**
Upland	Forested	8.90	4
	Scrub-shrub	2.11	1
	Herbaceous	10.88	5
	Managed herbaceous	4.37	2
	Upland total	**26.26**	**12**
Wetlands	**Wetlands total[a]**	**24.10**	**12**
Open water	**Open water total**	**10.78[d]**	**5**
Total		**212.28**	**100**

Notes:

[a] For a detailed discussion of wetland impacts, refer to Section 4.3, *Wetlands*.

[b] These are direct impacts on vegetation in the 212-acre project area, which includes the 190-acre terminal plus additional elements (e.g., access roads, docks, and the rail line).

[c] This column represents the percent of cover type in the direct impacts study area that would be affected by construction.

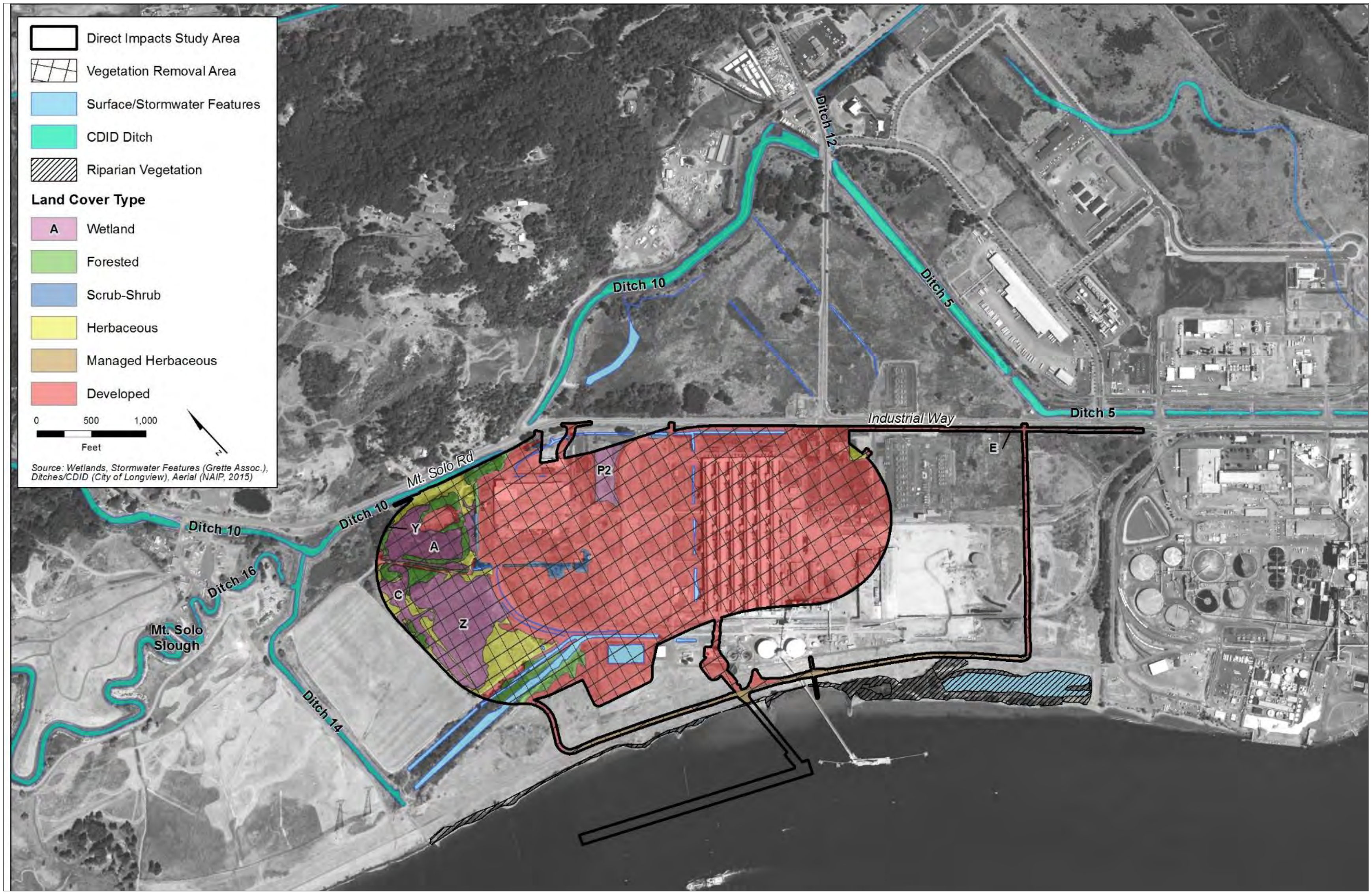
[d] Approximate open water area within footprint of project area. This area includes area of docks and trestle over the open water of the Columbia River. For details on permanent impacts to open water, see Section 4.8 *Wildlife*.

Approximately 0.05 acre of upland forest impact consists of riparian forest. This impact would occur as a result of construction of the trestle that would connect the surge bin to Docks 2 and 3, and would include removing and trimming black cottonwood and willow trees, and understory shrubs as red-osier dogwood and Himalayan blackberry.

Construction would result in the permanent loss of 24.10 acres of vegetated wetland from placement of permanent fill in all of Wetlands A, C, Z, and P2, and a portion of Wetland Y. For a detailed discussion of wetland impacts, refer to Section 4.3 *Wetlands*.

Although no special-status plant species have been recorded in the project area, potentially suitable habitat is present. Should any special-status plant species occur in the project area, they could be destroyed as a result of project construction depending on the location of the plant. Implementation of the proposed mitigation measure to conduct a special-status plant survey would determine presence of special-status plants in the project area and would determine if any special-status plants identified could be avoided or impacts minimized. These surveys would occur during the appropriate time of year, prior to any project related construction activities beginning.

Figure 4.6-2. Impacts on Existing Land Cover Classes and Vegetation Cover Types



Temporarily Disturb Adjacent Vegetation

Construction and staging activities along the edges of the project area could crush and bury adjacent vegetation and compact soil in the direct impacts study area through vehicle use, material storage and stockpiling, and ground disturbance. Ground disturbance related to these activities could also increase the opportunity for stormwater runoff to carry sediments, spilled vehicle fluids, or other construction materials into areas outside of the project area, potentially affecting the health and vigor of adjacent vegetation. Depending on the extent, duration, and content of this runoff, vegetation could be affected through interference with photosynthesis, respiration, growth, and/or reproduction.

Dust from construction activities could also affect vegetation by collecting on leaves and other plant surfaces, potentially inhibiting photosynthesis and other plant functions.

The 35-foot-high preload material piles could provide an area for invasive plant species, including noxious weeds, to colonize. Such conditions would provide a seed source that could be readily dispersed into adjacent areas by wind and runoff, increasing the potential for invasive species and noxious weeds to spread and displace native vegetation.

Special-status plants adjacent to the project area could be temporarily affected by construction. The extent of any such impact cannot be quantified until a special-status plant survey is conducted.

Construction—Indirect Impacts

Construction of the Proposed Action would not result in indirect impacts on vegetation because construction impacts would be limited to the project area, and would not occur later in time or farther removed in distance than the direct impacts.

Operations—Direct Impacts

Direct impacts on vegetation from operation of the Proposed Action would likely be limited to the continued existence and possible colonization by noxious weeds around (and outside) the periphery of the project area, impacts from vessel loading and transport along rail tracks, and control of vegetation under the conveyor and along the rail tracks and rail loop.

Promote Colonization by Noxious Weeds

The disturbed nature of the project area during operations would favor colonization by noxious weeds, which are generally adapted to highly disturbed areas, such as the periphery and other portions of the project area. Areas along rail tracks, along stacking conveyors, and between tracks of the rail loop would be most likely to support noxious weed species. Reed canarygrass, Himalayan blackberry, Canadian and/or bull thistle, and Scotch broom, which are already present on the project area, would likely persist during operations.

Disturb Vegetation during Rail and Vessel Loading

Operation of the Proposed Action could disturb vegetation along the railroad tracks entering the project area, along the shoreline of the Columbia River, and in the shallow waters of the Columbia River near the project area. Such impacts could occur as the result of spills of coal or other materials associated with operation of the rail cars, the conveyor and stockpiling systems, the mobile maintenance equipment, and the shiploaders.

Direct impacts on aquatic vegetation along the shoreline of the Columbia River cannot be quantified until an aquatic vegetation survey is conducted. Mitigation is proposed to conduct an aquatic vegetation survey (described in Section 4.6.7, *Proposed Mitigation Measures*) to reduce potential impacts on aquatic vegetation prior to initiating in-water work. Impacts on water quality associated with the routine movement of coal near water bodies could also affect vegetation along or in receiving waters. However, stormwater runoff would be collected and treated to remove potential contaminants associated with the operations and maintenance activities (e.g., coal, diesel fuel, oil, hydraulic fuel, antifreeze, tire, and brake dust, exhaust particulates) prior to discharge to the Columbia River. Best management practices and mitigation to reduce potential water quality impacts are detailed in Section 4.5, *Water Quality*.

Although hazardous material spills or leaks could occur, the potential for these to occur and affect the environment would be minimized by appropriate training and the implementation of prevention and control measures. Best management practices and mitigation to reduce potential impacts from spills and leaks are detailed in Chapter 3, Section 3.6, *Hazardous Materials*, Chapter 5, Sections 5.1, *Rail Transportation*, and 5.4, *Vessel Transportation*.

Alter Vegetation during Maintenance Activities

Trees and tall shrubs around the trestle and conveyor to Docks 2 and 3 would likely be regularly trimmed or removed, slightly reducing organic material delivered to the river, shading for the upper beach and shoreline, and native foraging, resting, and perching opportunities for birds. The affected 45- to 50-foot-wide area would be small relative to the approximately 5,000 linear feet of vegetated shoreline in the project area.

Routine vegetation maintenance along the perimeter road, rail tracks, and rail loop would involve trimming trees and tall shrubs within approximately 25 feet of either side of the perimeter road. This maintenance would artificially stunt individual trees and shrubs in these areas but would not measurably reduce the functions of native plant communities because it would be confined to the outermost edges of such communities. Any vegetation that colonizes the disturbed interior of the project area along the rail loop would likely also be removed, controlled, or trimmed to eliminate any interference with the movement of the rail cars, equipment, or personnel.

Any special-status plants that occur along the periphery of the project, along the rail tracks and rail loop, or under the conveyor would be affected by operations as described above. The spatial extent of any such impact cannot be quantified until a special status plant survey is conducted.

Spill Coal during Operations of the Proposed Action

Direct impacts resulting from a coal spill during coal handling at the coal export terminal would likely be minor because the amount of coal that could be spilled would be expected to be small due to the contained nature and features of the terminal and safety mechanisms to stop operations of coal moving equipment. It is anticipated that a small spill could be cleaned up by hand, hand tools, or small mechanized equipment in a short period so as to not stop or delay routine terminal operations. Also, impacts would be negligible because of the absence of vegetation in the project area and the contained nature and design features of the terminal.

Coal spilled into terrestrial environments could affect vegetation. Herbaceous vegetation would be more susceptible to damage and smothering from a coal spill compared to more rigid, woody vegetation like shrubs and trees, which may be better able to withstand the weight and force of a coal spill, depending on the magnitude of the spill. The magnitude of potential impacts would depend on the size (volume) and extent (area) of the coal spill. The physical impact of coal spilled on vegetation would range from minor plant damage to complete loss of vegetation. Some plant species may be more sensitive to coal than other species. Coal dust associated with a coal spill could also cover vegetation, resulting in reduced light penetration and photosynthesis, which could lead to reduced vegetation density and plant diversity. The magnitude of potential coal dust impact would depend on duration of exposure, tolerance of vegetation, and aggressiveness of nonnative species. Cleanup of coal spilled during operations could further affect vegetation by either removing or further damaging vegetation as a result of ground disturbance related to cleanup activities. Any coal remaining on the ground after a cleanup effort could leach chemicals from exposure to rain, which could damage or kill vegetation. However, if this were to occur, the impact area would generally be highly localized and limited to the extent of the spill, and unlikely to disrupt the overall plant community in the project area.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts.

Deposit Coal Dust on Vegetation

The movement of coal into and around the project area, creation of large stockpiles of coal, and use of open conveyors could generate approximately 14.6 tons of coal particles and fugitive coal dust per year at maximum throughput. Figure 5.7-4 depicts estimated maximum annual coal deposition at varying distances from the project area. Windborne coal dust can deposit on vegetation, soils, and sediments. The potential extent and deposition rate of coal dust particles less than 75 microns in diameter was modeled as part of the air quality analysis. Based on this modeling, the highest rate of coal dust deposition would be expected in the area adjacent to the project area, but smaller particles could also deposit in a zone extending around and downwind of the project area. Deposition rates could range from 1.99 grams per square meter per year (g/m^2/year) closest to the project area, gradually declining to less than 0.01 g/m^2/year approximately 2.4 miles from the project area.

The potential zone of deposition includes the coniferous forest vegetation on the hills adjacent to the northern extent of the project area, as well as the riparian vegetation along the shoreline of the river. Deposition rates of less than 0.1 g/m^2/year are projected to occur over the forested communities on Lord Island within the Columbia River just east of the project area, with declining concentrations across the island and to the south and west toward Walker Island.

The impacts of dust on vegetation, including special-status plants, would vary depending on dust load, climatic conditions, and the physical characteristics of the vegetation. Impacts could be physical, such as blocked stomata that alters gas diffusion into and out of the leaves, causing reduced respiration or increased transpiration; altered leaf surface reflectance and light absorption potential; and increased leaf temperature due to optical properties of the dust (Chaston and Doley 2006; Doley 2006; Farmer 1993). The *SEPA Vegetation Technical Report* summarizes studies of the impacts of dust deposition on vegetation. Coal dust deposition is also discussed in Chapter 5, Sections 5.6, *Air Quality*, and 5.7, *Coal Dust.*

Although coal transport could release contaminants such as arsenic and polycyclic hydrocarbons into the soil, concentrations would vary greatly and impacts on vegetation communities in the study area are not known. Given the number and variety of environmental, climatic and plant factors affecting the deposition of dust (Doley 2006), information regarding foliage density, leaf dimensions and characteristics, as well as particle size distribution, dust color, and climatic conditions would likely be needed to determine the level of dust deposition that could affect vegetation or plant functions.

The movement of coal by rail could generate coal particles and fugitive coal dust, which could be deposited on vegetation, soil, and sediments. Coal transported by vessel would be in enclosed cargo holds and is not likely to result in deposition of coal on vegetation along the vessel route in the Columbia River. Coal dust deposition from rail cars is discussed in Chapter 5, Sections 5.6, *Air Quality*, and 5.7, *Coal Dust.* Potential impacts from coal dust deposition on vegetation are the same as described above for the proposed coal export terminal.

Erode Vegetation Due to Vessel Wakes

Increased vessel traffic resulting from the coal export terminal and associated wakes could contribute to erosion of vegetation along the Columbia River. Operation of the coal export terminal at maximum throughput would result in 1,680 vessel transits (i.e., one-way trips either to or from the coal export terminal) a year (Chapter 5, Section 5.4, *Vessel Transportation*). The location and extent of these impacts would depend on vessel design, hull shape, vessel weight and speed, angle of travel relative to the shoreline, proximity to the shoreline, currents and waves, tidal stage, and water depth (Jonason 1993:29–30; MARCOM 2003). The potential for shoreline erosion could also be influenced by the slope and physical character of the shoreline (i.e., soil erodibility), as well as the amount and type of vegetation that occurs along the shoreline.

Shoreline erosion is both a natural process as well as a human-caused process that removes sediment from the shoreline. It is caused by a number of factors including storms, wave action, and wind. Erosion of shoreline sediment can remove the substrate in which vegetation grows, eventually leading to loss of plants. Although erosion does naturally occur, it can be increased by vessel wakes, which can intensify the impacts and/or rate of the erosion process. In riverine environments the wave periods of vessels are longer compared to waves generated by wind. Riverbank vegetation is naturally adapted to the shorter period of wind waves, but not to the longer periods of vessel wakes. Long-period waves are an erosion mechanism to which the riverbank vegetation may be susceptible (Macfarlane and Cox 2004 in Gourlay 2011). While shoreline erosion along the Columbia River currently occurs due to existing vessel traffic, operation of the terminal would increase vessel traffic and probably increase or intensify the extent and/or rate of shoreline erosion and subsequent loss of shoreline vegetation.

The potential for vessel wake impacts on vegetation along the project area shoreline would be limited due to the slope of the shoreline and the general lack of aquatic vegetation near the docks. Additionally, vessels maneuvering near the docks would move very slowly and likely would not generate a wake sufficient to cause shoreline erosion. However, there is potential for erosion along the thin strip of shoreline vegetation along the northern end of Lord Island from large wakes or wakes oriented perpendicular to the main navigation channel and docks, such as those occurring when tugs push vessels into position at docks. There is higher potential for vessel wake impacts on vegetation along the shoreline of the lower Columbia River as a result of the Proposed Action. Vessel operations in the Lower Columbia River are federally regulated, including size, speed, and navigation. Additionally, large vessels in the lower Columbia River must be operated by pilots licensed by the United States Coast Guard to perform this function. The navigation channel and its ongoing maintenance are also managed and regulated at the federal level.

Disturb Vegetation during Rail and Vessel Transport

Operation of the Proposed Action could indirectly affect vegetation outside of the project area along the rail tracks entering the project area, along the shoreline of the Columbia River, and in the shallow waters of the Columbia River. Such impacts could occur as the result of spills of coal or hazardous materials associated with operation of the trains and vessels transporting coal within the study area. Chapter 3, Section 3.6, *Hazardous Materials*, and Chapter 5, Sections 5.1, *Rail Transportation*, and 5.4, *Vessel Transportation,* provide further details. Washington State oil transfer rules include requirements for trained personnel, procedures, and equipment to prevent a spill during a transfer of oil over water, such as diesel for emergency ship generators.

Spill Coal during Rail Transport

The magnitude of the potential indirect impact from a coal spill on terrestrial environments would be similar to those described previously and would depend on the location of the spill, the volume of the spill, and success of efforts to contain and clean up the spill, none of which can be predicted.

The potential impact of a coal spill from a Proposed Action-related train is directly related to the probability of a Proposed Action-related train incident occurring. Chapter 5, Section 5.2, *Rail Safety*, estimates the number of Proposed Action-related train incidents that could occur during coal transport within Cowlitz County and Washington. The predicted number of incidents of loaded trains related to the Proposed Action is approximately one every 2 years in Cowlitz County or five per year in Washington.

Not every incident of a loaded coal train would necessarily result in a rail car derailment or a coal spill. A train incident could involve one or multiple rail cars, and could include derailment in certain circumstances. The size and speed of the train and the terrain at the location of an incident would influence whether the incident resulted in a coal spill that could have impacts on vegetation. A broad range of spill sizes from a partial rail car to multiple rail cars could occur as a result of a Proposed Action-related train incident.

Additionally, containment and cleanup efforts for coal spills from a rail incident factor into the potential impact on vegetation and the environment. It is expected that coal spills in the terrestrial and built environments would be easier to contain and clean up than spills occurring in an aquatic environment. Spills occurring on land may have a quicker response time and cleanup in some locations due to their visibility and access for cleanup equipment, as compared to spills into aquatic environments. Cleanup of spills in the terrestrial environment could affect vegetation and require restoration.

Potential physical and chemical effects of a coal release in terrestrial environments would be the same or similar to those described above under direct impacts.

4.6.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the Proposed Action. Current operations would continue and the existing bulk product terminal site would be expanded. However, any expansion would be limited to activities that would not require a permit from the U.S. Army Corps of Engineers (Corps) or a shoreline permit from Cowlitz County. Therefore, no construction impacts on aquatic habitats or plant species would be expected to occur as a result of an expansion of the existing bulk production terminal under the No-Action Alternative.

Continued industrial use of the project area over the 20-year analysis period (2018 to 2038) would likely result in the redevelopment of the largely developed upland areas of the project area. New construction, demolition, and activities related to this development could affect the disturbed vegetation that is present throughout the developed portions of the site. Cleanup activities, relative to past industrial uses, would also continue, potentially affecting vegetation in disturbed areas.

4.6.6 Required Permits

No permits related to vegetation would be required for the Proposed Action.

4.6.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to vegetation from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

4.6.7.1 Applicant Mitigation

The Applicant would implement the following measures to mitigate impacts on vegetation.

MM VEG-1. Conduct Rare Plant Surveys Prior to Construction.

To ensure that threatened, endangered, or rare plants are not affected, the Applicant will conduct rare plant surveys of the project area, including the ditches and stormwater conveyance features. Surveys for rare plants will be performed for those rare plants that may occur in Cowlitz County, according to the Washington Natural Heritage Program. Surveys will be performed prior to any project related ground disturbance and during the appropriate survey windows for each species. If such plant species are found, the Applicant will notify and consult with the Washington State Department of Natural Resources, and the U.S. Fish and Wildlife Service (if federally protected species are found). The Applicant and the agencies will work together to determine the appropriate conservation and mitigation measures should potential impacts on any rare plants be possible as a result of ground-disturbing activities.

MM VEG-2. Conduct Aquatic Vegetation Surveys Prior to Construction.

To ensure that aquatic plants along the shoreline of the Columbia River are not affected, the Applicant will conduct an aquatic plant survey along the shoreline of the project area prior to commencing in-water work associated with construction of Docks 2 and 3 and construction related dredging, including all areas within the shallow water zone adjacent to the proposed docks. If areas of aquatic vegetation are found, the Applicant will notify the Washington State Department of Natural Resources, Cowlitz County, and the U.S. Fish and Wildlife Service, and work with these agencies to develop appropriate conservation or mitigation measures before beginning any in-water work.

MM VEG-3. Replant Areas Temporarily Disturbed during Construction.

To ensure that disturbed native vegetation is restored, after construction the Applicant will replant vegetated areas temporarily disturbed during construction with native vegetation suitable for site conditions post-construction. The Applicant will monitor replanted vegetation annually for 5 years and will ensure the survival of 80% of all replanted vegetation. The Applicant will submit annual monitoring reports to Cowlitz County.

MM VEG-4. Develop and Implement a Revegetation Plan.

To mitigate permanent removal of vegetation from project construction, the Applicant will develop and implement a revegetation plan for the project area. This plan will be approved by Cowlitz County prior to implementation and will be consistent with the Cowlitz County Critical Areas Ordinance 19.15.170.

MM VEG-5. Control Noxious Weeds.

To limit further invasion and colonization of noxious weeds on disturbed land, the Applicant will monitor for noxious weeds during construction and operations and remove noxious weeds that invade new areas of the site. The Applicant will coordinate with the Cowlitz County Noxious Weed Control Board if Class A and B noxious weeds are detected.

MM CDUST-3. Reduce Coal Dust Emissions from Rail Cars.

To address coal dust emissions, the Applicant will not receive coal trains unless surfactant has been applied at the BNSF Railway Company (BNSF) surfactant facility in Pasco, Washington for BNSF trains traveling through Pasco. While other measures to control emissions are allowed by BNSF, those measures were not analyzed in this EIS and would require additional environmental review. For trains that will not have surfactant applied at the BNSF surfactant facility in Pasco, before beginning operations, the Applicant will work with rail companies to implement advanced technology for application of surfactants along the rail routes for Proposed Action-related trains.

MM WQ-2. Develop and Implement a Coal Spill Containment and Cleanup Plan.

To limit the exposure of spilled coal to the terrestrial, aquatic, and built environments during coal handling, the Applicant will develop a containment and cleanup plan. The plan will be reviewed by Cowlitz County and Ecology and implemented prior to beginning export terminal operations. In the event of a coal spill in the aquatic environment by the Applicant during export terminal operations, action will be taken based on the specific coal spill, and the Applicant will develop a cleanup and monitoring plan consistent with the approved containment and cleanup plan. This plan will include water quality and sediment monitoring to determine the potential impact of the coal spill on the aquatic habitat and aquatic species. The Applicant will develop the cleanup and monitoring plan in coordination with Cowlitz County, Ecology, and the Corps. The cleanup and monitoring will be similar in scope to the monitoring completed for the Aquatic

Impact Assessment (Borealis 2015) associated with a coal spill in British Columbia, Canada in 2014.

4.6.8 Unavoidable and Significant Adverse Environmental Impacts

Compliance with laws and implementation of the mitigation measures and design features described above would reduce impacts on vegetation. There would be no unavoidable and significant adverse environmental impacts on vegetation.

4.7 Fish

Fish and fish habitat are important resources of the Columbia River. They include fish listed as endangered or species of concern under state or federal regulations. Resident or anadromous[1] fish species support important tribal, commercial, and recreational fisheries and are integral to healthy freshwater and marine ecosystems.

This section describes fish in the study area. It then describes impacts on fish that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

4.7.1 Regulatory Setting

Laws and regulations relevant to fish are summarized in Table 4.7-1.

Table 4.7-1. Regulations, Statutes, and Guidelines for Fish

Regulation, Statute, Guideline	Description
Federal	
Endangered Species Act (16 USC 1531 *et seq*.)	Requires that applicants seeking a federal action such as issuing a permit under a federal regulation (e.g., NEPA, Clean Water Act, Clean Air Act) undergo consultation with USFWS and/or NMFS. This will ensure the federal 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. NMFS is responsible for managing, conserving, and protecting ESA-listed marine species. USFWS is responsible for terrestrial and freshwater species. Both NMFS and USFWS are responsible for designating critical habitat for ESA-listed species.
Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267)	Requires fishery management councils to include descriptions of essential fish habitat and potential threats to essential fish habitat in all federal fishery management plans. Also requires federal agencies to consult with NMFS on activities that may adversely affect essential fish habitat.
State	
Washington State Growth Management Act (36.70A RCW)	Defines a variety of critical areas, which are designated and regulated at the local level under city and county critical areas ordinances. These critical areas may include shorelines or portions of fish habitat.
Washington State Shoreline Management Act (90.58 RCW)	Requires cities and counties (through Shoreline Master Programs) to protect shoreline natural resources.

[1] *Anadromous* describes a life history of migration between fresh water and salt water. Reproduction and egg deposition occur in fresh water while rearing to the adult stage occurs in the ocean.

Regulation, Statute, Guideline	Description
Washington State Hydraulic Code (WAC 220-660)	WDFW issues a hydraulic project approval for certain construction projects or activities in or near state waters. The hydraulic code was specifically designed to protect fish life.
Clean Water Act Section 401 Water Quality Certification	Ecology issues Section 401 Water Quality Certification for in-water construction activities to ensure compliance with state water quality standards and other aquatic resources protection requirements under Ecology's authority as outlined in the federal Clean Water Act.
Local	
Cowlitz County Critical Areas Ordinance (CCC 19.15)	Regulates activities within and adjacent to critical areas.
Cowlitz County Shoreline Master Program (CCC 19.20)	Regulates development within shoreline jurisdiction, including the shorelines of the Columbia River, a Shoreline of Statewide Significance.

Notes:
USC = United States Code; NEPA = National Environmental Policy Act; USFWS = U.S. Fish and Wildlife Service; NMFS = National Marine Fisheries Service; ESA = Endangered Species Act; RCW = Revised Code of Washington; WAC = Washington Administrative Code; WDFW = Washington Department of Fish and Wildlife; CCC = Cowlitz County Code; Ecology = Washington State Department of Ecology

4.7.2 Study Area

The study area for direct impacts on fish is the main channel of the Columbia River 3.92 miles upstream and downstream of the project area, measured from the two proposed docks (Figure 4.7-1). This study area accounts for the area where noise from construction or operation of the Proposed Action could affect fish.

The study area for indirect impacts on fish extends downstream from the project area to the mouth of the Columbia River (Figure 4.7-2) and includes areas with shallow-sloping beaches where fish could be stranded by wakes from vessels related to the Proposed Action. The study area for indirect impacts related to potential coal spills from Proposed Action-related trains includes the rail routes in Cowlitz County and Washington State that would be used to transport coal to the coal export terminal (refer to Chapter 5, Section 5.1, *Rail Transportation,* for rail routes in Cowlitz County and Washington State).

4.7.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on fish associated with the construction and operation of the Proposed Action and No-Action Alternative.

Figure 4.7-1. Fish Direct Impacts Study Area

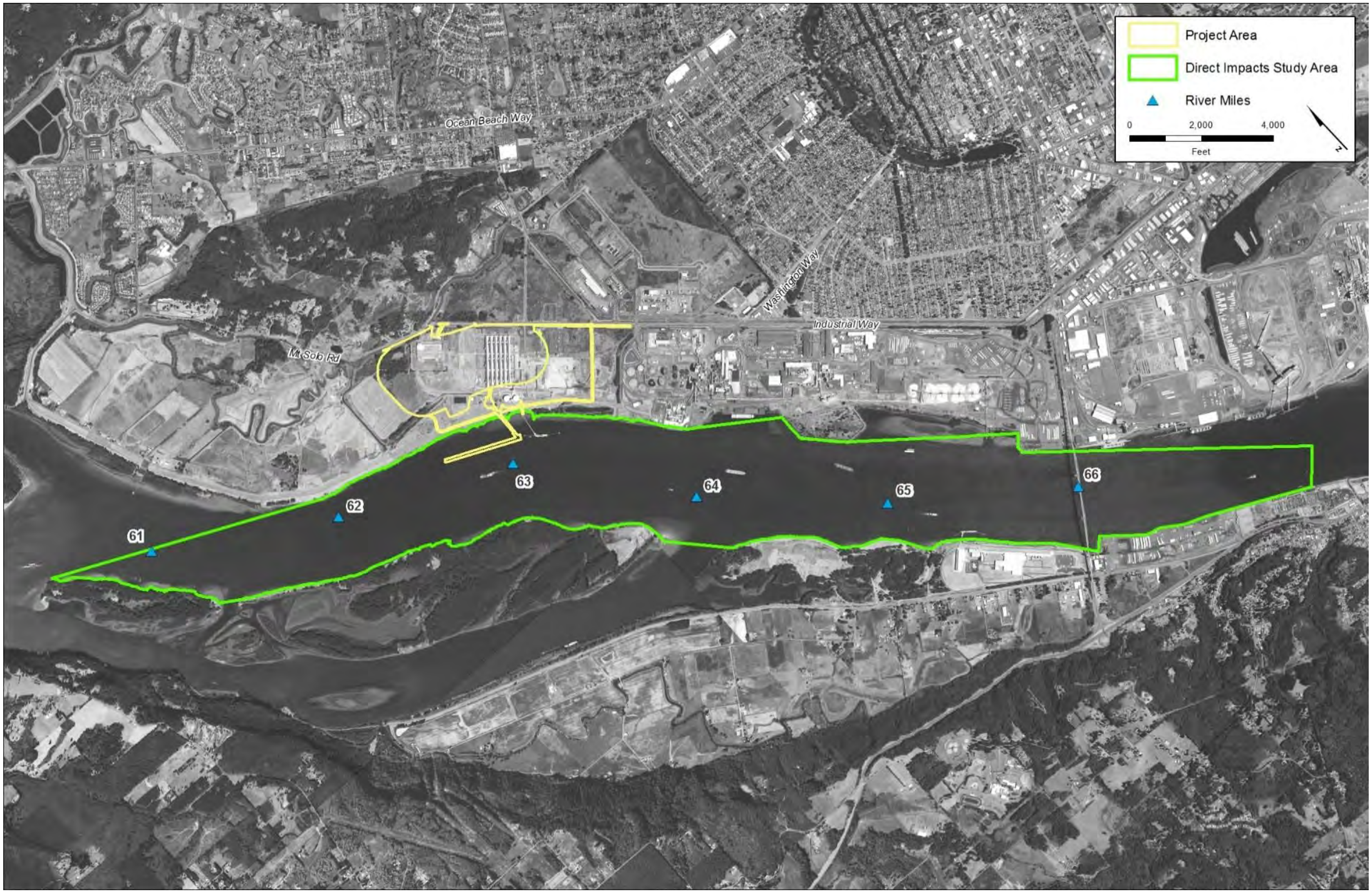


Figure 4.7-2. Fish Indirect Impacts Study Area

4.7.3.1 Information Sources

The following sources of information were used to define the existing conditions relevant to fish and identify the potential impacts of the Proposed Action and No-Action Alternative on fish in the study areas. These sources focus on fish, fish habitat, and aquatic resources in the study areas and, specifically, the aquatic and shoreline habitat adjacent to the project area.

- One site visit conducted by ICF fish biologists on January 29, 2014.
- Reports prepared by Grette Associates for the Applicant as part of the permit application materials. (Grette Associates 2014a, 2014b, 2014c, 2014d).
- National Oceanic and Atmospheric Administration (NOAA) Fisheries West Coast Region species list and listing packages (2014a, 2014b).
- U.S. Fish and Wildlife Service (USFWS) (2014) Information, Planning, and Conservation system online database.
- Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) geographic information system (GIS) data (2015a) and SalmonScape data (2015b).
- Washington Department of Natural Resources, Natural Heritage Program (2014).
- Washington State Department of Ecology (Ecology) 303(d)/305(b) Integrated Report Viewer (2016).
- Fish Passage and Timing Data Columbia River Data Access in Real Time, Columbia Basin Research, University of Washington (juvenile and adult fish passage) (Columbia River Research 2014).

A detailed list of references is provided in the *SEPA Fish Technical Report* (ICF 2017a).

4.7.3.2 Impact Analysis

Potential fish and fish habitat that could be affected by construction and operation of the Proposed Action were determined as follows. For more information on these methods, see the *SEPA Fish Technical Report*.

Identifying Resources in the Study Area

The following species and habitat characteristics were identified and quantified, where possible.

- Documented species occurrences.
- Species likely to occur in the study area.
- Suitable habitat conditions.

Impacts on fish species are qualitatively described because fish are generally mobile and their presence and abundance in the study area cannot be quantitatively predicted at a specific location or time. Where appropriate, species sensitivity to construction or operation impacts is discussed.

Assessing Noise Impacts

Federal agencies have established interim criteria to protect fish from underwater noise generated by pile driving (Fisheries Hydroacoustic Working Group 2008; Carlson et al. 2007). The criteria indicate sound pressure levels of 150 decibels $(dB)_{RMS}$ could result in behavioral changes, while sound pressure levels of 206 dB_{PEAK} could result in injury to fish. Specific dB criteria for Endangered Species Act (ESA)-listed fish are provided in Table 4.7-2. NMFS assumes that a 12-hour recovery period with no exposure to sound is necessary to return to appropriate cumulative sound levels (Stadler and Woodbury 2009).

Table 4.7-2. Underwater Sound-Level Thresholds for Endangered Species Act-Listed Fish

Species	Effect Type	Threshold
All Listed Fish[a]	Injury, cumulative sound (fish ≥2 grams): onset of TTS (auditory response), with onset of auditory tissue damage and nonauditory tissue damage with increasing cumulative sound	187dBSELcum
	Injury, cumulative sound (fish <2 grams): similar to above, onset of nonauditory tissue damage occurs at lower sound levels with smaller fish	183dBSELcum
	Injury, single strike: onset of TTS and auditory tissue damage from single strike	206dBPEAK
	Behavioral disruption	$150dB_{RMS}$

Notes:

[a] Injury thresholds are based on interim criteria that were developed for salmonids based on data specific to hearing generalists with swim bladders (Carlson et al. 2007). NMFS also applied these thresholds to other listed fish with swim bladders (e.g., green sturgeon) and sometimes conservatively to fish without swim bladders (e.g., eulachon). Injury descriptions are based on information summarized in Carlson et al. (2007).

Source: Grette Associates 2014a.

TTS = temporary threshold shift; dB = decibel; SEL = sound exposure level; cum = cumulative; RMS = root mean square.

The criteria for sound pressure levels and underwater noise thresholds described above were applied to proposed pile-driving activities for the Proposed Action. Because the project area is similar to the Columbia River Crossing (the site of a proposed interstate crossing of the Columbia River, between Portland, Oregon and Vancouver, Washington), underwater noise characteristics from pile-driving at that site were used to calculate per-pile levels of underwater noise for the 36-inch diameter pile used for the Proposed Action (Grette Associates 2014a).

A complete description of noise impact models, calculations, and assessments is provided in the *SEPA Fish Technical Report*. Further, project-related vessels could generate underwater noise levels that could cause disturbance, as measured by the applicable noise thresholds for fish. Vessel noise levels were obtained from available literature and are described in the *SEPA Fish Technical Report*.

4.7.4 Existing Conditions

This section describes the existing environmental conditions in the direct and indirect study areas related to fish that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative. Key terms used in this section are defined in Table 4.7-3.

Table 4.7-3. Definitions of Key Terms

Term	Acronym	Definition
Active channel margin	ACM	The shoreline and nearshore edge habitat, extending from the OHWM (+11.1 feet) to 0 feet (Columbia River Datum)
Columbia River Datum	CRD	The adopted fixed low water reference plane for the lower Columbia River.
Decibel	dB	A logarithmic unit used to express the ratio of two values of a physical quantity, often power or intensity.
Deepwater zone	DWZ	The area extending waterward from the edge of the SWZ, approximately 450 feet ranging in depth from -20 feet CRD to -45 feet CRD. Water depths are based on an OHWM of +11.1 feet, CRD.
Distinct population segment	DPS	The smallest division of a taxonomic species permitted to be protected under the ESA.
Essential fish habitat	EFH	Per the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act, EFH includes those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.
Evolutionarily significant unit	ESU	A population of organisms that is considered distinct for purposes of conservation.
Peak	PEAK	The instantaneous maximum overpressure or underpressure observed during each pulse during pile driving.
Primary constituent element	PCE	A physical or biological feature essential to the conservation of a species for which its designated or proposed critical habitat is based on, such as space for individual and population growth, and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and habitats that are protected from disturbance or are representative of the species' historic geographic and ecological distribution.
Priority habitat and species	PHS	Program fulfilled by WDFW to provide important fish, wildlife and habitat information to local governments, state and federal agencies, private landowners and consultants, and tribal biologists for land use planning purposes.
Root mean square	RMS	The square root sound of the energy divided by the impulse duration. Essentially, the average of the PEAK energy measured over time.
Shallow water zone	SWZ	The fully inundated near-shore zone extending from the edge of the ACM at 0 feet CRD out to -20 feet CRD.
Sound exposure level	SEL	A metric for acoustic events, often used as an indication of the energy dose.
Temporary threshold shift	TTS	Temporary shift in auditory threshold, such as temporary hearing loss.

The lower Columbia River (Bonneville Dam to the mouth of the Columbia River), which encompasses the study areas, has been affected by extensive modifications for flood control, industrial development, and deep draft vessel traffic. The mainstem Columbia River is deeper than it was historically because of the deepening and periodic maintenance dredging of the navigation channel and the berths in and adjacent to the existing and proposed docks. The hydrologic regime and water temperature have been altered by the operation of dams throughout the Columbia River basin. River flows reverse direction during periods when river flows are low and incoming tides are large. Although the flow reverses in response to tidal fluctuation, saltwater does not intrude as far upstream as the study area and the water remains fresh through the tidal cycle. The study area can be considered a high-energy environment, characterized by strong currents, active bedload transport, and variable patterns of sediment of deposition and erosion (Grette Associates 2014b).

Floodplain habitats have been disconnected from the riverine environment and in some cases eliminated. The shoreline and riparian environment has been substantially altered by extensive shoreline armoring and protection, construction of overwater structures, and development in adjacent upland and riparian zones. These modifications have eliminated and substantially altered habitat conditions and degraded habitat-forming processes, resulting in corresponding changes to the biological communities associated with these habitats.

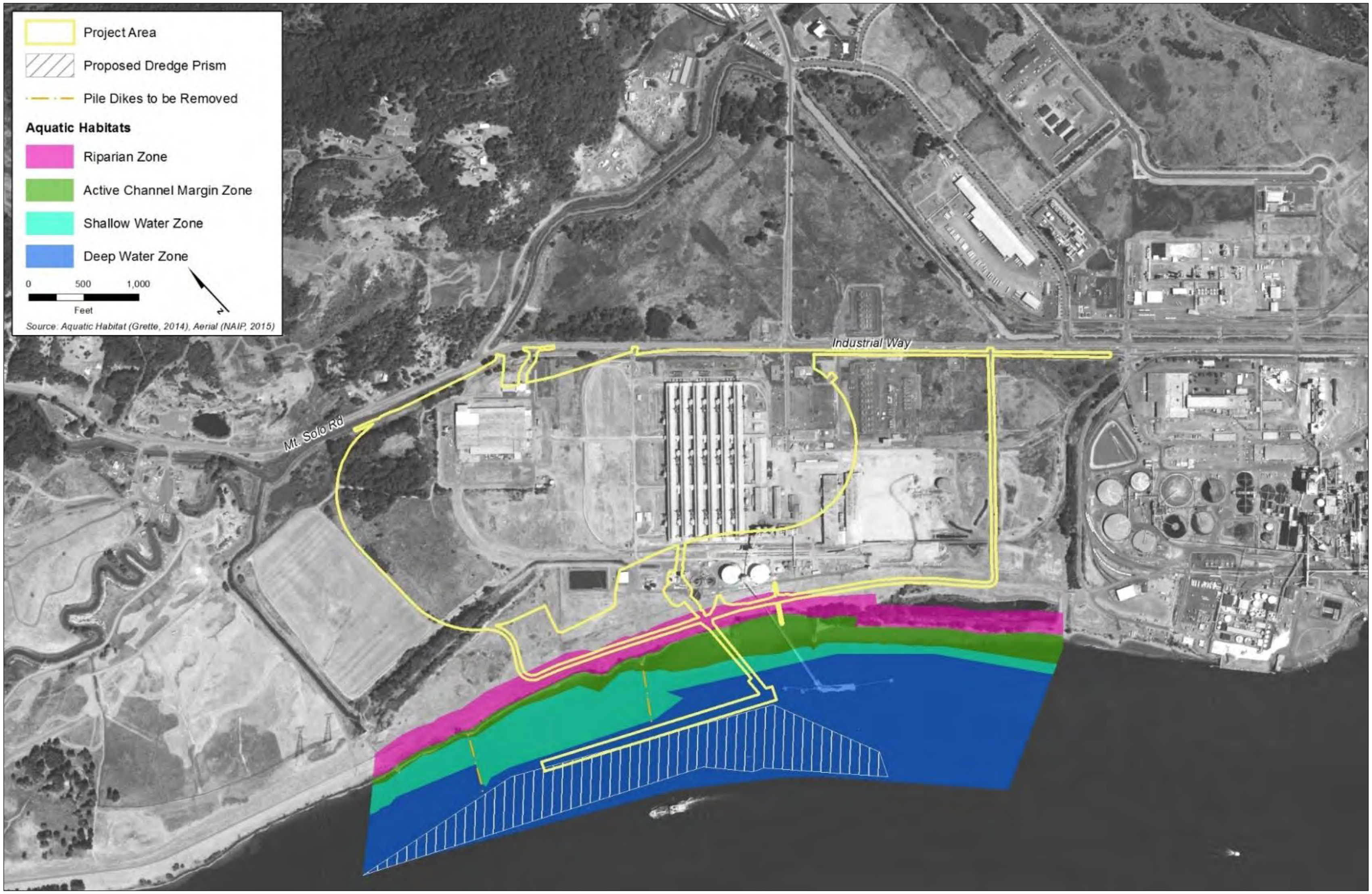
The *SEPA Fish Technical Report* provides information on all the habitat restoration projects that are known to have occurred in the lower Columbia River subbasin (i.e., watershed below Bonneville Dam). This information is from the Lower Columbia River Estuary Partnership database. The Columbia River estuary extends upstream from the mouth of the Columbia River to the Bonneville Dam (Simenstad et al. 2011). It has been considerably degraded from past use due to diking and filling and from water withdrawal for agricultural, municipal, navigation, and industrial purposes. The estuary is also influenced by a number of physical structures (e.g., jetties, piles, pile dikes, bulkheads, revetments, and docks) that contribute to its overall degradation. Habitat-forming processes in the estuary have also been altered by loss of upriver sediment input (now constrained behind upriver dams), changes in flow patterns that move sediments and modify landforms, and channel deepening and dredging.

4.7.4.1 Aquatic Habitat Types

The aquatic habitat in the study area is discussed in terms consistent with habitat equivalency analysis,[2] which describes habitat quality in the context of habitat availability and suitability as a function of water depth and physical attributes. The aquatic portion of the study area adjacent to the project area is composed of three broad habitat types (Grette Associates 2014b): the active channel margin (ACM), the shallow water zone (SWZ), and the deepwater zone (DWZ). The riparian zone is also considered in terms of its interactions with aquatic habitats, as the riparian zone is the transition from aquatic to upland/terrestrial habitat. A plan view showing the extent of each habitat type is provided in Figure 4.7-3.

[2] Habitat equivalency analysis is a tool that can be used to estimate habitat gains and losses across a range of habitat types

Figure 4.7-3. Aquatic Habitat Types Potentially Affected by the Proposed Action



Riparian Zone

The riparian zone includes lands extending approximately 200 feet landward from ordinary high water mark (OHWM). Shoreline armoring and Consolidated Diking Improvement District (CDID) #1 levees have contributed to a low-complexity and artificially steepened upper shoreline with no floodplain connectivity downstream of the proposed new docks. Landward of the shoreline, most of the riparian area has been heavily modified such that there is little remaining habitat function (Grette Associates 2014b). Relative to shoreline areas with intact riparian habitat, the habitat equivalency analysis would rank shoreline habitat at a lower value, especially when compared to similar areas with intact riparian habitat (e.g., Lord Island, immediately across the river) (Grette Associates 2014b). Lord Island also provides habitat for Columbia white-tailed deer. Refer to Section 4.8, *Wildlife*, for further information on Columbia white-tailed deer.

Active Channel Margin

The ACM is defined as the shoreline and nearshore edge habitat, extending from the OHWM line (+11.1 feet CRD) to CRD 0 feet. The ACM near the proposed docks covers approximately 25 acres and extends from 25 to 350 feet offshore (Figure 4.7-2). Water levels in the ACM fluctuate continuously. Portions of the ACM are periodically dewatered by tidal influence and river flow conditions, with the extent and duration of exposure dependent on site-specific topography. Habitat functions in the ACM are strongly influenced by the condition of the shoreline and adjacent riparian zone. The shoreline in this area is highly modified by levees and riprap armoring with scattered large woody debris.

Shallow Water Zone

The SWZ includes the fully inundated near-shore zone extending waterward from the edge of the ACM at 0 feet CRD out to -20 feet CRD. The SWZ covers approximately 34 acres near the proposed docks and extends from approximately 25 to 500 feet offshore. Bottom structure is primarily (90%) flat or shallow sloping substrate, with some moderate slopes out to depths of about -25 feet CRD, where the slope becomes markedly steeper. The substrate consists primarily of silty river sand with little organic matter (Grette Associates 2014b).

Deepwater Zone

The DWZ encompasses approximately 117 acres near the proposed docks, extending waterward from the edge of the SWZ beyond -20 feet CRD. At approximately 450 feet from the shore, it is -20 feet deep CRD; at 1,200 feet from shore, it reaches -45 feet deep CRD. The DWZ is a dynamic environment, characterized by relatively high flows (high water velocity) and sediment transport. Sediments are composed of fine grain sands with little to no gravel or cobble for structure (Grette Associates 2014b).

4.7.4.2 Focus Fish Species

Fish species of special interest include federally and state-listed threatened and endangered fish and their designated critical habitat, as well as species of commercial, recreational, or cultural importance. Table 4.7-4 outlines the focus fish species, the listing status of each species (i.e., state and federal), habitat types these species typically occupy, and their seasonal occurrence in the study area. Other common native and introduced fish species also occur in the study area.

Salmon and Trout

Eight threatened or endangered salmon evolutionarily significant units (ESUs), five threatened steelhead distinct population segments (DPSs), one threatened bull trout DPS, and their designated critical habitats occur in the study area (Table 4.7-4) (Bottom et al. 2008; National Marine Fisheries Service 2011). In addition, essential fish habitat (EFH) has been designated for Chinook and coho salmon in the lower Columbia River. The Columbia River estuary is used primarily as migratory and rearing habitat by salmon, steelhead, and bull trout (salmonid), and no salmonid spawning takes place in the study area. Adult anadromous salmonids travel through the estuary and lower river relatively quickly during their migration to upstream spawning grounds, remaining primarily in offshore deepwater habitats. In contrast, juvenile salmonids are present year round and use a wider variety of habitats and exhibit more variable downstream migration speed, taking advantage of shallow water and ACM for foraging and seeking cover.

General salmon reproductive strategies can be divided into two groups: stream-rearing and ocean-rearing. Stream-rearing fish tend to spend extended periods, usually more than a year, rearing in fresh water before immigrating to the ocean. Examples of stream-type fish are steelhead, coho, and spring-run Chinook salmon. In contrast, ocean-type juvenile salmonids tend to return to the ocean in the same year they were spawned. Examples of ocean-type fish are chum salmon, and fall-run Chinook salmon. These strategies affect how each population uses the estuary and how it may be affected by the Proposed Action.

Designated critical habitat for federally protected salmonids within the study area consists of two primary elements: migration corridors and estuarine areas. Additionally, the Columbia River is also EFH, as defined by the Magnuson-Stevens Fishery and Management Conservation Act for Chinook salmon and coho salmon. EFH for Pacific salmon is defined as those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem.

A fully functioning ACM provides natural cover (large woody debris, undercut banks, overhanging vegetation), shoreline complexity, shade, submerged and overhanging large woody debris, logjams, and aquatic vegetation. All of these elements are identified in the primary constituent elements (PCEs) of critical habitat for ESA-listed salmon and steelhead, as well as bull trout (Grette Associates 2014b). PCEs are defined as those physical and biological features that a species needs to survive and reproduce. The ACM provides important habitat for juvenile salmon, with different species using different habitat types at different life stages. Table 4.7-4 identifies the seasons when salmon and steelhead species could be present in the ACM portion of the study area.

The SWZ is used primarily as a migratory corridor by adult salmon and steelhead and as foraging habitat by larger juveniles that are capable swimmers in open water. Juvenile Chinook salmon, and sockeye salmon and steelhead smolts are typically found in deeper open water in the SWZ, where they forage on phytoplankton, invertebrates, and small fish (Bottom et al. 2008; Carter et al. 2009).

Table 4.7-4. Status of Focus Species and Seasonal Presences in the Study Area[a]

Species, ESU/DPS	Federal Status[a]	Life Stage	September			October			November			December		
			A[b]	S[b]	D[b]	A	S	D	A	S	D	A	S	D
Chinook Salmon														
Snake River fall-run ESU	T	Adults			X[c]			...						
		Subyr		...[d]	...		...	...		...	...			
Lower Columbia River ESU	T	Adults			X			X						
		Yrlng												...
		Subyr		...	...		...	...		...	...	...		
Upper Willamette River ESU	T	Yrlng												...
		Subyr		...	...		...	...		...	...	...		
Coho Salmon														
Lower Columbia River ESU	T	Adults			X			X			X			X
		Subyr		...			...			...		...	...	
Chum Salmon														
Columbia River ESU	T	Adults						X			X			
		Subyr										...	...	
Steelhead Trout														
Snake River DPS	T	Adults			X			...						
Upper Columbia River DPS	T	Adults			X			...						
Middle Columbia River DPS	T	Adults			X			...[e]						
Lower Columbia River DPS	T	Adults			X			X			X			X
Bull Trout														
Columbia River DPS	T	Adults		...	...		...	...		...	...		...	...
Cutthroat Trout														
Columbia River DPS	NL	Adults/Juveniles		X	X		X	X		X	X		X	X
Green Sturgeon														
Southern DPS	T	Adults/Subadults		X	X		X	X						
Northern DPS	SOC	Adults		X	X		X	X						

Species, ESU/DPS	Federal Status[a]	Life Stage	September		October		November		December	
		Subadults	X	X	X	X				
White Sturgeon										
Lower Columbia River		Adults	X	X	X	X	X	X	X	X
		Subadults	X	X	X	X	X	X	X	X
Eulachon										
Southern DPS	T	Adults					…	…	X	X
		Eggs/Larvae					…	…	X	X
Pacific & River Lamprey										
Multiple populations	NL	Adults	X	X	X	X				
		Ammocoetes	X	X	X	X	X	X	X	X

Notes:

[a] T denotes federally threatened (no Endangered in this table), "NL denotes Not Listed, SOC denotes Species of Concern.

[b] A, S, and D represent the HEA habitat categories of ACM, SWZ, and DWZ; see Grette (2014b) Section 3.2.3.1 for additional information.

[c] X denotes expected or potential presence; see Grette Associates (2014b), Section 3.3 for additional information.

[d] "..." denotes expected presence but low relative abundance; see Grette Associates (2014b), Section 3.3 for additional information.

[e] The Middle Columbia River DPS includes a very small proportion of winter-run fish (Klickitat River, Fifteen-Mile Creek); because passage data at Bonneville Dam indicate that the vast majority of steelhead have passed the dam by early October, it is assumed that this includes winter steelhead spawning above it.

ESU = Evolutionary Significant Unit; DPS = Distinct Population Segment; Subyr = subyearling; Yrlng = yearling.

Juvenile Chinook salmon are most commonly present from March through July but juveniles of certain runs may be found in the SWZ during any month of the year. Juvenile coho salmon and steelhead are less likely to be found in the shallower areas but are abundant in deepwater offshore habitats during their outmigration period (Roegner and Sobocinski 2008), indicating that they likely occur in the deeper areas of the SWZ.

The DWZ provides a migratory corridor for adult salmon and steelhead and foraging and migratory habitat for larger juvenile Chinook salmon, coho salmon, and sockeye salmon and steelhead smolts pursuing phytoplankton, invertebrates, and small fish (Bottom et al. 2008; Carter et al. 2009; Roegner and Sobocinski 2008). Generally, juvenile salmonids do not reside in specific habitats in the lower Columbia River for extended periods, remaining in a given area for just a day or two before moving downstream to new suitable habitats (Bottom et al. 2008; Johnson et al. 2003). Juvenile and adult salmon and steelhead are likely to be found in the DWZ during their respective migration and rearing periods (Table 4.7-4) as outmigrating salmonids (particularly stream type) tend to use deepwater (Carter et al. 2009).

Bull Trout (Char)

Columbia River bull trout are listed as threatened, and there is one extant population in the Lewis River subbasin, which drains to the lower Columbia River below Bonneville Dam. Bull trout migrate to the mainstem Columbia River to rear, overwinter, or migrate to and from spawning areas. This indicates the possibility that more distant populations (e.g., Klickitat, Deschutes, Willamette) may migrate to and forage in the project vicinity or could in the future, but the extent to which different bull trout populations use the lower Columbia River is uncertain (Carter et al. 2009). The Lower Columbia Recovery Team considers the mainstem Columbia River to contain core habitat that may be important for full recovery of Columbia River bull trout (U.S. Fish and Wildlife Service 2002). Bull trout have occasionally been observed in the lower Columbia River as foraging or migrating adults and subadults, most likely originating from accessible lower Columbia River tributaries with extant bull trout populations. Subadults may occur in the study area throughout the year in shallow rearing habitats of the ACM and SWZ while adults are more likely to occur in the deeper areas of the SWZ and the DWZ (U.S. Army Corps of Engineers 2004).

Eulachon

Eulachon are small anadromous fish in the smelt family (*Osmeridae*), sometimes known as Columbia River smelt (among other names), that spawn in coastal rivers and migrate to the ocean to rear to adulthood. The lower Columbia River up to Bonneville Dam and the lower reaches of those tributary streams that provide potential spawning habitats (i.e., Grays, Elochoman, Cowlitz, Kalama, Lewis and Sandy Rivers) have been designated as critical habitat (76 *Federal Register* [FR] 65324). Currently, the lower mainstem Columbia River and the Cowlitz River support the majority of eulachon production in the system (Gustafson et al. 2010). However, in years of relative abundance, spawning occurs broadly in the tidally influenced portions of the Columbia River and its tributaries (Grette Associates 2014b).

WDFW and ODFW conducted plankton tows to sample for eulachon eggs and larvae between the Port of Longview above Barlow Point and the channel below the Cowlitz River mouth including four sample sites offshore near the project area (Mallette 2014). Peak larval abundance occurred in mid-March during two of the three survey years and in late April/early May in the third (Mallette 2014).

As part of a related one-time sampling effort, eulachon eggs/larvae were documented in plankton tows at six sample sites (inshore and offshore) near the project area between river miles 62.8 and 64.0 in February 2012 (Mallette 2014: Report B). Eggs could be present from December through April; however, peak of spawning season is usually in February or March. Larval eulachon, particularly from spawning aggregations in the Cowlitz River, likely pass through the study area as they are transported downriver. Further, it is likely that at least limited spawning occurs in the mainstem Columbia River, as documented on the Oregon side of the Columbia River by Mallette (2014). Mallette (2014) found the greatest numbers of eulachon larvae were found in samples collected well downstream of the Lewis, Kalama, and Cowlitz rivers and upstream of the Elochoman (rivers with known eulachon spawning). While the relatively distant proximity of sampling events to known spawning areas does not discount the possibility that larvae in samples may be the product of spawning in these tributaries, Mallette (2014) concluded that these findings highlight the potential for at least limited spawning in the mainstem Columbia River.

Adult eulachon could arrive in the study area as early as November, although most adults would migrate through the study area during peak spawning between February and March. Eggs from early spawners could be transported with currents from the tributaries downstream to portions of the study area where suitable incubation conditions exist (i.e., sand waves) shortly thereafter. Emergent larvae could be present in the study area as early as December. However, based on the timing of peak spawning, and because incubation occurs for 1 to 2 months (Grette Associates 2014b), peak larval transport has been shown to occur between mid-March and early May (Mallette 2014).

Dredging in the Columbia River is identified as an activity of concern for eulachon conservation because this activity takes place in proximity to known and potential eulachon habitats. Dredging activities during the migratory and spawning period could entrain and kill adult fish, eggs, and larvae; bury and smother incubating eggs; or cause stress and disturbance that could contribute to decreased spawning success (National Marine Fisheries Service 2010).

Sturgeon

Both green and white sturgeon may be present in the deepwater habitats of the study area as adults and subadults. Two green sturgeon DPSs occur in in the lower Columbia River. While this species does not spawn in the Columbia River or its tributaries, subadult and adult green sturgeon from all major spawning populations use the lower Columbia River and other coastal estuaries in Oregon and Washington for holding habitat in the summer and early fall (Adams et al. 2002; Lindley et al. 2011; Moser and Lindley 2007). Sturgeon are most commonly found in association with the bottom, where they feed on a mixture of aquatic insects and benthic (i.e., bottom dwelling) invertebrates (Adams et al. 2002; Independent Scientific Review Panel 2013). The water depth preferences of white sturgeon indicate this species is most likely to be found in the DWZ, but individuals may also be present in the SWZ and, infrequently, in the ACM. The DWZ near the proposed docks does not provide suitable substrates for white sturgeon spawning or larval rearing, so these life stages are unlikely to occur for extended periods in this area. In contrast, juvenile white sturgeon are found throughout the lower Columbia River and use a wide variety of habitats, including both main-channel and off-channel areas. They are most commonly found at water depths greater than 33 feet (Independent Scientific Review Panel 2013).

The white sturgeon population in the Columbia River downstream from Bonneville Dam has been among the most productive sturgeon populations in North America. White sturgeon downstream from Bonneville Dam continue to range freely throughout the lower river mainstem, estuary, and marine habitats to take advantage of dynamic seasonal patterns of food availability. Individual growth, condition, and maturation values from the Lower Columbia River remain among the highest observed for white sturgeon range-wide. Habitat use of subadults and adults varies with habitat availability. Given the abundance and mobility of white sturgeon in the Lower Columbia River, there likely would be some present during construction and operation of the Proposed Action.

Lamprey

Lamprey are primitive anadromous fish that spend their adult lives in the ocean but return to freshwater habitats for spawning and larval rearing. Two species, Pacific and river lamprey, spawn in tributaries to the Columbia River and migrate through the study area as adults and juveniles. Adults migrate through the lower Columbia River from March through October on their return to spawning tributaries (Columbia River Research 2014). Adult lamprey ascend rivers by swimming upstream briefly, sucking to rocks, resting, and then proceeding. Larval lamprey (ammocoetes) hatch after 2 to 3 weeks and are dispersed downstream by currents to slack-water areas with soft substrates, where they settle in sediments. The larval lamprey burrow into soft substrate where they may reside for 3 to 8 years as filter feeders. Late in the larval lamprey's life stage, unknown factors trigger metamorphosis, when larval lamprey become juvenile lamprey. During late winter or early spring, juvenile lamprey migrate to the ocean where they mature. The study area lacks suitable spawning substrates for either species. Juvenile and adult lamprey may be present in the SWZ and DWZ during their respective migration periods (Table 4.7-4).

4.7.4.3 Nonfocus Fish

The nonfocus fish (Table 4.7-5) are important food fish (harvested commercially and recreationally), game fish (harvested recreationally), or on Washington's PHS list. Two of the species, mountain whitefish (*Prosopium williamsoni*) and leopard dace (*Rhinichthys falcutus*), are on Washington's PHS list as state candidate species. Both species are widely distributed in the Columbia and Fraser River basins. The remainder of the species in this group are important as commercial or recreational species. Most are abundant and widely distributed in the system, including several introduced species. Some are known predators of juvenile salmonid, such as largemouth bass, northern pikeminnow, smallmouth bass, striped bass, and walleye.

Table 4.7-5. Nonfocus Fish Species that Could Occur in the Study Area

Species	Reason for Interest	Native or Introduced
Channel catfish (*Ictalurus punctatus*)	WDFW game fish	I
Common carp (*Cyprinus carpio*)	WDFW food fish	I
Largemouth bass (*Micropterus salmoides*)	WDFW game fish	I
Leopard dace (*Rhinichthys falcutus*)	WDFW PHS	N
Mountain sucker (*Catostomus platyrhuchus*)	WDFW PHS, WDFW game fish	N
Mountain whitefish (*Prosopium williamsoni*)	WDFW game fish	N
Northern pikeminnow (*Ptychocheilus oregonensis*)	WDFW game fish	N
Peamouth (*Mylocheilus caurinus*)	WDFW game fish	N
Perch (family Percidae)	WDFW game fish	I
Shad (subfamily Alosinae)	WDFW food fish	I
Smallmouth bass (*Micropterus dolomieu*)	WDFW game fish	I
Suckers (family Catostomidae)	WDFW game fish	N
Sunfish (family Centrarchidae)	WDFW game fish	I
Striped bass (*Morone saxatilis*)	WDFW game fish	I
Walleye (*Sander vitreus*)	WDFW game fish	I

Notes:
Source: Grette Associates 2014b.
WDFW = Washington Department of Fish and Wildlife; PHS = Priority Habitats and Species; I = introduced; N = native

4.7.4.4 Commercial, Tribal and Recreational Fishing

Commercial, tribal, and recreational fisheries in the lower Columbia River are managed by the States of Washington and Oregon, and tribes, subject to the terms of the 2008–2017 *United States v. Oregon* Management Agreement. The agreement establishes tribal harvest allocations and upholds the right of tribes to fish for salmon in their usual and accustomed fishing grounds. Commercial and recreational fishing primarily target hatchery-produced salmon and steelhead, as well as sturgeon and other game fish. Tribal fish resources are discussed in Chapter 3, Section 3.6, *Tribal Resources*.

Commercial fisheries in these waters are managed under the Columbia River Compact, a congressionally mandated process that adopts seasons and rules for Columbia River commercial fisheries (National Marine Fisheries Service 2015). The Columbia River Compact consists of the Washington and Oregon Departments of Fish and Wildlife Directors or their delegates, acting on behalf of the Oregon and Washington Fish and Wildlife Commission. The Columbia River Compact is charged by congressional and statutory authority to adopt seasons and rules for Columbia River commercial fishers. When addressing commercial seasons for salmon, steelhead, and sturgeon, the Columbia River Compact must consider the effect of the commercial fishery on escapement, treaty rights, and sport fisheries, as well as the impact on species listed under the federal ESA. Although the Columbia River Compact has no authority to adopt sport fishing seasons or rules, its inherent responsibility is to address the allocation of limited resources among users. This responsibility has become increasingly demanding in recent years. The Columbia River Compact can be expected to be more conservative than in the past when considering fisheries that will affect listed salmon and steelhead (National Marine Fisheries Service 2015).

In Washington, recreational fishing seasons and rules are updated annually and presented in the Washington Sport Fishing Rules pamphlet. Sport fishing seasons are generally established for July 1 through June 30 of the following year. The pamphlet covers all fresh waters and marine waters in Washington, including the lower Columbia River, and describes the seasons and rules for recreational fishing for finfish and shellfish or seaweed.

4.7.4.5 Water Quality Conditions

Sediment conditions in the study area are generally uniform with slight variations between aquatic habitat types. ACM sediments are primarily sand mixed with silt, SWZ sediments are primarily sand, and DWZ sediments are primarily silt mixed with sand (Grette Associates 2014b). The lower Columbia River is listed as a Washington State 303(d) impaired water and is classified by Ecology as a Category 5 polluted water for dissolved oxygen, bacteria, temperature, Dieldrin (organochlorine insecticide), PCB (polychlorinated biphenyl), 2,3,7,8 TCDD (tetrachlorodibenzo-p-dioxin), and 4,4,4 DDE (dichlorodiphenyldichloroethylene) (Washington State Department of Ecology 2016). At the project area, the Columbia River is listed as 303(d) impaired for bacteria and temperature. Over the years, downstream salinity patterns have changed, but intrusion and salinity within the study area are generally similar to historic patterns. Turbidity in the study area is variable based on a number of factors. For example, over 5 days of water quality monitoring for dredging, background levels (upstream from active dredging) ranged from the mid-20s to the mid-60s nephelometric turbidity units (NTUs) at all water depths (U.S. Army Corps of Engineers Dredged Material Management Office 2010 in Grette Associates 2014b). Water temperature within the study area ranges from low 40s to low 70s (°F), which is slightly warmer than historic values (Bottom et al. 2008). Salmonids typically move from habitat areas as temperatures approach 66°F, and the study area habitat within the ACM and upper SWZ likely reaches this threshold and may become unsuitable for juveniles salmonids in the summer months. Refer to Section 4.5, *Water Quality*, for further information regarding water quality conditions near the project area.

4.7.4.6 Fish Stranding

A growing body of evidence indicates that juvenile salmon and other fish are at risk of stranding on wide, gently sloping beaches because of wakes generated by deep draft vessel passage (Bauersfeld 1977; Hinton and Emmett 1994; Pearson et al. 2006; ENTRIX 2008). Depending on the slope and breadth of a beach, wakes from passing vessels can travel a considerable distance, carrying fish and depositing them on the beach where they are susceptible to stress, suffocation, and predation.

Pearson et al. (2006) published the most detailed study of Columbia River fish stranding completed to date. They evaluated stranding at three sites in the lower Columbia River: Sauvie Island, Barlow Point (adjacent to the project area), and County Line Park. The sites were chosen because prior work had established them as sites with a high risk of stranding (Bauersfeld 1977). Pearson et al. (2006) observed 126 vessel passages, 46 of which caused stranding. They also measured numerous site variables such as fish density (measured via beach seining), site topography, river stage, current velocity, tidal stage, tidal height, and a variety of vessel variables including direction of movement, velocity, ship type, ship size, and draft. Although the study provides an understanding of the factors that contribute to stranding, it does not create a predictive model because it was limited to analysis of known or suspected high-risk sites. From the study, certain sites appear to be more susceptible to stranding than others. For example, the highest occurrence of stranding occurred at Barlow Point, where 53% of the observed passages resulted in stranding. Stranding occurred less frequently at

Sauvie Island (37% of the observed passages resulted in stranding) and County Line Park (15% of observed passages resulted in stranding) (Pearson et al. 2006). The Proposed Action would add 1,680 vessel transits to the Columbia River at full buildout (840 vessels transiting to and from the project area), which would introduce additional permanent risk of fish stranding in the Columbia River. However, Barlow Point is directly downstream from the Proposed Action and vessels would be slowing as they approach the docks and accelerating as they leave the docks, which could reduce the size of vessel wakes generated by vessels associated with the Proposed Action at Barlow Point. Other sites downstream of Barlow Point would be susceptible to increased risk of fish stranding because of the vessels associated with the Proposed Action.

4.7.5 Impacts

This section describes the potential direct and indirect impacts related to fish and fish habitat that would result from the construction and operation of the Proposed Action and the No-Action Alternative.[3] The Corps is conducting a review of the Proposed Action under NEPA, as the lead federal agency, and will be consulting under Section 7 of the federal ESA with both the USFWS and the NMFS. Additional measures may be identified under one or both of these processes that could further reduce potential impacts on fish and fish habitat.

4.7.5.1 Proposed Action

This section describes the potential impacts that could occur in the study areas as a result of construction and operation of the Proposed Action. The Applicant has identified the following design features and best management practices to be implemented as part of the Proposed Action, and were considered when evaluating potential impacts of the Proposed Action. Some or all of these measures may be terms and conditions of permits that would be issued for the project, should the project be permitted.

- The Applicant would design the trestle to be long and narrow, and at a height above the OHWM to minimize shading in the shallow water zone. From shore, the trestle would measure 24 feet in width for 700 feet, and 51 feet in width for the final 150 feet. The top of the deck would be +22 feet CRD and the bottom of the deck +19.5 feet CRD. Therefore, the bottom of the deck would be more than 8 feet above OHW. This design would minimize overall impacts in shallow water, including impacts on habitat connectivity along the shoreline.
- The Applicant would locate Docks 2 and 3 entirely in deepwater habitat to distance the structure and terminal activities from shallow water areas.
- The Applicant would install pile caps on all project-related piling to minimize perching/roosting opportunities for piscivorous birds on the trestle and docks.
- The Applicant would locate the berthing area at water depths of at least -20 feet CRD to avoid habitat conversion from shallow to deepwater during dredging.
- The Applicant would locate the berthing area in deepwater closer to the navigation channel to minimize the scope of future maintenance dredging.

[3] Acreages presented in the impacts analysis were calculated using Geographic Information System (GIS), thus, specific acreage of impacts are an estimate of area based on the best available information.

- The Applicant would direct project lighting downward or at structures, and would incorporate shielding to avoid spillage of light into aquatic areas.
- The Applicant would include a pinpoint light source at the end of the shiploading boom, aimed straight down into the ship hold area to avoid a broader beam that could cause light spillage.
- The Applicant would remove the piles slowly to minimize sediment disturbance and turbidity in the water column.
- Prior to pile extraction, the Applicant would break the friction between the pile and substrate to minimize sediment disturbance.
- The Applicant would conduct impact pile-driving using a confined bubble curtain or similar sound attenuation system capable of achieving approximately 9 dB of sound attenuation.
- During pile removal and pile driving, the Applicant would place a containment boom around the perimeter of the work area to capture wood debris and other materials released into the waters as a result of construction activities. The Applicant would collect all accumulated debris and dispose of it upland at an approved disposal site. The Applicant would deploy absorbent pads should any sheen be observed.
- The Applicant would provide a containment basin on the work surface on the barge deck or pier for piles and any sediment removed during pulling. The Applicant would 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 would move the pile expeditiously from the water into the containment basin. The Applicant would 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 would limit the impact of turbidity to a defined mixing zone and otherwise comply with WAC 173-201A.
- The Applicant would not stockpile dredged material on the river bottom surface.
- The Applicant would 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 would not operate hydraulic pumps unless the dredge intake is within 3 feet of the bottom.
- The Applicant would remove any floating oil, sheen, or debris within the work area as necessary to prevent loss of materials from the site. The Applicant would be responsible for retrieval of any floating oil, sheen, or debris from the work area and any damages resulting from the loss.
- The Applicant would 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 would have a spill containment kit, including oil-absorbent materials, on site to be used in the event of a spill or if any oil product is observed in the water.
- The Applicant would not allow barges to ground out during construction.
- The Applicant would be required to retrieve any floating debris generated during construction using a skiff and a net. The Applicant would dispose of debris at an appropriate upland facility. If

necessary, the Applicant would install a floating boom to collect any floated debris generated during in-water operations.

- The Applicant would not allow land-based construction equipment to enter any shoreline body of water except as authorized.
- The Applicant would store, handle, and use all fuel and chemicals in a fashion to ensure that they do not enter the water.

Construction activities that could affect fish or fish habitat include the following.

- Permanent removal or temporary alteration of fish habitat and prey resources from dredging and pile installation.
- Noise impacts on fish associated with pile driving.
- Shading of aquatic habitat during construction from construction vessels and construction of docks.
- Spills and leaks during construction from equipment or storage of potentially hazardous materials.

Operation activities that could affect fish or fish habitat include the following.

- Shading of aquatic habitat from Docks 2 and 3 and vessels.
- Spills and leaks of potentially hazardous materials associated with operations (i.e., fuel, hydraulic fluids, lubricants, or other chemicals).
- Vessel generated noise.
- Vessel generated wakes resulting in fish stranding.
- Impacts on fish and benthic habitat during maintenance dredging.
- Coal dust deposition in aquatic environments.

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Temporarily Alter and Permanently Remove Aquatic Habitat

Construction of the proposed docks would temporarily alter or permanently remove aquatic habitat in the Columbia River adjacent to the project area. A total of 610, 36-inch-diameter steel piles would be placed in-water, permanently removing 0.10 acre (4,312 square feet) of benthic habitat. The majority of this habitat is located in the DWZ, and pile placement would result in the loss of benthic habitat and primary and secondary production from affected benthic habitat. Benthic, epibenthic (i.e., living at the water-substrate interface), or infaunal (i.e., beneath the surface of the river floor) organisms within the footprint of individual piles at the time of pile driving would likely perish.

Existing creosote-treated piles would be removed from portions of two existing timber pile dikes. Removal of approximately 225 lineal feet of pile dike would result in long-term benefits by removing a source of creosote, a mixture of polycyclic aromatic hydrocarbons (PAHs) and other chemicals that are toxic to aquatic organisms (Brooks 1995). However, removal could temporarily increase suspended sediments, resulting in short-term contamination of water and long-term contamination of sediments from creosote piling that have been in place for many years, which may be mobilized during extraction and result in temporary water contamination.

Dredging would permanently alter a 48-acre area of benthic habitat in the DWZ by removing approximately 500,000 cubic yards of benthic sediment to achieve a water depth of -43 feet CRD, with a 2-foot overdredge allowance. Water depth would be increased by up to 16 feet in the dredge prism (i.e., extent of the area to be dredged).

Sediment sampling from within, adjacent to, and upstream of the project area has demonstrated that in deepwater areas of the Columbia River, sediments are typically composed of silty sands with a low proportion of fines (e.g., silt or mud) and very low total organic carbon. Further, sediments sampled from deepwater areas in the project vicinity have consistently met suitability requirements for flow lane disposal or beneficial use in the Columbia River (Grette Associates 2014b). Sediment within the dredge prism for Docks 2 and 3 would be evaluated in the permit process for suitability for flow lane disposal or beneficial use in the Columbia River. However, as part of the permit process for the Proposed Action, including dredging, the Applicant would conduct site-specific sediment sampling to characterize the proposed dredge prism and comply with the dredged materials management plan (Grette Associates 2014b). The disposal area for dredged materials is anticipated to be approximately 80 to 110 acres. The actual acreage and specific location of the disposal site would be determined by the permitting agencies and would be based on sediment characteristics (i.e., consistency and density of sediments). Recent authorizations for flow lane disposal of dredged materials in the Columbia River in the vicinity of the project area were generally in or adjacent to the Columbia River navigation channel between approximately river miles 60 and 66 (Grette Associates 2014c). Riparian vegetation at the project area is sparse and degraded. Project construction would not result in measurable impacts on riparian vegetation or habitat conditions.

Entrain Aquatic Organisms during Hydraulic Dredging

Fish, fish eggs, and fish larvae (i.e., eulachon eggs, lamprey ammocoetes) that occur within the dredge prism could become entrained during hydraulic dredging. It is assumed that adherence to the in-water work window for the Proposed Action, to be defined within permits issued for the Proposed Action, would be protective of the most vulnerable life-history stages for affected fish, however some life-history stages could occur in the dredge prism year-round (i.e., lamprey ammocoetes). Thus, it is recognized that not all potential impacts associated with entrainment during hydraulic dredging would be avoided. Additionally, because the in-water work window is unknown at this time and would not be defined until the Applicant obtains the necessary permits to construct the Proposed Action, and dredging would occur periodically over the life of the project, mitigation is proposed for the Applicant to conduct monitoring during hydraulic dredging operations to avoid and minimize potential impacts to fish (refer to Section 4.7.7, *Proposed Mitigation Measures,* for further details). Additionally, this mitigation is also proposed because the magnitude of the periodic dredging would vary both in terms of frequency and quantity, which cannot be fully defined at this time. This mitigation measure would contribute to avoiding and minimizing potential impacts to fish, fish eggs and fish larvae related to hydraulic dredging.

The majority of benthic, epibenthic, and infaunal organisms within the proposed dredge prism would likely perish during dredging. Recolonization by benthic, epibenthic, and infaunal organisms would be rapid, and disturbed habitats would return to reference conditions following recolonization by benthic organisms (McCabe et al. 1996). Typically benthic organisms require 30 to 45 days to recolonize disturbed environments.

Cause Physical or Behavioral Reponses from Elevated Turbidity during Pile-Driving and Dredge Disposal

Removal of piles and the dredging and disposal of dredge materials would temporarily increase turbidity. The Proposed Action would permanently affect approximately 48 acres of benthic habitat due to dredging activities (i.e., removal of benthic habitat and benthic organisms) and 610 piles for construction of the docks. Suspended sediment concentrations near dredging activity do not typically cause gill damage to salmonids (Servizi and Martens 1992; Stober et al. 1981).

Behavioral effects related to increased turbidity are another consideration. Some of the documented behavioral effects of turbidity on fish include avoidance, disorientation, decreased reaction time, increased or decreased predation and increased or decreased feeding activity. However, many fish species (especially estuarine species) have been documented to prefer higher levels of turbidity for cover from predators and for feeding strategies. For example, increased foraging rates for juvenile Chinook salmon were attributable to increase in cover provided by increased turbidity, while juvenile steelhead and coho salmon had reduced feeding activity and prey capture rates at relatively low turbidity levels. Juvenile Chinook salmon were also found to have reduced predator-avoidance recovery time after exposure to turbid water. (ECORP Consulting 2009). Thus, while there may be some beneficial behavioral effects from increased turbidity, it is expected that for many of the focus fish species and native nonfocus fish species behavior effects from increased turbidity would generally be negative. Although it is difficult to determine exactly how much of a temporary increase in turbidity would result from the construction activities, increases in suspended sediments are expected to be relatively short term, occurring during in-water construction activities and maintenance dredging. Thus, in-water construction and maintenance activities would not result in chronic sediment delivery to adjacent waters, because sediments would be disturbed only during in-water work and, thus, temporary.

The temporary increase in turbidity from the Proposed Action is expected to be short term and would not result in chronic sediment delivery to adjacent waters. Construction-related dredging is proposed to occur from August 1 through December 31, when many fish species would be present in the study area. Impacts on water quality from dredging would be minimized with the preparation and implementation of a dredging plan in compliance with the dredged material management program (DMMP) as required by state agencies (Ecology and Washington State Department of Natural Resources) and federal agencies (the Corps and EPA). Adhering to a plan developed in compliance with DMMP would minimize, but not eliminate, water-quality impacts, ensuring that potential impacts are temporary and localized in nature. No long-term changes in the baseline conditions in the study area would be expected to occur.

Cause Physical or Behavioral Responses to Underwater Noise during Pile-Driving

Installation of 610 structural steel piles to support Docks 2 and 3 would generate underwater noise during pile-driving (Grette Associates 2014a). Most piles would be installed to a depth approximately 140 to 165 feet below the mudline to provide the necessary resistance to support Docks 2 and 3, the shiploaders, and conveyors (Grette Associates 2014a). The duration of vibratory and impact pile-driving required to install each pile would depend on the depth at which higher-density materials (e.g., volcanic ash or dense sand and gravels) are encountered; shallower resistance would require less vibratory and more impact driving, while deeper resistance would require more vibratory and less impact driving.

Pile driving would occur over two construction seasons, with multiple rigs operating simultaneously between September 1 and December 31. The sequence of pile driving and the number of pile-driving rigs operating at the same time would be determined during permitting. Each pile would be installed using a vibratory driver until it meets resistance, at which point an impact pile driver would be used to proof the pile to the necessary weight-bearing capacity. Impact pile driving would be expected to last 20 to 120 minutes per pile.

Noise attenuation and fish movement models predicted that underwater noise thresholds would be exceeded, resulting in injury or behavior impacts, at distances ranging from 45 feet (single sound strike) to 3.92 miles (cumulative sound). The specific distances and effects on ESA-listed fish are provided in Table 4.7-6.

Table 4.7-6. Underwater Noise Thresholds and Distances to Threshold Levels

Species	Effect Type	Threshold	Distance to Effect Threshold[a]
All Federally Protected Fish	Injury, cumulative sound (≥2 grams)	187 dB_{SEL}	1,775 feet[b]
	Injury, cumulative sound (<2 grams)	183 dB_{SEL}	1,775 feet[b,c]
	Injury, single strike	206 dB_{PEAK}	45 feet[d]
	Behavior	150 dB_{RMS}	3.92 miles

Notes:

[a] Impact pile-driver operation, 36-inch steel pile with 9 dB attenuation from use of confined bubble curtain.

[b] This represents the point at which the model for distance to threshold for cumulative sound no longer increases with increased pile strikes. For 187 dB $_{SELcum}$ (fish ≥ 2 grams), this is at 5,003 strikes; for 187dB_{SELcum} (fish >2 grams), this is at 1,992 strikes. The concept of effective quiet makes the 1,775-foot distance applicable to both thresholds and therefore is applicable to fish both greater than and less than 2 grams.

[c] Given the On-Site Alternative location and adherence to the proposed in-water work window, most salmonids in the area during construction are assumed to be greater than 2 grams (187 dB_{SELcum} threshold), except possibly for very early subyearling chum salmon in December

[d] Because the distance to cumulative sound thresholds are greater than the distance to the single-strike sound threshold, this analysis follows the NMFS dual criteria guidance and moves forward solely considering the larger values.

dBSEL = decibels sound exposure level; dBPEAK = decibels at peak sound level; dBRMS = decibels root mean square

Because the number of pile strikes per day would be variable, it was assumed that a minimum of 5,000 strikes/day would occur. Increasing pile strikes beyond 5,000 would not affect the distance at which thresholds would be exceeded for all federally protected fish. Predicted noise reduction using confined or unconfined bubble curtains or similar attenuation devices would be at least 9 dB, based on observations at the Columbia River Crossing (David Evans Associates 2011) and at Puget Island (Washington State Department of Transportation 2010).

Underwater sound generated by impact pile driving could affect fish in several ways, ranging from alteration of behavior to physical injury or mortality. The impact would depend on the intensity and characteristics of the sound, the distance, and location of the fish in the water column relative to the sound source, the size and mass of the fish, and the fish's anatomical characteristics (Hastings and Popper 2005).

Based on calculations of where underwater noise thresholds would be exceeded by pile-driving noise (Section 4.7.3.2, *Impact Analysis, Assessing Noise Impacts*), the area where cumulative sound levels could reach or exceed the injury threshold (potential injury area) would extend from the proposed trestle and dock to a maximum distance of 1.1 miles along the shoreline (1,775 feet upstream and downstream plus the 2,300-foot length of Docks 2 and 3). The total potential injury area would encompass 0.44 square mile. Although the thresholds were developed for salmonids, they would apply to other fish species. The potential for injury or behavioral effects depends on the duration of the fish in the potential injury area.

Five threatened salmon species could occur in the study area during the proposed in-water work window of September 1 through December 31 (Table 4.7-7). All life history stages of the Snake River spring/summer-run Chinook salmon, upper Columbia River spring-run Chinook salmon, Snake River sockeye salmon, and upper Willamette River steelhead populations units would likely be absent from the study area and not affected by pile-driving. Bull trout are expected to occur infrequently and in very low numbers relative to all other salmonids. The likelihood of bull trout presence at any given time is very low, and the potential for pile-driving activities to affect bull trout is, therefore, negligible. According to the USFWS (2002), bull trout in the Lower Columbia River Recovery Unit could have migrated seasonally from tributaries downstream into the Columbia River to overwinter and feed. However, the extent to which bull trout in the Lower Columbia River Recovery Unit currently use the mainstem Columbia River is unknown.

Green sturgeon, eulachon, and other salmonid populations could be present in the study area during the proposed in-water work window. For these species, pile driving could affect fish migrating in the SWZ and the migrants and residents in the DWZ. Approximately 0.09 of the 0.44-square-mile potential injury area would be in the SWZ. The risk of injury could be lower for some populations, depending on their abundance or absence during in-water work, but juvenile salmon present as shallow water subyearlings could be at risk of injury. Larger subyearling or yearling individual salmonids could occur in all of the 0.44-square-mile potential injury area.

Adult salmon could migrate upstream through the study area during the proposed in-water work window, but none of the salmon populations spawn in the potential injury area. Chinook salmon, chum salmon, and steelhead migrate approximately 19 to 25 miles per day (Keefer et al. 2004; English et al. 2006; Buklis and Barton 1984). Coho salmon migrate approximately 9 to 20 miles per day (Sandercock 1991). These migration rates suggest that adult salmon would move through the study area relatively quickly, travelling through the potential injury area in approximately 20 to 90 minutes, depending on the species and actual rate of travel. These migration patterns could limit the potential for and duration of exposure; however, adult salmon migrating through the study area could be injured by pile-driving noise. Injuries to adult salmon could include temporary and long-term hearing damage, referred to as Temporary Threshold Shifts (TTS) and Permanent Threshold Shifts (PTS), respectively (Grette Associates 2014a).

Table 4.7-7. Salmonids in the Study Area during the Proposed Work Window (September 1–December 31) by Life Stage

Species	Federal Status	Shallow-water Subyearling	Deepwater Subyearling	Deepwater Yearling	Adult
Chinook Salmon					
Snake River fall-run ESU	T[a]	Sep–Nov[b]	Sep–Nov[b]		Sept–Oct
Lower Columbia River ESU	T	Sep–Nov[b]	Sep–Dec[b]	Sep–Dec[b]	Sept–Oct
Upper Willamette River ESU	T	Sep–Nov[b]	Sep–Dec[b]	Sep–Dec[b]	
Coho Salmon					
Lower Columbia River ESU	T	Sep–Dec[b]	Sep–Dec[b]		Sept–Dec
Chum Salmon					
Columbia River ESU	T				Sept–Dec
Steelhead Trout					
Snake River DPS	T				Sept–Oct
Upper Columbia River DPS	T				Sept–Oct
Middle Columbia River DPS	T				Sept–Oct
Lower Columbia River DPS	T				Sept–Dec
Green Sturgeon	T				Sept–Dec
Eulachon	T	Dec	Dec	Dec	Nov–Dec

Notes:
[a] T denotes federally threatened (no Endangered in this table).
[b] Denotes expected presence during the proposed in-water work window; see Grette Associates (2014a).
ESU = Evolutionary Significant Unit; DPS = Distinct Population Segment

Exposure to very loud noise or loud noise for extended periods may result in permanent reductions in sensitivity or PTS. Generally, TTS would occur at lower levels than those resulting in auditory tissue damage, which result in PTS. The effect of hearing loss in fish may relate to the fish's reduced fitness, which may increase the vulnerability to predators or result in a reduced ability to locate prey, inability to communicate, or inability to sense their physical environment (Hastings and Popper 2005). Popper et al. (2005) found fish experiencing TTS were able to recover from varying levels of TTS, including substantial TTS, in less than 18 hours post exposure. Meyers and Corwin (2008) reported evidence that fish can replace or repair sensory hair cells that have been damaged in both the inner ear and lateral line, indicating that fish may be able to recover from PTS over a period of days to weeks. Measures to reduce the risk of TTS and PTS to salmonids includes noise attenuation measures to be implemented during in-water pile-driving activities (i.e., use of confined bubble curtain or similar noise attenuation and implementing a soft-start when initiating pile driving). See Section 4.7.7, *Proposed Mitigation Measures*, for further information.

Sound pressure levels could exceed the threshold for behavioral impacts up to 3.92 miles from pile-driving activities per the *SEPA Fish Technical Report*. A line-of-sight rule, meaning that noise may propagate into any area that is within sight of the noise source, is used to determine the extent of noise propagation in river systems. Fish in the potential injury area could exhibit behavioral responses, which could include reduced predator avoidance and foraging efficiency.

Based on studies by Carlson et al. (2007) the potential injury area would extend approximately 10 meters (33 feet) from the pile-driving activity. Because the potential injury area would be limited to such a small area, it is extremely unlikely that adult fish would experience injury.

Increase Temporary Shading that Affects Aquatic Habitat

Overwater structures, barges, and vessels required for construction would increase shading to the aquatic environment beneath and adjacent to the structures and vessels, which could result in changes to primary productivity, fish behavior, predation and migration. The use of these structures and vessels would primarily be during the in-water construction period for installation of support piling for Docks 2 and 3. Pile-driving activities would be expected to be much more disruptive to fish than the shading created by construction-related barges and vessels, and would likely affect migration and foraging opportunities in the study area to a greater extent. During pile driving, fish would likely not be present near pile-driving activities and where barges are located and would not be affected by shading related to construction activities.

Cause Spills and Leaks that Temporarily Contaminate Water Quality

Construction activities could result in temporary water quality impacts from the release of hazardous materials such as fuels, lubricants, hydraulic fluids, or other construction- related hazardous materials. Spills could affect aquatic habitat or fish near the discharge point, resulting in potential toxic acute or subacute impacts that could affect the respiration, growth, or reproduction of the affected fish or other aquatic organisms. It is assumed that spills would be less than 50 gallons because limited quantities of potentially hazardous materials would be stored and used during construction at the project area. However, a spill could cause potential impacts on fish based on the location, weather conditions, quantity, and material spilled. The potential risks, impacts, and mitigation measures related to water quality are addressed in Section 4.5, *Water Quality*. Appropriate training and implementation of prevention and control measures would guard against these risks, greatly reducing the potential for these types of impacts.

Construction—Indirect Impacts

Construction of the Proposed Action would not result in indirect impacts on fish because construction impacts are immediate and no construction impacts would occur later in time or farther removed in distance than the direct impacts.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Increase Shading that Affects Fish and Fish Habitat

Overwater structures (Docks 2 and 3 and large vessels) would increase shading to the aquatic environment, which could result in changes to primary productivity as well as fish behavior, predation and migration. Permanent shading could reduce primary productivity by phytoplankton and macrophytes (Carrasquero 2001). Less primary productivity contributes to less energy for epibenthic communities and ultimately the fish that prey on epibenthic organisms. Shadows may also directly affect fish migration, prey capture, and predation. Juvenile salmon tend to migrate along the edges of shadows rather than passing through them (Simenstad et al. 1999). Low levels of underwater light are also favorable for predatory fish such as bass and northern pikeminnow to see and capture their prey, including juvenile salmonids. Reduction of primary productivity in DWZ habitat would not likely translate to reductions of epibenthic communities, which are more prevalent in SWZ habitat.

Light attenuation could affect fish migration, prey capture, and predation. While salmon fry are known to use darkness and turbidity for refuge, they generally migrate along the edges of shadows rather than penetrate them. Foraging opportunities for juvenile fish are generally associated with SWZ habitat, which are expected to provide greater availability of benthic organisms as compared to DWZ habitat. Juvenile salmon primarily migrate in SWZ habitat, although larger juveniles do migrate in DWZ habitat. Juveniles migrating in DWZ habitat are likely migrating relatively quickly and not rearing for extended periods in any particular area. The trestle is the only structure that would generate shade in SWZ habitat. The potential shading created by the trestle would be relatively limited because the trestle is elevated over the OHWM by approximately 8 feet. The height of the trestle would allow light to penetrate beneath the structure and would, therefore, not be expected to have measurable shading effects on primary productivity or fish behavior, migration, or predation in SWZ habitat.

The trestle would shade 0.3 acre of SWZ habitat, while Docks 2 and 3 and a portion of the trestle would shade 4.83 acres of DWZ habitat. Vessels loading at Docks 2 and 3 during operations would further increase the shading of DWZ habitat. If two Panamax vessels were being loaded simultaneously, they would shade an additional 4.7 acres of DWZ habitat, or 9.83 total shaded acres. The study area (Figure 4.7-1) encompasses approximately 1,300 acres, primarily DWZ habitat. Shading created by Docks 2 and 3 as well as vessels being loaded at the docks would shade approximately 0.8%. Because, juvenile salmonids tend to migrate in SWZ habitat, shading of DWZ habitat would likely affect juvenile salmonids to a lesser extent than adults or larger juveniles that tend to migrate in DWZ habitat. Shading of DWZ habitat would have low impacts on primary productivity, as primary productivity tends to be higher in SWZ habitat. Based on the location of Docks 2 and 3 over DWZ habitat, and the relatively small area shaded in relation to the overall study area, the overall shading impact would be low.

The trestle is the only structure that would cross the SWZs where juvenile salmon may be present. The design, orientation (north-south), narrow width (24 feet), and height above the water surface (8 feet) would allow some natural light to pass under the structure during all seasons and limit the potential impacts of shading on fish and fish habitat. The dock and moored vessels would be located over DWZ habitats, where shaded habitat could provide suitable conditions for larger predatory fishes and piscivorous (i.e., fish-eating) birds. Piles and moored vessels may also create flow conditions favorable for predatory fishes. The extent or magnitude to which an increase in overwater surface area could alter the predator–prey relationship in the study area is unknown, but it is assumed that the relationship would change and an increase in predation could occur where larger subyearling, yearling, or larger juvenile fish encounter the docks in the DWZ. This likely would likely not apply to smaller subyearling fish when encountering the trestle as they migrate within the ACM and SWZ.

In addition to shading, Proposed Action-related features such as support piling, the docks and trestle could provide suitable habitat for piscivorous birds. The level of activity on the docks and trestle would likely reduce the potential for birds to use these features as roosting habitat

(Grette Associates 2014d). As part of the proposed project design, the Applicant would install pile caps on all Proposed Action-related piling to minimize perching and roosting opportunities for piscivorous birds on the trestle and docks. Thus, the Proposed Action would not result in a measurable increase in predation of fish from piscivorous birds.

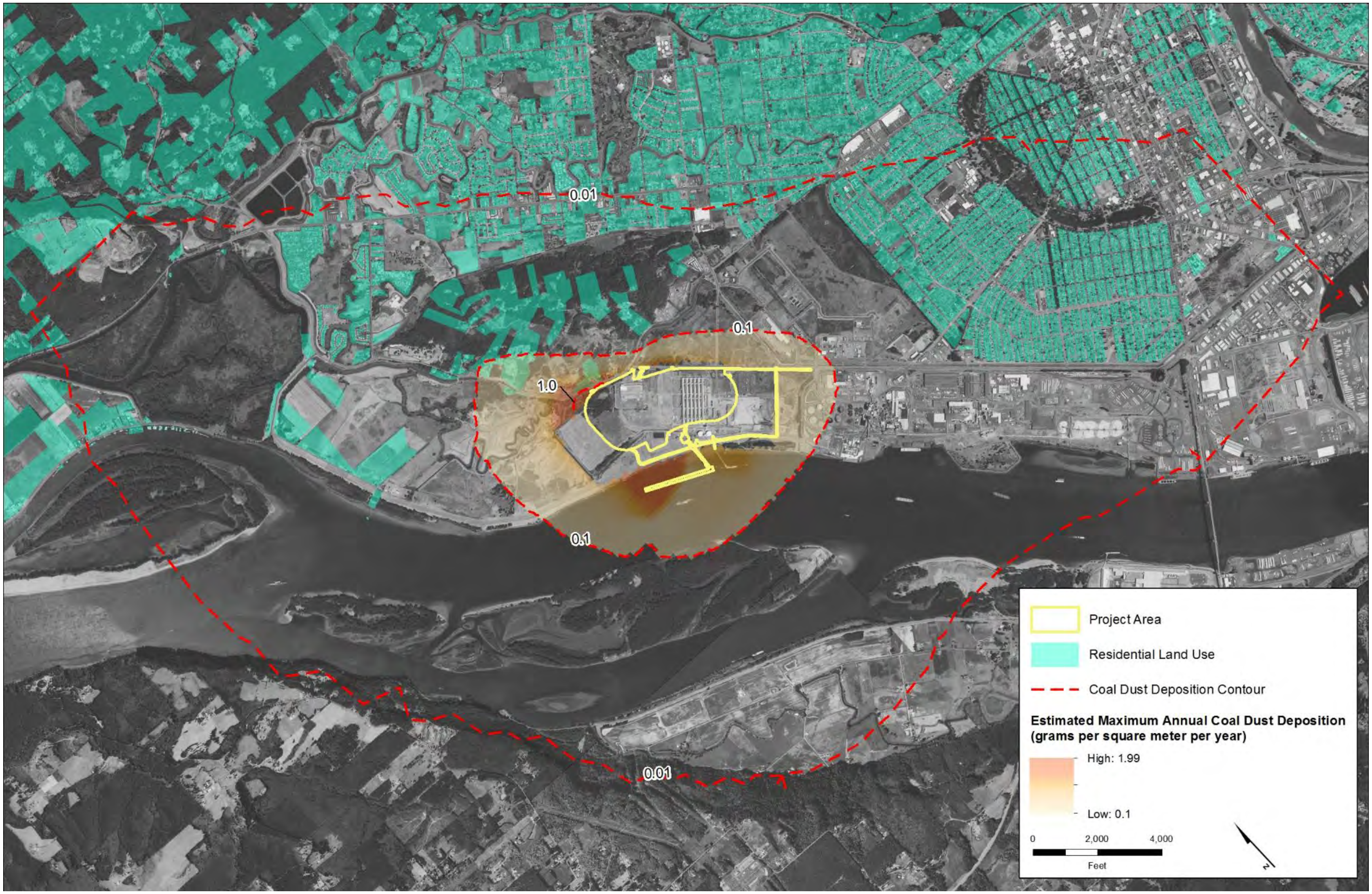
Cause Spills or Leaks that Contaminate Water Quality

Operations activities on land as well as in- and over-water could result in temporary water quality impacts from a release of hazardous materials such as fuels, lubricants, hydraulic fluids, or other chemicals. Spills could affect aquatic habitat or fish that occur near the discharge point, resulting in potential toxic acute or subacute impacts that could affect the respiration, growth, or reproduction of the affected fish. Overall, it is assumed that a spill would be less than 50 gallons because limited quantities of potentially hazardous materials would be stored and used during operations at the project area. Refueling of vehicles during operations would occur off site at approved refueling stations, or fuel would be delivered to the site by a refueling truck (capacity of 3,000 to 4,000 gallons). Refueling trucks are required to carry appropriate spill response equipment, thereby being prepared to respond and reduce the impact associated with a fuel spill. Vessel bunkering (i.e., a vessel receiving fuel while at the dock) would not occur at the project area. Refer to Section 5.4, *Vessel Transportation*, for more information on vessel bunkering. There would be no increased risk of spills in the project area associated with vessel fueling associated with the Proposed Action. The potential risks, impacts, and mitigation measures related to water quality are addressed in Section 4.5, *Water Quality*. Refer to Section 4.9, *Energy and Natural Resources,* as well as Chapter 3, Section 3.6, *Hazardous Materials,* and Chapter 5, Section 5.4, *Vessel Transportation*, for more information related to fuel and refueling activities associated with the Proposed Action. Similarly, appropriate training and implementation of prevention and control measures would guard against these risks, greatly reducing the potential for these types of impacts.

Generate and Disperse Coal Dust in the Aquatic Environment

Fugitive coal dust particles would be generated by the Proposed Action through the movement of coal into and around the project area, as well as during transfer onto vessels (Chapter 5, Sections 5.6, *Air Quality,* and 5.7, *Coal Dust*). Coal dust could also become airborne from stockpiles located within the project area. Estimated maximum annual coal dust deposition at or beyond the project area (Figure 4.7-4) would range from 1.99 grams per square meter per year (g/m^2/year) adjacent to the project area to 0.01 g/m^2/year approximately 2.4 miles from the project area (Chapter 5, Section 5.7, *Coal Dust*).

Figure 4.7-4. 3-Year Annual Average Coal Dust Deposition for the Proposed Action



Assuming a maximum deposition rate of 1.99 g/m^2/year adjacent to the project area, and at the minimum flow[4] recorded over the 23-year period of record for 1 day, coal dust deposition directly into the river, assumed to be an area of approximately 3 million square meters (1.16 square miles) in the study area, would result in a change in suspended sediment concentration of less than 1 part per 10 billion (0.000075 milligrams per liter [mg/L]). One review of the chemical composition of coal dust (U.S. Geological Survey 2007) suggests that the risk of exposure to concentrations of toxic materials (e.g., PAHs and trace metals) from coal are low because the concentrations are low and the chemicals bound to coal and not easily leached. Particles would also be transported downstream by the flow of the river and distributed over a broad area, thus diluting any potential impacts.

Spill Coal during Operations of the Proposed Action

Direct impacts on the natural environment from a coal spill during operations of the Proposed Action could occur; however, local, state, and federal permit processes would require features and site design that would be expected to reduce coal spills. Direct impacts resulting from a spill during coal handling at the coal export terminal would most likely be minor because the amount of coal that could be spilled would be relatively small. Also, impacts would be minor because of the absence of aquatic environments in the project area and the contained nature and design features of the terminal (e.g., enclosed belt conveyors over water, transfer towers, and shiploaders). Potential physical and chemical effects of a coal release on the aquatic environments that occur adjacent to the terminal are described below.

Aquatic environments could potentially be affected from a coal spill both physically and chemically. A coal spill could have physical effects on aquatic environments, including abrasion, smothering, diminished photosynthesis, alteration of 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 existing conditions of a particular aquatic environment (e.g., river shoreline, open water, pond, 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. This is unlikely because the rail loop and stockpile areas would be contained, and other areas adjacent to the coal export terminal are separated from the Columbia River by an existing levee, which would prevent coal from being conveyed from upland areas adjacent to the rail loop to the Columbia River. 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

[4] The minimum recorded flow at the Columbia River at Beavery Army Terminal, Quincy, Oregon, is 65,600 cubic feet per second (1969 to 2014).

safeguards to prevent such operational errors, such as start-up alarms, dock containment measures to contain spillage/rainfall/runoff, and enclosed shiploaders.

The chemical effects on fish, aquatic organisms, and habitats would depend on the circumstances of a coal spill and the existing conditions of a particular aquatic environment (e.g., shoreline, open water, pond, wetland). Some research suggests that physical effects are likely to be more harmful than 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 information about 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). Further information is provided under *Operations—Indirect Impacts*.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Cause Fish Stranding from Vessel Wakes

At full build-out, 70 cargo vessels per month (840 vessels per year) would be used for the Proposed Action, resulting in 1,680 vessel transits in the lower Columbia River (840 vessels each transiting to and from the project area). The vessels would consist of Panamax and Handymax vessels. Panamax vessels measure approximately 738 feet long by 105 feet wide with a draft of 43 feet. Handymax vessels measure approximately 490 to 655 feet long by 105 feet wide with a draft of 36 feet. Depending on various factors—such as the slope and breadth of a beach, river stage, tidal stage, depth of water vessel is transiting, and vessel size, direction of travel and speed, wakes from passing vessels can travel a considerable distance. When these wakes meet the shoreline, they can carry fish and deposit them on the beach, potentially stranding them where they would be susceptible to stress, suffocation, and predation before they could return to the water.

Physical conditions affect the risk of fish stranding in the lower Columbia River caused by vessel wakes have been documented in several studies (Bauersfeld 1977; Hinton and Emmett 1994; Ackerman 2002; Pearson et al. 2006; Pearson and Skalski 2007; Pearson et al. 2008). The physical conditions influencing the risk of fish stranding include gentle shoreline slopes (i.e., less than 5% slope), sandy substrate along the shoreline, confined river channel, close proximity of the navigation channel to the shoreline, river tidal stage/elevation at the time of vessel passage, presence of a berm parallel to the shoreline and shoreward of the 18-foot-deep contour, and presence of shoreline features such as vegetation, riprap, bank faces, and debris.

Prior studies have evaluated the risk for stranding along different portions of the Columbia River (Pearson et al. 2008). Shorelines in the lower estuary (i.e., river miles 0 to 22) were determined to be too distant from the navigation channel to pose a stranding risk. Between river miles 22 and 104, approximately 33 of the 82 miles of shoreline pose a risk of fish stranding by ship wakes due to the shoreline being close to the navigation channel, not shielded from wave action, and having a beach slope of less than 10%. Of the 33 miles of shoreline, approximately 8 miles have a high susceptibility for stranding based on the screening criteria (Pearson et al.

2008). Because Pearson's study considered only the physical conditions that contributed to the susceptibility of stranding along the shoreline in the lower Columbia River, and not the abundance or distribution of fish, there was no attempt to quantify the potential extent of fish stranding in the lower Columbia River (Pearson et al. 2008).

The susceptibility of fish stranding by vessel wakes not only depends on physical conditions existing along the shoreline but also the presence of fish in the channel margins and nearshore areas adjacent to the shoreline. Subyearling Chinook salmon appear to be more susceptible to stranding, accounting for approximately 80% of the fish stranded by vessel wakes along the lower Columbia River (Hinton and Emmett 1994; Dawley et al. 1984; Pearson et al. 2006) while comprising only 49% of fish captured in beach seine samples along the same shorelines (Pearson et al. 2006). Studies indicate juvenile salmon and other fish are at risk of stranding on wide, gently sloping beaches because of wakes generated by deep-draft vessel passage (Bauersfeld 1977; Hinton and Emmett 1994; Pearson et al. 2006; ENTRIX 2008).

Within the lower Columbia River, the presence of fish in nearshore channel margin areas varies seasonally by species. However, fish are present year-round in the lower Columbia River. Previous studies have found that fish also use different areas of the river, depending on age and life-history stage, and not all juvenile salmonids appear to be equally susceptible to stranding. The majority of stranding appears to occur for subyearling Chinook salmon. Subyearling chum and coho salmon are also stranded but in much lower numbers than subyearling Chinook salmon. Other salmonids such as juvenile sockeye salmon, pink salmon, steelhead, yearling Chinook and coho salmon, do not appear to be as susceptible to vessel wake stranding based on their habitat use in the lower Columbia River (Grette Associates 2016). In general, subyearling Chinook salmon are present in the shallow river margin during winter, spring, and early summer but not during the late summer and fall. NMFS (2012) did not identify ship wake stranding as a limiting factor or threat to eulachon. Grette (2016) noted that "overall, eulachon are not expected to be susceptible or exposed to wake stranding risk in the lower Columbia River." This is supported by the fact that eulachon were not observed stranded or in beach seines conducted by Pearson et al. (2006, in Grette Associates 2016).

While the scientific literature generally acknowledges the connection between wakes generated by deep-draft vessels and fish stranding in the lower Columbia River, the literature has not identified methods to quantify the current level of stranding that occurs in the lower Columbia River, or resulted in the development of a model that could accurately predict the extent of stranding that would be caused by deep-draft vessels within the lower Columbia River. Thus, while it is acknowledged that the Proposed Action would increase deep-draft vessel traffic in the lower Columbia River, which could contribute to an increase in fish stranding, it would be speculative to attempt to quantify fish stranding from vessels associated with the Proposed Action, given the uncertainty related to fish stranding and lack of reasonably accurate methods to quantify the potential impact within the lower Columbia River. SEPA Rules require the consideration of environmental impacts that are likely, not merely speculative (WAC 197-11-060). In accordance with this requirement, the EIS discloses the potential for impacts related to fish stranding due to vessel wakes, but does not quantify the potential impact because the worst-case scenario cannot be developed with any reasonable certainty (WAC 197-11-080-3(a)). While vessel operations in the lower Columbia River are federally regulated, the Applicant has no authority to control or influence vessel operations, either directly or indirectly. Thus, there are no available mitigation measures associated with vessel operations that the Applicant could implement to reduce vessel wake stranding impacts.

Cause Physical or Behavioral Responses to Vessel Noise

Vessels transit the Columbia River carrying oil, freight, and materials to and from ports along the river. Hemmera Envirochem et al. (2014) measured sound pressure levels (RMS) of one Panamax vessel passing Victoria on Vancouver Island, Canada, at a speed of 11.1 knots. Sound pressure levels measured were approximately 155 dB_{RMS} at 67 meters, decreasing to less than 150db_{RMS} at approximately 110 meters. These source sound levels exceed identified thresholds for potential behavioral disturbance for fish and may cause avoidance or other behavioral responses (Fisheries Hydroacoustic Working Group 2008). Fish near transiting vessels could experience behavioral responses to the vessel noise but would not likely be injured.

Remove or Alter Aquatic Habitat during Maintenance Dredging

Maintenance dredging would be scheduled to occur on a multiyear basis, but could occur annually or following extreme flow conditions, as needed, to maintain required water depths at Docks 2 and 3 and to allow for navigation between the docks and the navigation channel (WorleyParsons 2012). Maintenance dredging may require separate local and state permitting beyond those permits issued for construction of the Proposed Action. Maintenance dredging would follow the same methods and have the same impacts as those described for construction-related dredging.

Generate and Disperse Coal Dust in the Aquatic Environment

Indirect impacts associated with fugitive coal dust particles would be the same as those described previously for operational direct impacts.

Spill Coal during Rail Transport

The potential indirect impacts of a coal spill during rail transport from a Proposed Action-related train is based on the likelihood of a Proposed Action-related train incident occurring and the consequences of an incident were it to occur.

Chapter 5, Section 5.2, *Rail Safety*, estimates the number of Proposed Action-related train incidents that could occur during coal transport within Cowlitz County and Washington State. In Cowlitz County, the predicted number of loaded coal train incidents is approximately one every 2 years. The predicted number of loaded coal train incidents within Washington State is approximately five per year.

Not every incident of a loaded coal train would result in a rail car derailment or a coal spill. A train incident could involve one or multiple rail cars, and could include derailment in certain circumstances. The size and speed of the train and the terrain at the location of the incident would influence whether the incident resulted in a coal spill that could have impacts on fish. A broad range of spill sizes from a partial rail car to multiple rail cars could occur as a result of a Proposed Action-related train incident.

If an incident resulted in a coal spill, impacts on aquatic environments would depend on the location of the spill, the volume of the spill, and success of efforts to contain and clean up the spill. It is expected that coal spills in the terrestrial and built environments would be easier to contain and clean up than spills occurring in an aquatic environment. Spills occurring on land may have a quicker response time and cleanup in some locations due to their visibility and access for cleanup equipment, as compared to spills into aquatic environments.

Research suggests that the bioavailability of contaminants in coal is limited, and that at levels of coal contamination at which estimates of bioavailable concentrations of contaminants might give cause for concern, the acute physical effects are likely to be more harmful than the chemical effects (Ahrens and Morrisey 2005). However, the variable chemical properties of coal could conceivably result in contaminant mobility and enhanced bioavailability in the aquatic environment. Coal can be a source of acidity, salinity, trace metals, PAHs, and chemical oxygen demand (a measure of organic pollutants found in water). Interactions between coal and water could alter pH and salinity, release trace metals and PAHs, and increase chemical oxygen demand. However, if and how much these alterations occur in the aquatic environment and whether the alterations are significant enough to be potentially toxic to aquatic organisms depends on many factors, including the type of coal, the relative amount of time the coal is exposed to water, dilution, and buffering.

The following provides a summary of an Aquatic Impact Assessment following the derailment of a coal train in Burnaby, British Columbia, Canada in 2014 and subsequent clean-up and recovery of the spilled coal. Further information on the spill, efforts to recover the spilled coal, and monitoring results that provide here for context of the potential impacts of a coal spill from a train derailment. On January 11, 2014, a Canadian Pacific train derailed in Burnaby, resulting in the release of metallurgical coal[5] from three rail cars adjacent to and into Silver Creek, approximately 350 meters upstream of Burnaby Lake. Based on discussions with regulatory agencies, the rail company decided to follow a “precautionary principle” risk-management approach, and remove the majority of the coal from the spill site. Coal recovery occurred between March 4 and April 2, 2014, using a vacuum-truck system and/or hand tools. A total of approximately 143 tons of mixed coal, organic and mineral fines were removed.

The conclusions at the end of the monitoring completed as part of the Aquatic Impact Assessment focused on four major elements: water quality, sediment quality, sediment and sediment “leachate”/porewater toxicity, and bioaccumulation potential. Monitoring locations were established upstream and downstream of coal recovery areas to provide a control/impact comparison. In situ and analytical water quality sampling was conducted between February 28 and April 1, 2014, prior to and during cleanup activities. Other monitoring efforts performed for the Aquatic Impact Assessment were completed on two dates, May 30/31 and April 2 (Borealis Environmental Consulting 2015).

The in situ water quality sampling between February 28 and April 1, 2014 focused on temperature, turbidity, conductivity, pH, dissolved oxygen (DO), salinity and oxidation-

[5] The Proposed Action would handle subbituminous or thermal coal from the Powder River Basin, which is different than metallurgical coal. Thermal coal is lower in carbon content and calorific value and higher in moisture.

reduction potential (ORP). The analytical sampling program focused on the following parameters:

- Alkalinity
- Chloride
- Hardness
- Extractable Petroleum Hydrocarbons
- Nutrients (NH3, NO3, NO2, C)
- pH
- PAHs
- Sulphate
- Sulphide
- Total and dissolved metals
- Total and dissolved solids (TDS)
- Total and suspended solids (TSS)

Triton's (2014, in Borealis 2015) compiled in situ and analytical data were compared with available Provincial and federal water quality guidelines for the protection of freshwater aquatic life. The resultant data indicated that sampled parameters were within applicable water quality guidelines, with some exceptions (e.g., that were not deemed to be spill related (CN 2014a, b, in Borealis 2015).

The intent of the monitoring completed for the Aquatic Impact Assessment was to determine the potential agents of effect/impact; where those effects/impacts occur; whether chemicals in water and sediment occur at concentrations seemed to result in effects/impacts; whether chemicals in water and sediment have adverse effects to resident organisms, and; whether those chemicals are taken up by organisms (bioaccumulate) over time.

For water quality, monitoring results indicated that water quality was deemed generally consistent with the BC Ministry of Environment (BCME) and/or the Canadian Council of Ministers of the Environment (CCME) guidelines protective of aquatic life.

For sediment quality, site sediment concentrations of three metals (cadmium, copper, and nickel) and various PAHs (mainly downstream of the coal recovery area) exceeded BCME and/or CCME freshwater sediment guidelines and background/reference area concentrations. The exceedance of site sediment concentrations of the three metals was only noted at one location, the Burnaby Lake reference site, which was located upstream of the spill area and not affected by the spill. No exceedances were noted in the exposed sites or the other reference location. These results support the assertion that the elevated levels of cadmium, copper, and nickel at the Burnaby Lake reference site must either be naturally occurring or originate from a source other than the coal spill.

Additional laboratory toxicity tests (of sediment samples) provided more specific information regarding the bioavailability of these parameters and the potential for biological impacts. The bioaccumulation potential test results for invertebrates (i.e., represented by freshwater oligochaetes) conducted with Silver Creek/Burnaby Lake sediment samples, in comparison with both laboratory control samples and reference areas, indicate that PAHs present in specific, localized areas downstream of the derailment site have the slight potential to accumulate in benthic invertebrates resident in those areas. However, further mitigation of these sediments was not recommended, nor was additional study in the form of a Tier 2 assessment,[6] as it is not anticipated that higher tropic levels would experience any significant adverse effects, and there

[6] The Aquatic Impact Assessment completed a Tier 1 assessment, which focused on risks to water and sediment quality, and resident aquatic biota in Silver Creek and Burnaby Lake. A Tier 2 assessment would have addressed any potential impacts on higher tropic levels (i.e., fish, birds, amphibians, reptiles) and aquatic habitats further downstream of Silver Creek and Burnaby Lake, but was not required or recommended.

are unlikely to be impacts beyond the spatial extent assessed during the Aquatic Impact Assessment (i.e., downstream of the coal recovery area) (Borealis 2015).

For sediment and sediment porewater toxicity, test results for the fish, invertebrate, and algae tests conducted with Silver Creek/Burnaby Lake sediment samples in comparison with both laboratory control samples and reference areas indicate that samples were nontoxic to all species tested in most areas, with the exception of one monitoring site, at which samples yielded marginal but statistically significant effects on the survival of benthic macroinvertebrates (i.e., midges and amphipods). The results indicate that the sediments located approximately 160 meters downstream of the spill site have the potential to affect freshwater invertebrates, and that PAHs in sediments have a slight potential to bioaccumulate in benthic invertebrates. However, the results of the Aquatic Impact Assessment indicate that while there are potentially minor impacts, restricted to a very small localized area, the coal in sediments post-recovery is of a low volume in relation to the volume of coal spilled and that these sediments should be left in place to undergo natural attenuation. Further mitigation of these sediments was not recommended (Borealis Environmental Consulting 2015).

In summary, fugitive coal dust from project operations is not expected to increase suspended solids in the Columbia River to the point that there would be a demonstrable effect on fish distribution, abundance, or survival, or acute physical effects. Additionally, the potential risk for exposure to toxic chemicals contained in coal (e.g., PAHs and trace metals), according to one study, would be relatively low because these chemicals tend to be bound in the matrix structure and not quickly/easily leached. Any coal particles would be transported downstream by the flow of the river and either carried out to sea or distributed over a broad area, further reducing the potential for adverse impacts on fish from suspended solids.

Affect Commercial and Recreational Fishing

Project-related increases in vessel traffic in the lower Columbia River and associated underwater noise could affect the fishing in study area. Increases in vessel traffic could cause behavioral responses including quicker migration or avoidance of the navigation channel. The 70 large commercial vessels anticipated per month under the Proposed Action, would be limited to the navigation channel. If adult fish targeted in commercial and recreational fishing were to alter behavior in response to underwater noise from vessels, they could avoid the navigation lanes or migrate quickly through them. Commercial and recreational fishing vessels in the navigation channel would be disrupted and need to move out of the navigation channel when large vessels are approaching or present. The Proposed Action would slightly affect commercial or recreational fishing access for fishing activities. See Chapter 5, Section 5.4, *Vessel Transportation,* for potential impacts on commercial and recreational fishing vessels associated with Proposed Action-related vessels.

4.7.5.2 No-Action Alternative

Under the No Action Alternative, the Applicant would not construct the Proposed Action. Current operations would continue and the existing bulk product terminal site would be expanded. Any expansion activities would not require a permit from the U.S. Army Corps of Engineers (Corps) or a shoreline permit from Cowlitz County. Therefore, no construction impacts on aquatic habitats or species would be expected to occur as a result of an expansion of the existing bulk production terminal under the No-Action Alternative.

4.7.6 Required Permits

The Proposed Action would require the following permits related to fish and fish habitat.

- **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.
- **Critical Areas Permits—Cowlitz County**. The Proposed Action would require local permits related to 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 fish and wildlife habitat conservation areas (including streams and their buffers), frequently flooded areas, and other sensitive areas.
- **Construction and Development Permits—Cowlitz County**

  The Proposed Action would require fill and grade permits (CCC 16.35) and construction permits (CCC 16.05) for clearing and grading and other ground disturbing activities, as well as construction of structures and facilities associated with the Proposed Action.
- **Clean Water Act Authorization—U.S. Army Corps of Engineers.** Construction and implementation of the Proposed Action would affect waters of the United States, including wetlands. Because impacts would exceed 0.5 acre, Individual Authorization from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act and appropriate compensatory mitigation for the acres and functions of the affected wetlands would be required.

  An Individual Water Quality Certification from Ecology under Section 401 of the Clean Water Act and a National Pollution Discharge Elimination System permit under Section 402 of the Clean Water Act would also be required for construction of the Proposed Action. Additional details regarding the permitting process related to the Clean Water Act can be found in the *SEPA Water Quality Technical Report.*
- **Rivers and Harbors Act—U.S. Army Corps of Engineers.** Construction and implementation of the Proposed Action would affect navigable waters of the United States (i.e., the Columbia River). The Rivers and Harbors Act authorizes the Corps to protect commerce in navigable streams and waterways of the United States by regulating various activities in such waters. Section 10 of the RHA (33 USC 403) specifically regulates construction, excavation, or deposition of materials into, over, or under navigable waters, or any work that would affect the course, location, condition, or capacity of those waters.
- **Hydraulic Project Approval—Washington Department of Fish and Wildlife.** The Proposed Action would require a Hydraulic Project Approval from WDFW because project elements would affect and cross the shoreline of the Columbia River. The approval would consider impacts on riparian and shoreline/bank vegetation in issuance and conditions of the permit, including for the installation of the proposed docks and piles, as well as for interior culverts or other crossings of drainage features.

4.7.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to fish from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action and described below.

Additionally, the Corps is conducting a review of the Proposed Action under NEPA, as the lead federal agency, and will be consulting under Section 7 of the federal ESA with both the USFWS and the NMFS. Additional measures may be identified under one or both of these processes that could further reduce potential impacts on fish and fish habitat.

4.7.7.1 Applicant Mitigation

The Applicant would implement the following measures to mitigate impacts on fish.

MM FISH-1. Implement Best Available Noise Attenuation Method for Pile-Driving.

To minimize underwater noise impacts on fish during pile driving, the Applicant will employ the best available noise attenuation methods during pile driving. These methods may include, but are not limited to, confined bubble curtain, temporary noise attenuation pile, double-walled noise attenuation pile, or other similar technology. The Applicant is currently proposing use of a confined bubble curtain, but other methods may be found to be better at attenuating noise impacts during the Endangered Species Act Section 7 consultation or by the time construction begins. Should other methods in the future prove to attenuate underwater noise better than a confined bubble curtain, those methods will be employed.

MM FISH-2. Implement a "Soft-Start" Method during Pile-Driving.

To minimize underwater noise impacts on fish during pile driving, the Applicant will commence impact pile-driving using a "soft-start," or other similar method. The "soft-start" method is a method of slowly building energy of the pile driver over the course of several pile strikes until full energy is reached. This "soft-start" method cues fish and wildlife to pile-driving commencing and allows them to move away from the pile-driving activity.

MM FISH-3. Monitor Pile-Driving and Dredging Activities for Distress to Fish and Wildlife.

To minimize the potential harm to marine mammals, diving birds, or fish, a professional biologist will observe the waters near pile-driving and dredging activities for signs of distress from fish and wildlife during these activities. If any fish or wildlife species were to show signs of distress during pile driving, the biologist will issue a stop work order until the species are recovered, moved, or relocated from the area. The Applicant will immediately report any distressed fish or wildlife observed to the appropriate agencies (i.e., Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and National Marine Fisheries Service) and determine the appropriate course of action.

MM FISH-4. Conduct Eulachon Surveys.

Should in-water work be permitted to occur between December and May, the Applicant will conduct advance underwater surveys at least 1 year before in-water work would occur for eulachon (adult, eggs and larvae) in those areas where in-water work would occur (i.e., Docks 2 and 3 and the dredge prism). Surveys would be conducted starting in December when water temperatures are near 40 degrees Fahrenheit (°F) in the lower Columbia River, which appears to trigger river entry for adults, and continue through May, when larval eulachon have generally hatched and drifted out of the system. Survey design and results would be provided to WDFW and NMFS. If adult or larval eulachon or eulachon eggs are observed and in-water work is proposed, the Applicant would coordinate with the fish and wildlife agencies on the appropriate measures to avoid and minimize impacts on eulachon and implement those measures.

MM FISH-5. Conduct Fish Monitoring during Hydraulic Dredging Operations.

The Applicant will develop and implement fish community monitoring in coordination with WDFW, USFWS, and NMFS. Fish community monitoring will include surveys conducted prior to dredging to identify fish species and life-stages present in the area to be dredged. As part of the coordination with WDFW, USFWS, and NMFS, measures to reduce the entrainment of fish anticipated to be present during dredging will also be developed, which may include timing restrictions for hydraulic dredging. The Applicant will also develop and implement dredge entrainment monitoring for hydraulic dredging, in coordination with WDFW, USFWS, and NMFS. Dredge entrainment monitoring will involve screening the dredge output at the point of discharge (i.e., barge) to determine the number, life-stage, and species of fish entrained by hydraulic dredging. The information gathered during dredge monitoring will be provided to WDFW, USFWS, and NMFS.

MM-WQ-2. Develop and Implement a Coal Spill Containment and Cleanup Plan.

To limit the exposure of spilled coal to the terrestrial, aquatic, and built environments during coal handling, the Applicant will develop a containment and cleanup plan. The plan will be reviewed by Cowlitz County and Ecology and implemented prior to beginning operations. To limit the exposure of spilled coal to the terrestrial, aquatic, and built environments during coal handling, the Applicant will develop a containment and cleanup plan. The plan will be reviewed by Cowlitz County and Ecology and implemented prior to beginning export terminal operations. In the event of a coal spill in the aquatic environment by the Applicant during export terminal operations, action will be taken based on the specific coal spill, and the Applicant will develop a cleanup and monitoring plan consistent with the approved containment and cleanup plan. This plan will include water quality and sediment monitoring to determine the potential impact of the coal spill on the aquatic habitat and aquatic species. The Applicant will develop the cleanup and monitoring plan in coordination with Cowlitz County, Ecology, and the Corps. The cleanup and monitoring will be similar in scope to the monitoring completed for the Aquatic Impact Assessment (Borealis 2015) associated with a coal spill in British Columbia, Canada in 2014.

MM CDUST-1. Monitor and Reduce Coal Dust Emissions in the Project Area.

To address coal dust emissions, the Applicant will monitor coal dust during operation of the Proposed Action at locations approved by the Southwest Clean Air Agency (SWCAA). A method for measuring coal dust concentration and deposition will be defined by SWCAA. If coal dust levels exceed nuisance levels, as determined by SWCAA, the Applicant will take further action to reduce coal dust emissions. Potential locations to monitor coal dust concentration and deposition will be along the facility fence line in close proximity to the coal piles, where the rail line enters the facility and operation of the rotary dumper occurs, and at a location near the closest residences to the project area, if agreed to by the property owner(s). The Applicant will conduct monthly reviews of the concentration and deposition data and maintain a record of data for at least 5 years after full operations, unless otherwise determined by SWCAA. If measured concentrations exceed particulate matter (PM) air quality standards, the Applicant will report this information to SWCAA, Cowlitz County, and Ecology. The Applicant will gather 1 year of fence line data on PM2.5 and PM10 prior to beginning operations and maintain the data as reference. This data will be reported to SWCAA, Cowlitz County, and Ecology.

MM CDUST-3. Reduce Coal Dust Emissions from Rail Cars.

To address coal dust emissions, the Applicant will not receive coal trains unless surfactant has been applied at the BNSF Railway Company (BNSF) surfactant facility in Pasco, Washington for BNSF trains traveling through Pasco. While other measures to control emissions are allowed by BNSF, those measures were not analyzed in this EIS and would require additional environmental review. For trains that will not have surfactant applied at the BNSF surfactant facility in Pasco, before beginning operations, the Applicant will work with rail companies to implement advanced technology for application of surfactants along the rail routes for Proposed Action-related trains.

4.7.8 Unavoidable and Significant Adverse Environmental Impacts

Compliance with laws and implementation of the mitigation measures described above would reduce impacts on fish. There would be no unavoidable and significant adverse impacts on fish.

4.8 Wildlife

A rich diversity of wildlife species historically inhabited or used the waters of, and terrestrial habitat adjacent to, the Columbia River. Although development along the river has altered the natural environment, many wildlife species occur or depend on habitats found in the study area. 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 species are also covered under the ESA and are discussed in Section 4.7, *Fish*, and the *SEPA Fish Technical Report* (ICF 2017a).

This section describes wildlife in the study area. It then describes impacts on wildlife that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

4.8.1 Regulatory Setting

Laws and regulations relevant to wildlife are summarized in Table 4.8-1.

Table 4.8-1. Regulations, Statutes, and Guidelines for Wildlife

Regulation, Statute, Guideline	Description
Federal	
Endangered Species Act (16 USC 1531 *et seq*.)	Requires that applicants seeking a federal action, such as issuing a permit under a federal regulation (e.g., NEPA, Clean Water Act, Clean Air Act) undergo consultation with USFWS and/or NMFS. This will ensure the federal 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. NMFS is responsible for managing, conserving, and protecting ESA-listed marine species. USFWS is responsible for terrestrial and freshwater species. Both agencies are responsible for designating critical habitat for ESA-listed species.
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 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."

Regulation, Statute, Guideline	Description
Marine Mammal Protection Act of 1972, as amended (50 CFR 216)	Protects marine mammals from "take" without appropriate authorization, which may only be granted under certain circumstances. NMFS and USFWS enforce the act. Animals under the jurisdiction of NMFS may be present in the study area. An incidental harassment authorization or letter of authorization (specific authorization to be determined) may be required pursuant to the act.
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. These critical areas may include portions of wildlife habitat.
Washington State Shoreline Management Act (RCW 90.58)	Requires cities and counties (through their Shoreline Master Programs) to protect shoreline natural resources.
Washington State Hydraulic Code (RCW 77.55)	WDFW administers the hydraulic project approval program under the state hydraulic code in or near state waters.
Clean Water Act Section 401 Water Quality Certification	Ecology issues permits for in-water construction activities to ensure compliance with state water quality standards and other aquatic resources protection requirements under Ecology's authority.
Marinas and Terminals in Freshwater Areas (WAC 220-660-160)	Applies to constructing, maintaining, and repairing marinas and terminals in freshwater areas and addresses fish life concerns.
Local	
Cowlitz County SEPA Regulations (CCC 19.11)	Provide for the implementation of SEPA in Cowlitz County.
Cowlitz County Critical Areas Ordinance (CCC 19.15)	Requires the County to designate critical areas such as wildlife habitat conservation areas.
Cowlitz County Shoreline Master Program (CCC 19.20)	Regulates development in the shoreline zone, including the shoreline of the Columbia River, a Shoreline of Statewide Significance.
City of Longview Shoreline Master Program (Ord. 3300)	Regulates development in the shoreline, including the shoreline of the Columbia River. Adopted in September 2015.
City of Longview Critical Areas Ordinance (LMC 17.10)	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; USFWS = U.S. Fish and Wildlife Service; NMFS = National Marine Fisheries Service; ESA = Endangered Species Act; CFR = Code of Federal Regulations; RCW = Revised Code of Washington; WDFW = Washington Department of Fish and Wildlife; WAC = Washington Administrative Code; CCC = Cowlitz County Code; SEPA = State Environmental Policy Act; LMC = Longview Municipal Code

4.8.2 Study Area

The 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 4.8-1). This distance accommodates noise and visual disturbance thresholds set by the U.S. Fish and Wildlife Service (USFWS) for some sensitive species (U.S. Fish and Wildlife Service 2006).

The study area for direct impacts on aquatic species and habitats includes the main channel of the Columbia River and extends approximately 5.1 miles upstream and 2.1 miles downstream from the upstream and downstream ends of the proposed docks (Docks 2 and 3), respectively (Figure 4.8-1). The aquatic study area is based on the distances where underwater noise is estimated to reach harassment levels (Section 4.8.3.3, *Impact Analysis*). These distances represent the in-water "line of site" distances from the ends of the dock with respect to underwater noise.

The direct impacts aquatic study area also includes the various surface and stormwater ditches, ponds, and wetlands found throughout the project area.

The study area for indirect impacts on terrestrial species includes the rail corridors in Washington State that would be used by Proposed Action-related trains to account for potential coal spill and wildlife strike impacts (refer to Chapter 5, Section 5.1, *Rail Transportation,* for rail routes in Cowlitz County and Washington State). The study area for indirect impacts on aquatic species includes the Columbia River downstream from the project area to the mouth of the river to account for potential impacts on marine mammals (Section 4.7, *Fish*, Figure 4.7.2).

4.8.3 Methods

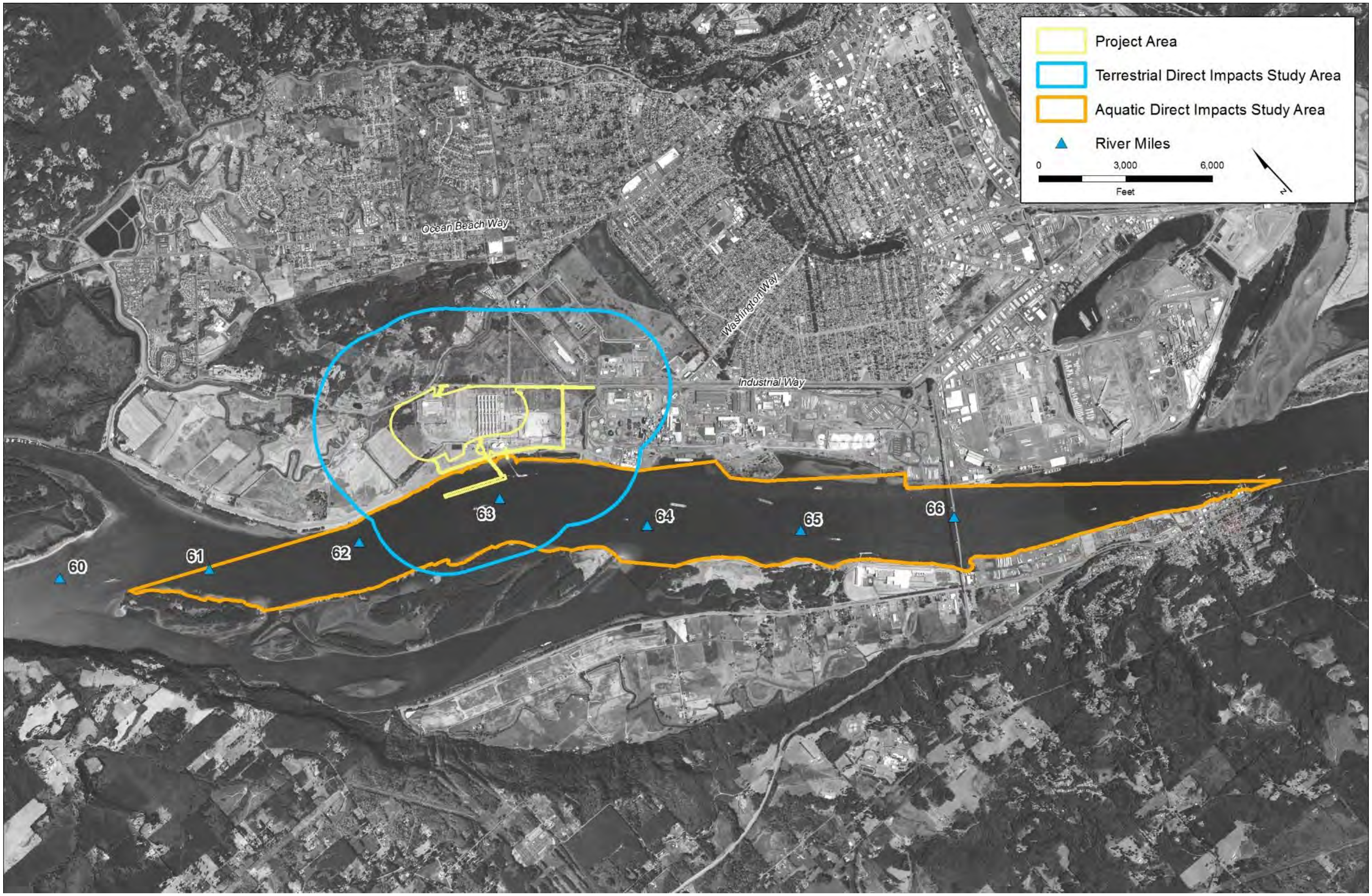
This section describes the sources of information used to evaluate the potential impacts on wildlife and wildlife habitat associated with the construction and operation of the Proposed Action and No-Action Alternative.

4.8.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on wildlife in the study area. A detailed list is provided in the *SEPA Wildlife Technical Report* (ICF 2017b).

- Two site visits conducted by ICF biologists on April 8, 2014, and December 12, 2014
- Reports prepared by Grette Associates for the Applicant as part of the permit application materials (Grette Associates 2014a through 2014p)
- National Marine Fisheries Service (NMFS) (2015) west coast region species list
- National Oceanic Atmospheric Administration (2016a) technical guidance for assessing the effects of underwater sounds on marine mammals
- USFWS (2015) Information, Planning, and Conservation system online database

Figure 4.8-1. Boundaries for the Terrestrial and Aquatic Study Areas for Direct Impacts of the Proposed Action



The following sources of information were used to define the existing conditions relevant to wildlife and evaluate potential impacts of the Proposed Action and No-Action Alternative in the terrestrial and aquatic study areas. A detailed list is provided in the *SEPA Wildlife Technical Report*.

- Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) Statewide List and Distribution for Cowlitz County (Washington Department of Fish and Wildlife 2015a); PHS spatial data (Washington Department of Fish and Wildlife 2015b)
- Washington State Department of Natural Resources (2015) online Herpetological Atlas spatial database

4.8.3.2 Impact Analysis

Potential wildlife and wildlife habitat that could be affected by the construction and operation of the Proposed Action were determined as described below. For more information on these methods, see the *SEPA Wildlife Technical Report*.

Identifying Resources in the Terrestrial and Aquatic Study Areas

The following species and habitat characteristics were identified and quantified, where possible.

- Documented species occurrences
- Species likely to occur in the terrestrial and aquatic study areas
- Suitable habitat conditions

While impacts on wildlife habitat can be quantified, impacts on wildlife species are qualitatively described. Wildlife species are mobile and their presence and abundance in the terrestrial and aquatic study areas cannot be quantitatively predicted. For documented occurrences, the focus was on wildlife species identified in the WDFW PHS database. 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.

Assessing Noise and Visual Disturbance

An animal's response to sounds 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). As sound waves spread out from their source, their energy level decreases. This analysis considers potential terrestrial sound impacts on wildlife and potential underwater sound impacts on diving birds and marine mammals.

Terrestrial Noise and Visual Disturbance

USFWS has established terrestrial distance thresholds at which harassment, as defined under ESA, may occur for some sensitive species in Washington due to construction activity (U.S. Fish and Wildlife Service 2006); these species include the bald eagle (*Haliaeetus leucocephalus*), marbled murrelet (*Brachyramphus marmoratus*), Northern spotted owl (*Strix occidentalis caurina*), and Columbian white-tailed deer (*Odocoileus virginianus leucurus*). Table 4.8-2 presents distances from construction activity at which the USFWS predicts these species may experience harassment. Of the four species, the bald eagle has the lowest threshold for disturbance and, therefore, the greatest protective distance (0.5) mile. Therefore, using a conservative approach, the terrestrial study area for the Proposed Action extends 0.5 mile beyond the project area. While this distance is based on the bald eagle's sensitivity to noise and visual impacts, it is a reasonable proxy to use for terrestrial wildlife species in the absence of similar information for other terrestrial wildlife species.

Table 4.8-2. 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
Marbled murrelet	*Brachyramphus marmoratus*	Pile-driving: 33 feet[b] Visual: 300 feet
Northern spotted owl	*Strix occidentalis caurina*	Pile-driving: 180 feet
Columbian white-tailed deer	*Odocoileus virginianus leucurus*	Noise: 0.25 mile

Notes:
[a] Noise level disturbance varies on 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] Injury would occur at 202 decibels at this distance (Washington State Department of Transportation 2015).
Source: U.S. Fish and Wildlife Service 2006.

Underwater Noise Disturbance

For underwater impacts on marine mammals and diving birds due to sound, USFWS and NMFS have determined noise-level thresholds that may result in behavioral changes or injury. The distance at which these thresholds would be reached for the Proposed Action is based on the practical spreading loss model as described by Thomsen et al. (2006).

NMFS currently provides regulatory acoustic thresholds for assessing the effects of noise exposure on marine mammal hearing from impulsive (e.g., impact pile driving) and nonimpulsive (e.g., vibratory pile driving) noise sources (Table 4.8-3) (National Oceanic Atmospheric Administration 2016a). These thresholds represent peak and cumulative sound energy levels that may cause a permanent threshold shift (PTS), a physical injury that results in reduced hearing sensitivity, in the hearing of five functional hearing groups of marine mammals.

Table 4.8-3. NMFS Underwater Sound Level Effect Thresholds for PTS Auditory Injury to Marine Mammals

	PTS Onset Acoustic Thresholds (Received Level)	
Hearing Group[a]	**Impulsive**	**Non-impulsive**
Low-Frequency (LF) Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (Underwater)	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (Underwater)	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB

Notes:
[a] Cetacean examples include whales and dolphins; pinniped examples include seals and sea lions.
Source: National Oceanic Atmospheric Administration 2016a.
dB = decibel; $L_{pk,flat}$ = Peak Sound Pressure Level (unweighted); $L_{E,24h}$ = Sound Exposure Level, Cumulative 24 hour; PW = Phocids in Water; OW = Otariids in Water

While NMFS' recent technical guidance on underwater noise impacts on marine mammals (National Oceanic Atmospheric Administration 2016a) provides guidance on injury effects of noise to marine mammals, it does not provide revised guidance on behavioral disturbance of noise to marine mammals. NMFS's interim sound threshold guidance for the potential onset of behavioral disturbance or harassment to marine mammals from nonimpulsive (vibratory) and impulsive (impact) pile driving is 120 decibels root mean square (dB_{RMS}) and 160 dB_{RMS}, respectively (National Oceanic Atmospheric Administration 2016B). Because there is an extremely low probability of cetaceans (e.g., whales and dolphins) using the study area, they are not assessed for underwater sound impacts for the Proposed Action. Pinnipeds (e.g., seals and sea lions) may be found in the aquatic study area during construction.

USFWS has established underwater noise level thresholds for behavioral change, auditory injury, and nonauditory injury (i.e., barotrauma) to the federally listed marbled murrelet (U.S. Fish and Wildlife Service 2011). The underwater effect threshold for behavioral disturbance is 150 dB_{RMS}; auditory injury is 202 dB_{SEL}; and nonauditory injury is 208 dB sel. Underwater noise below 150 dB_{SEL} does not cause injury and is recognized by USFWS as effective quiet (Washington State Department of Transportation 2015). While marbled murrelets are not 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 potentially present in the study area. In the absence of any federal or state agency criteria for underwater noise impacts on diving birds, these marbled murrelet criteria were used to establish distances at which underwater noise due to impact pile-driving may affect all diving birds in the aquatic study area. There are currently no vibratory pile-driving thresholds identified for marbled murrelet or other diving birds.

The distance at which underwater noise is reduced to the noise level thresholds described for marine mammals and marbled murrelet is calculated using the model currently preferred by USFWS and NMFS, the practical spreading loss model described by Thomsen et al. (2006). Up to four piles would be driven per day over an 8-hour period. Pile-driving duration and sound source levels measured during construction activities similar to those described for the Proposed Action provide the basis for calculating the distance at which construction-related noise no longer reaches the marine mammal and marbled murrelet noise impact thresholds. Sound attenuation devices would be used during impact pile-driving and are predicted to reduce sound levels by up to 9dB (Grette Associates 2014a). Attenuated sound levels are used in the calculation of the underwater distances at which murrelets and marine mammals may be affected. The calculated distances are presented in Section 4.8.5.1*, Proposed Action, Construction—Direct Impacts*. Specifics about these analysis methods and criteria are provided in the *SEPA Wildlife Technical Report*.

4.8.4 Existing Conditions

This section describes the existing environmental conditions in the terrestrial and aquatic study areas related to wildlife that could be affected by the construction and operation of the Proposed Action and No-Action Alternative.

Extensive modifications of the lower Columbia River (flood control, industrial development, deep-draft vessel traffic) have altered the habitat conditions in the study area available to wildlife species using terrestrial and aquatic habitats. Floodplain habitats have been disconnected from the riverine environment and in some cases eliminated. The shoreline and riparian environment has been substantially altered (armoring and protection, overwater structures, and development), affecting habitat in adjacent upland and riparian zones. Industrial and transportation development inland have further altered the landscape and habitat conditions, thus changing the biological communities associated with these habitats.

4.8.4.1 Terrestrial Habitat

The project area comprises a disturbed industrial site developed with roads and industrial buildings and relatively small and fragmented vegetated areas primarily in the western portion of the project area. Patches of potentially suitable habitat in the undeveloped areas could 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 2014c, 2014d, 2014e, 2014h). A segment of the project area where the trestle would be built crosses a levee with managed vegetation and riparian shoreline that borders the Columbia River. The vegetated riparian shoreline area is a very narrow strip of intermittent forest and shrub habitats that likely provides foraging and cover for small and large mammals, foraging and nesting for a variety of bird species, and foraging, breeding, and refuge for amphibians and reptiles (Grette Associates 2014d). Habitat types in the terrestrial study area for direct impacts include developed (i.e., disturbed), uplands (including riparian), and wetlands land cover classifications, which are described in Section 4.6, *Vegetation*.

In general, areas to the north-northeast and around to the southeast of the project area (in a clockwise direction) are already heavily developed by industrial, commercial, and residential land uses that extend to the Cowlitz River and along the Columbia River; immediately upstream of the project area, the heavily developed shoreline lacks suitable habitat and wildlife species are not present. Because the project area is at the western edge of this development, wildlife dispersal or movement through the project area is unlikely because there is no suitable habitat in these developed areas into which wildlife could move or disperse. Existing conditions currently hinder and create an impediment for wildlife movement toward the City of Longview (i.e., upstream of the project area). Immediately downstream of the project area are uplands, wetlands, and riparian habitats, as well as disturbed areas; habitat conditions for wildlife are less disturbed than the project area with fewer structures. Immediately north of the project area is a triangular area of the Applicant's leased area bordered by Industrial Way to the south and Consolidated Diking Improvement District (CDID) #1 drainage ditches to the east and west. The habitat likely supports foraging and cover for small to large mammals (e.g., voles to deer); foraging and nesting for a variety of birds; and foraging, breeding, and refuge for amphibians and reptiles.

A small portion of Lord Island, in the Columbia River is located within the terrestrial direct impacts study area. Previously used for dredged material disposal, the forested island connects to Walker Island, downstream, by a narrow band of sand. Between the two islands lies a tidal marsh and shallows. With the exception of several transmission towers, the island is undeveloped and contains habitat for small and large mammals, and a variety of birds, amphibians, and reptiles. The Columbian white-tailed deer is found here and Lord Island is designated as a recovery area. More detail on Lord Island wildlife species and habitat is provided in the *SEPA Wildlife Technical Report*.

The study area for indirect impacts on terrestrial species and habitats along the rail corridors in Washington State consists of many habitat types, which broadly include lowland and montane forests, sagebrush prairie, and shrub-steppe. Various species of wildlife are associated with each of these terrestrial habitats. See Section 4.8.4.3, *Wildlife Species*, for more information on these habitats and associated wildlife.

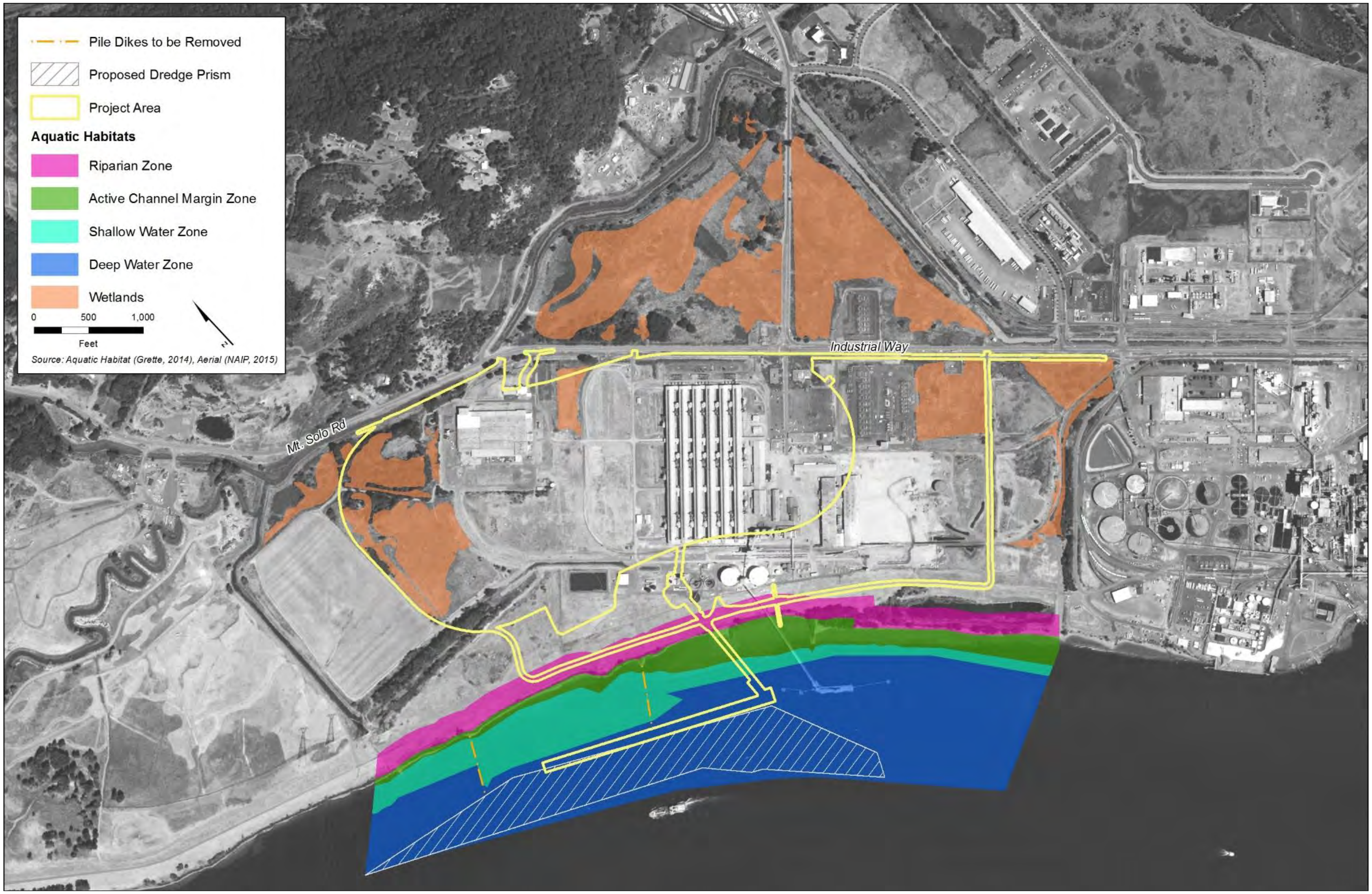
4.8.4.2 Aquatic Habitat

The aquatic direct impacts study area includes the Columbia River smaller areas of open water, including various surface and stormwater ditches and ponds, and wetlands throughout the project area (Section 4.3, *Wetlands*) that provide aquatic habitat. Ditches include those maintained by CDID #1 and privately owned stormwater ditches. The Columbia River supports marine mammals, fish, birds, and a variety of invertebrates (which serve as forage to support wildlife higher on the food chain). Fish are discussed in Section 4.7, *Fish,* other aquatic species are discussed below. Ponds, ditches, and wetlands in the aquatic direct impacts study area could support common species of invertebrates and amphibians as well as small mammals and birds.

Aquatic habitat types in the Columbia River in the aquatic direct impacts study area that could be affected by Proposed Action-related dredging and docks include the deepwater zone (DWZ), shallow water zone (SWZ), and active channel margin habitats (Figure 4.8-2) (Grette Associates 2014i). The active channel margin includes the shoreline and nearshore edge habitat extending from the ordinary high water mark (OHWM), or 11.1 feet Columbia River Datum (CRD), into the river to a depth of 0 feet CRD. In general, the upper shoreline adjacent to the active channel margin and above the OHWM is highly modified by levees and extensive riprap armoring with scattered large woody debris.

The SWZ extends from 0 feet CRD to a depth of -20 feet CRD and is relatively narrow and more steeply sloped than the active channel margin, making it unlikely to support aquatic vegetation (Grette Associates 2014j). The benthic (i.e., river bottom) habitats in the DWZ (-20 feet CRD to -45 feet CRD) of the Columbia River are subject to strong currents and reduced light penetration with depth and, therefore, support little to no aquatic vegetation.

Figure 4.8-2. Aquatic Habitats in the Direct Impacts Study Area Along the Length of the Project Area



Habitat in the aquatic indirect impacts study area includes the open water of the Columbia River from the project area to the river mouth that vessels use where marine mammals could be affected by vessel traffic. Marine mammals that may be found along the vessel route include sea lions and seals, as described in Section 4.8.4.3, *Wildlife Species*. The aquatic habitats along the navigation channel are deepwater habitats that are regularly dredged to depths for safe vessel passage.

4.8.4.3 Wildlife Species

Wildlife species likely to be found in the terrestrial direct impacts study area include common species of birds, rodents, amphibians, reptiles, and invertebrates. Larger and highly mobile species of mammals that are habituated to developed environments may also be present in the study area, including coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*) and deer (*Odocoileus* sp.).

Wildlife species likely to be found in the aquatic study areas include common species of birds (waterfowl, raptors, shorebirds, marine birds, and passerine birds), California sea lions (*Zalophus californianus*), Steller sea lions (*Eumetopias jubatus*), harbor seals (*Phoca vitulina*), rodents, frogs, salamanders, snakes, lizards, and invertebrates.

Representative wildlife in the terrestrial indirect impacts study area in Cowlitz County may include black-tailed deer, red fox, coyote, raccoon, striped skunk, beaver, Oregon and grey-tailed vole, red-tailed hawk, Cooper's hawk, Canada geese, mallard and northern pintail ducks, great blue heron, white-breasted nuthatch, chipping sparrow, and a variety of amphibians and reptiles (Commission for Environmental Cooperation 2011). A review of PHS data (Washington Department of Fish and Wildlife 2015c) for terrestrial habitats indicates small areas of oak woodlands in a few places along the rail line; species associated with this habitat include various woodpeckers, migrant birds, reptiles, invertebrates, and the western gray squirrel (Washington Department of Fish and Wildlife 1998). In addition, two osprey point locations are mapped within 300 feet of the rail line (Washington Department of Fish and Wildlife 2015c). No designated critical habitat for federally protected species under USFWS jurisdiction is mapped in the terrestrial environment near the rail line corridor(s) potentially used to transport coal in Cowlitz County. Beyond Cowlitz County, several ecoregions are found between the county and the Washington border, each with various representative wildlife species, which may include mule deer, pronghorn antelope, coyote, black-tailed jackrabbit, ground squirrels, American kestrel, red-tailed hawk, western meadowlark, savanna sparrow, western diamondback rattlesnake, greater sage-grouse, sage sparrows, sage thrashers, pygmy rabbits, black-tailed deer, black bear, beaver, river otter, pileated woodpecker, northern goshawk, cougar, wolverine, yellow bellied marmot, bald and golden eagles, Cooper's hawk, and osprey, in addition to many other birds, mammals, reptiles, and insects (Commission for Environmental Cooperation 2011). The largest ecoregion has dry desert and steppe climates, marked by hot, dry summers and cold winters, and consists of shrub-steppe vegetation communities. Shrub-steppe communities can also support federally protected species, including the pygmy rabbit and Spalding's catchfly. WDFW also considers shrub-steppe a priority habitat under the PHS program. PHS data (Washington Department of Fish and Wildlife 2015c) also indicate various priority habitats and species along the rail line study area beyond Cowlitz County, including talus slope and cliffs/bluffs habitats, bald eagle concentrations and breeding areas, and western pond turtle regular occurrence areas.

Site Visit Observations

During the December site visit, two Columbian black-tailed deer (*Odocoileus hemionus columbianus*) were observed in the forested wetland area (Wetland A) in the northwest portion of project area, and two nutrias (*Myocastor coypus*) were observed on the sloped bank of the CDID #1 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 navigation channel.

Several common bird species were recorded in the terrestrial direct impacts 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. During the December 2014 site visit, a small flock of Canada geese were observed grazing on wetland grasses in the project area, and several unoccupied raptor nests were observed in the forested habitat adjacent to the stormwater ditches on the southwest side of the project area and in 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 during the breeding season in 2013 and 2014 in the project area. No streaked horned larks were detected; however, 33 other bird species were recorded. A table listing these species is included in the *SEPA Wildlife Technical Report*. A few of these bird species are also special-status species, which are addressed in *Special-Status Wildlife Species*.

Three species of pinnipeds may be present in the aquatic study areas: 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 *Special-Status Wildlife Species*. Various bird species, including waterfowl, raptors, and shorebirds are supported by habitats in the aquatic study areas. Freshwater insects and other invertebrate species (i.e., 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 Section 4.7, *Fish.*

Special-Status Wildlife Species

Special-status wildlife species are those listed as threatened, endangered, proposed, or candidate species under the ESA or are listed as priority species by WDFW. Table 4.8-4 lists the special-status wildlife species likely to occur in the terrestrial direct impacts study area and aquatic study areas. Further descriptions of each species are provided in the *SEPA Wildlife Technical Report*. 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.

Table 4.8-4. Special-Status Wildlife Species that Could Occur in the Terrestrial Direct Impacts Study Area and Aquatic Study Areas

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	T	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
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

Wildlife Species	Potential for Occurrence[a]	Potential Habitat	State Priority Species Criteria[b]	Federal Status[c]	State Status[d]
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.	1	N/A	C

Notes:

[a] Potential for individuals to occur based on multiple sources, including PHS data, scientific literature, and agency documents; Potential for vulnerable aggregations based on PHS data only.

[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

The likelihood of each species or vulnerable aggregations occurring in the terrestrial direct impacts study area 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)

A listing of *No* does not mean individuals of that species could not occur in the terrestrial direct impacts study area or aquatic study areas, it signifies that there are no documented vulnerable aggregations (the potential for individuals to occur in the terrestrial or aquatic study areas is provided in parenthesis).

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

The Columbia River population of the Columbian white-tailed deer is a federally threatened and state endangered species. The Columbia River population is one of only two extant populations in the United States. 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 terrestrial direct impacts study area, including Barlow Point and Fisher, Walker, and Lord Islands (Washington Department of Fish and Wildlife 2013).

WDFW has identified specific locations along the Columbia River for recovery of this population (Washington Department of Fish and Wildlife 2013). The nearest recovery location to the study area is downstream of Longview, which includes Fisher, Hump, Lord, and Walker Islands (Washington Department of Fish and Wildlife 2013). The presence of Columbian white-tailed deer in the terrestrial direct impacts study area has been documented.

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

Columbian black-tailed deer use upland slopes and closed-canopy coniferous forests as they require a mix of forest and openings for cover and forage (Washington Department of Fish and Wildlife 2014). Columbian black-tailed deer have been observed on the project area.

Streaked Horned Lark (*Eremophila alpestris strigata*)

The streaked horned lark is a federally threatened and state endangered species. Streaked horned larks prefer open spaces characterized by flat, treeless landscapes of 300 acres or more, sparse grass/forb vegetation, and few or no shrubs. 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. In the project area and the broader terrestrial direct impacts study area, a few small areas contain potentially suitable habitat (low vegetative cover and no woody vegetation) that are located adjacent to the Columbia River: the closed Reynolds landfill and edges of roadbeds. No streaked horned larks were observed during the surveys in the project area during the 2013 and 2014 breeding seasons (Grette Associates 2014j, 2014k).

All critical habitat areas within the lower Columbia River are located downstream from the project area, with the exception of one area located upriver. The closest designated critical habitat is on

Crims Island, approximately 5 miles downstream of the study area. The only critical habitat upstream of the study area is on Sandy Island, Columbia County, Oregon at river mile 76, approximately 13 miles upriver (U.S. Fish and Wildlife Service 2012).

Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles nest and forage for fish along the lower Columbia River. There are no documented bald eagle nests in the terrestrial direct impacts study area and no suitable nesting habitat exists on the project area. The nearest documented nest sites are located approximately 2 miles downstream and 4 miles upstream of the project area (Washington Department of Fish and Wildlife 2014). The terrestrial direct impacts study area provides foraging habitat for this species. Lord Island also provides suitable habitat that may be used by bald eagles (Pacific Coast Joint Venture 1994). Bald eagles were observed soaring over the terrestrial direct impacts study area during the April 8, 2014 site visit. Bald eagles were also observed in the terrestrial direct impacts 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). The nearest documented nest location is approximately 3 miles south of the project area (Washington Department of Fish and Wildlife 2014). Peregrine falcons nesting within a few miles of the project area could 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 terrestrial direct impacts study area during the April 8, 2013 site visit. However, within the terrestrial direct impacts 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 terrestrial direct impacts study area. Lord Island and adjoining Walker Island support waterfowl and suitable habitat is located just outside of the terrestrial direct impacts study area in the tidal marsh area between the islands south of the sand spit (Pacific Coast Joint Venture 1994).

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 terrestrial direct impacts study area (Washington Department of Fish and Wildlife 2014).

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). There is no suitable nesting or roosting habitat on the project area; however, other forested areas in the terrestrial direct impacts study area may 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.

Pileated Woodpecker (*Dryocopus pileatus*)

Pileated woodpeckers inhabit mature deciduous or mixed deciduous-coniferous forests. There is no suitable nesting habitat in the project area. Limited foraging habit may be available in the forested areas onsite. Forested portions of the terrestrial direct impacts study area may contain suitable habitat for nesting and foraging.

Pinnipeds

Three species of pinniped are found in the lower Columbia River in the aquatic study areas: 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. Steller sea lions are primarily present during the nonbreeding season.

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 aquatic direct impacts study area, but individuals likely swim through the aquatic direct impacts study area as they migrate up and down the Columbia River. 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 aquatic direct impacts study area. There are no documented seal or sea lion haulout sites in the aquatic direct impacts study area, but individuals swim through the aquatic direct impacts study area as they migrate up and down the Columbia River.

4.8.5 Impacts

This section describes the potential direct and indirect impacts related to wildlife and wildlife habitat that could result from the construction and operation of the Proposed Action and the No-Action Alternative.[1] The Applicant identified the following design features and best management practices to be implemented as part of the Proposed Action, and these were considered when evaluating potential impacts of the Proposed Action.

- The Applicant would design the trestle to be long and narrow, and at a height above OHWM to minimize shading in shallow water areas. From shore, the trestle would measure 24 feet in width for 700 feet, and 51 feet in width for the final 150 feet. The top of the deck would be +22 feet CRD and the bottom of the deck +19.5 feet CRD. Therefore, the bottom of the deck would be more than 8 feet above OHWM. This design would minimize overall impacts in shallow water, including impacts on habitat connectivity along the shoreline.
- The Applicant would locate Docks 2 and 3 entirely in deepwater habitat to distance the structure and terminal activities from shallow water areas.

[1] Acreages presented in the impacts analysis were calculated using geographic information system (GIS), thus, specific acreage of impacts are an estimate of area based on the best available information.

- The Applicant would locate the berthing area at depths of at least -20 feet CRD to avoid habitat conversion from shallow to deepwater during dredging.
- The Applicant would locate the berthing area in deepwater closer to the navigation channel to minimize the scope of future maintenance dredging.
- The Applicant would direct lighting for the Proposed Action downward or at structures, and would incorporate shielding to avoid spillage of light into aquatic areas.
- The Applicant would include a pinpoint light source at the end of the shiploading boom, aimed straight down into the ship hold area to avoid a broader beam that could cause light spillage.
- The Applicant would remove the piles associated with the pile dikes slowly to minimize sediment disturbance and turbidity in the water column.
- Prior to pile extraction, the Applicant would break the friction between the pile and substrate to minimize sediment disturbance.

4.8.5.1 Proposed Action

This section describes the potential impacts that could occur in the terrestrial and aquatic study areas as a result of the construction and operation of the Proposed Action.

Construction activities that could affect wildlife include the following.

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

Operation activities that could affect wildlife include the following.

- Noise impacts on wildlife associated with operations such as train movements, transfer of coal, 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 habitat during maintenance dredging affecting wildlife and habitat.
- Coal dust deposition affecting terrestrial, wetland, and aquatic habitats and wildlife.

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Temporarily Alter or Permanently Remove Terrestrial Habitat

Construction of the Proposed Action would result in the permanent loss of terrestrial wildlife habitat in the study area (Table 4.8-5 and Section 4.3, *Wetlands*). Construction grading and clearing would permanently remove 201.50 acres of habitat, that is mostly disturbed vegetation. As described in Section 4.8.4.1, *Terrestrial Habitat*, patches of potentially suitable upland habitat in the undeveloped areas in the western portion of the project area could support foraging and cover for some wildlife, including the Columbian white-tailed deer.

Table 4.8-5. Permanent Terrestrial Habitat Loss by Type in the Project Area

Habitat Type	Direct Impact Area (acres)
Disturbed	151.14
Upland	26.26[a]
Wetland	24.10
Total	**201.50**

Notes:
[a] Includes 0.05 acre of riparian forest. Further information on the different vegetation components of upland is found in Section 4.6, *Vegetation*.

Approximately 24.1 acres of wetland would be permanently filled resulting in permanent loss of wetland function. Based on Ecology's *Washington State Wetland Rating System for Western Washington*, three of the five wetlands in the project area were determined to have moderate habitat function and two wetlands were determined to have low habitat function. Wildlife functions in these wetlands are likely limited to temporary use by passerine birds and waterfowl for foraging, breeding, and refuge. Mitigation would be required to compensate for the loss of these wetlands and their habitat functions as part of the Clean Water Act Section 401 and Section 404 permit process. Habitat functions of wetlands in the project area are described in more detail in Section 4.3, *Wetlands*.

Temporary impacts on aquatic habitat could occur through soil disturbance, stockpiling, and erosion, causing an increase in total suspended sediments in the Columbia River and freshwater ditches on and adjacent to the project area. These types of impacts would be avoided or greatly reduced with the implementation of construction best management practices, avoidance and minimization measures, and compliance with permit requirements, such as those associated with the required 401 Water Quality Certification and hydraulic project approval. Section 4.5, *Water Quality,* describes the potential impacts of the Proposed Action on water quality.

Cause Wildlife Displacement or Mortality

Wildlife present in the project area during construction activities could be displaced, injured, or killed by construction vehicles or equipment, placement of construction materials on the ground, or ground disturbance such as preloading activities. Approximately 151 acres (75%) of the terrestrial habitat in the project area are currently developed and wildlife would likely not be present in these areas due to the lack of suitable habitat. The remaining 50 acres comprise suitable but degraded habitat and animals inhabiting these areas during construction activities could be affected. Highly mobile wildlife species, such as larger mammals and birds, would likely leave the project area during construction activities and move to adjacent areas of suitable habitat. Some less mobile species, such as burrowing mammals, reptiles, amphibians, and insects, could be injured or killed. Because these potential mortality impacts would only occur during construction and these species would be able to reproduce rapidly and in adjacent suitable habitats, the losses due to mortality would not be expected to affect the viability or fitness of the species on the population scale.

Cause Temporary Physical or Behavioral Responses to Construction Noise and Human Activities

Construction of the Proposed Action could affect both terrestrial and aquatic wildlife because of increased human presence, elevated noise levels, and/or ground-disturbing activities. 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. Wildlife response to sounds depends on numerous 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. No studies specifically identify noise sensitivities of the streaked horned lark. However, noise sensitivity studies of the marbled murrelet found that marbled murrelets are very sensitive to underwater noise such as pile driving and to prolonged terrestrial noise that lasts longer than 10 to 15 minutes (Mountain Loop Conservancy 2010). 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 activities have been shown to generate noise of 72 decibels in commercial or industrial areas (Epsilon Associates, Inc. 2006). Noise levels in this range could disturb birds, but would not likely result in injury.

Construction-related noise impacts and the presence of construction equipment and materials would be temporary, occurring over the estimated 6-year construction period. A lower density of development northwest of the terrestrial study area could connect to potentially suitable wildlife habitat where wildlife could relocate during and after construction. Because wildlife in the terrestrial study area are likely habituated to noise levels associated with industrial areas and are generally mobile, construction-related noise could affect individuals of a species, but would not affect a species' whole population or the overall fitness of a population.

Temporarily Alter or Permanently Remove Aquatic Habitat

Construction of the Proposed Action would result in the physical alteration or permanent loss of approximately 77.37 acres of aquatic habitat in the aquatic study area. Dredging to provide vessel access to Docks 2 and 3 would alter approximately 48 acres of benthic deepwater habitat and construction would result in the permanent loss of approximately of 5.17 acres of aquatic habitat (ditches and ponds) throughout the terrestrial habitats of the project area and 0.10 acre (4,312 square feet) of Columbia River bottom for the placement of 610 piles (7.07 square feet per pile multiplied by 610 piles). Additionally, the Proposed Action would result in the permanent loss of 24.1 acres of wetland habitat (refer to Section 4.3, *Wetlands*, for further information).

These open areas of freshwater and wetlands support common species of amphibians and may be used by mammals and birds. Mammals and birds are highly mobile species and are expected to leave the vicinity during construction activities. Some mortality of amphibians could occur; however, these species typically reproduce rapidly and any losses due to mortality would not be expected to affect the viability or fitness of the species' populations.

The placement of 610 piles would permanently remove benthic habitat in the Columbia River, where the areas within each pile footprint would cease to contribute toward primary or secondary productivity. Benthic, epibenthic, or infaunal organisms within the pile footprint at the time of pile driving would likely perish.

Construction of the docks and trestle would also create 5.13 acres of new overwater surface area. While these overwater structures would be constructed on top of the 610 piles (i.e., no physical placement of overwater structures within the water column or substrate), the presence of the overwater structures would limit light penetration into the aquatic environment and affect primary productivity.

Existing creosote-treated piles associated with two pile-dikes would be removed using vibratory extraction or direct-pull methods (Grette Associates 2014n). Removing creosote-treated woodpiles from the Columbia River could improve water quality over the long term; however, removing the piles could cause temporary, short-term increases in suspended sediments, short-term water contamination, and long-term sediment contamination from creosote released during extraction or long-term exposure to the water column.

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). Creosote contains a mixture 200 to 250 compounds, with primary components composed of polycyclic aromatic hydrocarbons (PAHs) (Brooks 1997; 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). 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 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 by removing approximately 500,000 cubic yards of benthic sediment. Within the proposed dredge prism (i.e., extent of dredged area), the amount of deepening would vary based on existing depths, from no removal up to a depth of approximately 16 feet of removal. Permits for the Proposed Action, including dredging, would require site-specific sediment sampling to characterize the proposed dredge prism and ensure compliance with a dredged materials management plan.

Most bottom-dwelling benthic organisms are stationary or slow moving and would likely perish during dredging. Benthic organisms typically recolonize disturbed areas within 30 to 45 days. Dredging activities could also affect pinnipeds through collisions with vessels and dredge-related increases in turbidity. Collisions 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 could cause masking and behavioral changes but is unlikely to cause auditory damage to pinnipeds (Todd et al. 2014). Localized, temporary increases in turbidity would not likely cause long-term or negative impacts on pinnipeds.

Cause Temporary Physical or Behavioral Responses to Underwater Construction Noise—Pinnipeds

Installation of structural steel piles to support Docks 2 and 3 would generate underwater noise during pile-driving (Grette Associates 2014b) that could exceed the harassment thresholds described in Section 4.8.3.2, *Impact Analysis, Assessing Noise Impacts*. Pile installation and the applicable work windows would be provisioned in the Hydraulic Project Approval. Pile installation would likely occur over two in-water work window construction periods due to the number of in-water piles required for the dock and trestle.

Impact Pile-Driving

PTS auditory injury could occur on phocid pinnipeds (e.g., harbor seals) and otariid pinnipeds within 15,220 feet and 1,109 feet, respectively, of 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 at the source, which would decrease the distance to phocid and otariid PTS injury to 3,822 feet and 279 feet, respectively. Because the Columbia River is approximately 3,281 feet wide at the point where pile-driving would occur, and the aquatic direct impacts study area extends 5.1 miles upstream of the project area and 2.1 miles downstream of the project area, there would be a large area of the river within the aquatic study area that pinnipeds could use and avoid exposure to the area where underwater noise reaching PTS injury levels may occur. Based on the seasonal use patterns for

California sea lion, Steller sea lion, and harbor seals in the study area, presence of individual pinniped species during impact pile driving would be unlikely.

It is estimated that behavioral disturbance could occur for both phocid and otariid pinnipeds up to 17,756 feet from impact pile driving without any sound attenuation devices. 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 distance to pinniped behavioral disturbance to 4,459 feet from each pile as it is driven. In the event these pinnipeds pass through the study area during impact pile driving, they would be exposed to sound in excess of the behavioral disturbance threshold. Based on the seasonal use patterns for California sea lion, Steller sea lion, and harbor seals in the study area, presence of individuals of these species during impact pile driving would be unlikely.

Vibratory Pile-Driving

PTS auditory injury could occur for phocid and otariid pinnipeds within 331 feet and 23 feet, respectively, of active vibratory pile driving. Because the Columbia River is approximately 3,281 feet wide at the point where pile driving would occur, there would be a wide area of the river that pinnipeds could use in the aquatic study area and avoid exposure to the area where underwater noise reaching PTS injury levels may occur. 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 pile installation, presence of individual pinnipeds during pile driving would be unlikely. In addition, the threshold distances assume pinnipeds would be exposed to 1.2 hours of elevated noise during a day of vibratory pile-driving (four piles/day, 20 minutes/pile). Given the adherence to in-water work windows, the short impact distance, and the ability of pinnipeds to travel outside the area of elevated underwater noise, thereby reducing the duration of their exposure, pinnipeds that could be present in the study area are unlikely to experience PTS auditory injury due to vibratory pile-driving.

Behavioral disturbance due to vibratory pile driving could occur for both phocid and otariid pinnipeds up to 5.1 miles upstream from the project area and 2.1 miles downstream from the project area. These disturbance distances are defined by bends in the Columbia River that effectively intercept the underwater noise that would otherwise result in the disturbance area extending 72 miles. Sound travels in straight lines, and can only travel up to the distances of these river bends. Therefore, behavioral disturbance from vibratory pile driving could only occur within this area (Figure 5.8-1). Sound attenuation devices are not applicable to vibratory pile driving methods so no reduction in noise level is anticipated. Based on seasonal use patterns of the study area by pinnipeds and the proposed in-water work window for pile installation, pinnipeds are unlikely to be present during pile driving.

Cause Temporary Physical or Behavioral Responses to Underwater Construction Noise—Diving Birds

Potential impacts on diving birds in the Columbia River are most likely to occur due to underwater noise generated during in-water installation of piles; specifically impact pile-driving, which would generate the loudest and most intense underwater noise during construction. As described in the previous *Assessing Noise and Visual Disturbance* section, USFWS-established noise thresholds for the marbled murrelet were used to assess underwater noise impacts on all diving birds in the Columbia River. Based on these thresholds and assuming noise attenuation devices will reduce sound source levels by 9 dB, behavioral disturbance may occur at distances less than 20,701 feet, auditory injury may occur at distances less than 387 feet, and barotrauma injury may occur at distances less than 154 feet from in-water pile-driving.

The reaction of a diving bird that is 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 by forcing them to abandon the area of elevated noise levels, potentially resulting in impairment or disruption of normal behavioral patterns. Such 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 years during the approved in-water work window, and it is not anticipated that underwater impact pile-driving noise would affect the overall fitness of diving bird populations.

Cause Temporary Spills and Leaks that Affect Species or Habitat

Construction activities would occur on land as well as in and over waters of the Columbia River. Construction activities could result in temporary water quality impacts from the release of hazardous materials such as fuels, lubricants, hydraulic fluids, or other construction- related hazardous materials. Spills could affect aquatic and terrestrial wildlife near the discharge point, potentially affecting the respiration, growth, or reproduction of these species, or contaminating their habitat. The risk of a spill or release of hazardous materials is low because of the requirements associated with the handling, transfer, use, and storage of most construction-related hazardous materials. The potential risks, impacts, and mitigation measures related to impacts on water quality are addressed in Section 4.5, *Water Quality*. 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, in-water work restrictions, and compliance with regulatory and permit requirements, such as those associated with 401 Water Quality Certification. However, a spill may have potential impacts on wildlife based on the location, weather conditions, and type and amount of material.

Construction—Indirect Impacts

Construction of the Proposed Action would not result in indirect impacts on wildlife or wildlife habitat because construction of the coal export terminal would be limited to the project area.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Cause Periodic Spills or Leaks that Contaminate Terrestrial or Aquatic Habitat

Routine operations at the project area could result in spills or leaks of hazardous materials from vehicles, trains, or equipment. Contaminants could affect terrestrial habitat as well as water quality, thus degrading aquatic habitat in the Columbia River and drainage ditches in the aquatic study area. Training, oil discharge prevention briefings, and regulatory compliance would reduce these risks and the potential for impacts. Additional measures are outlined Section 4.5, *Water Quality*, and Chapter 3, Section 3.6, *Hazardous Materials*.

Cause Periodic Physical or Behavioral Reponses to Noise

Operations could result in increased terrestrial noise, which could affect wildlife by causing disturbance or avoidance behavior. Species present in the terrestrial study area are likely habituated to the elevated noise levels associated with industrial, commercial, and residential uses. These species are generally mobile and avoid disturbing noise levels and human activities. Noise generated by the Proposed Action would be similar to the existing, adjacent land uses and would not have a measurable impact on wildlife species in the terrestrial study area.

Generate and Disperse Coal Dust in Terrestrial and Aquatic Habitats

Coal dust and fugitive coal particles could be generated during operation of the Proposed Action through the movement of coal onto the project area, around the project area, and onto vessels. Coal dust could also become airborne from the large stockpiles that would be located within the project area.

The potential extent and deposition rate of coal dust particles less than 75 microns in diameter was modeled as part of the analysis conducted relative to air quality. Based on this modeling, the highest rate of coal dust deposition would be expected in the immediate area surrounding the coal export terminal, but smaller particles would also be expected to deposit in a zone extending around and downwind of the terminal. Deposition rates could range from 1.99 grams per square meter per year ($g/m^2/year$) adjacent to the project area, gradually declining to less than 0.1 $g/m^2/year$ within a few thousand feet from the project area and 0.01 $g/m^2/year$ approximately 2.4 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.

Windborne coal could potentially affect wildlife through physical or toxicological means. Coal particles could affect aquatic wildlife in a manner comparable to any form of suspended particulates, such as tissue abrasion, smothering, obstruction, or damage to feeding or respiratory organs, and other effects resulting from reduced quantity or quality of light. Another potential 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. Some PAHs are known to be toxic to aquatic animals and humans. Metals and PAHs could also potentially 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.

Spill Coal during Operations of the Proposed Action

Direct impacts on the natural environment from a coal spill during operations of the Proposed Action could occur. Direct impacts resulting from a spill during coal handling at the coal export terminal would likely be minor because the amount of coal that could be spilled would be relatively small. Also, impacts would be minor because of the absence of terrestrial and aquatic environments in the project area and the contained nature and design features of the terminal (e.g., enclosed belt conveyors over water, transfer towers, and shiploaders). Potential physical and chemical effects of a coal release on the aquatic and terrestrial environments that occur adjacent to the terminal are described below.

A coal spill could have physical effects on aquatic environments, including abrasion, smothering, diminished photosynthesis, alteration of 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 existing 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 spilled 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. This is unlikely because the rail loop and stockpile areas would be contained, and other areas adjacent to the coal export terminal are separated from the Columbia River by an existing levee, which would prevent coal from being conveyed from upland areas adjacent to the rail loop to the Columbia River. 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, such as start-up alarms, dock containment measures to contain spillage/rainfall/runoff, and enclosed shiploaders.

The chemical effects on aquatic organisms and habitats would depend on the circumstances of a coal spill and the existing 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 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).

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*. Under the Proposed Action, 1,680 vessel transits a year and 16 trains a day would operate at full build-out.

Cause Periodic Injury or Mortality from Vessel Strike—Pinnipeds

Operations of the Proposed Action would increase vessel traffic in the Columbia River (Chapter 5, Section 5.4, *Vessel Transportation*) by 840 ships a year. Increased vessel traffic related to operations at the project area could increase the risk of vessel collisions with pinnipeds in the indirect impacts 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). A blunt-force trauma that results from a marine mammal collision with a vessel can result in death or injury.

The potential for a pinniped strike with a vessel in the indirect impacts 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 avoid and swim away from the vessel. In addition, pinniped vessel strikes are rare; thousands of vessels transit the Columbia River every year. A small number of documented pinniped deaths are attributed to vessel strikes. For example, the *U.S. Pacific Marine Mammal Stock Assessments: 2015* (National Oceanic Atmospheric Administration 2016b) for the Pacific Coast documented two harbor seals (Oregon/Washington Coast Stock) killed by boats between 2007 and 2011 and 13 California sea lions killed by boats between 2008 and 2012. Pinnipeds in the Columbia River would also likely be habituated to existing Columbia River vessel traffic, and vessel speed in the indirect impacts study area would be less than 14 knots. Therefore, the potential risk for a vessel collision with a pinniped in the indirect study area would be generally be considered low.

Cause Periodic Physical or Behavioral Responses to Vessel Noise and Maintenance Dredging—Pinnipeds

Proposed Action-related vessels would increase vessel traffic and underwater noise in the Columbia River (Chapter 5, Section 5.4, *Vessel Transportation*). Studies in the Salish Sea have shown that the greater the ship size, the greater the underwater source level due to cavitation, with the exception of tug vessels that show greater source noise levels underwater while performing activities such as berthing or accelerating a ship (Hemmera Envirochem et al. 2014). While this information is from studies in the Salish Sea, it is expected that noise levels from vessels would be similar in the Columbia River.

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 (generally ranging between 10 Hertz and 1 kilohertz (Wright 2008) and these species are habituated to existing Columbia River vessel noise levels. Any response to project-related vessel noise would likely be minimal.

Periodically Remove or Alter Habitat during Maintenance Dredging

Maintenance dredging is anticipated to occur on a multiyear basis; however, it may occur as frequently as annually or following extreme flow conditions to maintain required depths at Docks 2 and 3 and to allow for navigation between the docks and the navigation channel (WorleyParsons 2012). Impacts on the benthic invertebrate community would be similar to those described for initial construction related dredging associated with construction activities (Section 4.8.5.1, *Proposed Action, Construction—Direct Impacts*). Compared to the initial construction dredging, maintenance dredging would remove a relatively small amount of material, including bottom dwelling organisms. Maintenance dredging would result in mortality of invertebrate organisms in the maintenance dredge prism and temporary disruption of benthic productivity. Benthic productivity is expected to be low in this deepwater habitat (McCabe et al. 1997). Maintenance-related dredging could affect pinnipeds and benthic organisms in a manner similar to the initial construction dredging (Section 4.8.5.1, *Proposed Action, Construction—Direct Impacts*). As mentioned above, benthic organisms typically recolonize in 30 to 45 days following disturbance. Thus, should dredging occur on an annual basis, it would not prevent recolonization of the benthic habitat.

Generate and Disperse Coal Dust in Terrestrial and Aquatic Habitats

Coal dust and fugitive coal particles could be generated during operation of the Proposed Action through the movement of coal by rail along the rail corridor. Coal transported by vessel would be enclosed in cargo holds and is not likely to result in deposition along the vessel route. The potential impacts from coal dust for the indirect impacts study area would be similar to the impacts described previously for the direct impacts study area.

Spill Coal during Rail Transport

The magnitude of the potential indirect impact from a coal spill on the aquatic and terrestrial environments would be similar to those described previously and would depend on the location of the spill, the volume of the spill, and success of efforts to contain and clean up the spill, none of which can be predicted.

The potential impact of a coal spill from a Proposed Action-related train is directly related to the probability of a Proposed Action-related train incident occurring. Chapter 5, Section 5.2, *Rail Safety*, estimates the number of Proposed Action-related train incidents that could potentially occur during coal transport within Cowlitz County and Washington State. In Cowlitz County, the predicted number of loaded coal train incidents is approximately one every 2 years. The predicted number of loaded coal train incidents within Washington State is approximately five per year.

Not every incident of a loaded coal train would necessarily result in a rail car derailment or a coal spill. A train incident could involve one or multiple rail cars, and could include derailment in certain circumstances. The size and speed of the train and the terrain at the location of an incident would influence whether the incident resulted in a coal spill that could have impacts on wildlife. A broad range of spill sizes from a partial rail car to multiple rail cars could occur as a result of a Proposed Action-related train incident.

Additionally, containment and cleanup efforts for coal spills from a rail incident factor into the potential impact on the environment. It is expected that coal spills in the terrestrial and built environments would be easier to contain and clean up than spills occurring in an aquatic environment. Spills occurring on land may have a quicker response time and cleanup in some locations due to their visibility and access for cleanup equipment, as compared to spills into aquatic environments.

Potential physical and chemical effects of a coal release into aquatic and terrestrial environments would be the same or similar to those described above under direct impacts.

Cause Wildlife Strikes along the Rail Corridor in Washington State

Increased rail traffic associated with the Proposed Action could result in an increase in train strikes of wildlife species that occur along the rail corridor.

Dorsey (2011) found that some wildlife may use railroads for movement, which could be considered a positive impact. Wildlife move on or along railroads while foraging, accessing critical resources (e.g., water), migrating, and dispersing. Wildlife tend to move along railroads for at least three reasons, including; railroads are often co-aligned with high quality habitats and natural movement corridors (e.g., valley bottoms and mountain passes); wildlife may move along railroads because foods (i.e., edge vegetation, carrion from strikes, and spilled agricultural grains) are available along rights-of-way or on the railbed, and; the flat railbed provides an easily traversable route particularly apparent in regions receiving significant amounts of snowfall where railroad beds may offer a relatively snow-free travel path.

However, Dorsey (2011) indicated that various factors are likely to contribute to the frequency of wildlife and rail interactions and the potential for train strikes and wildlife mortality. For example, train speed, rail alignment, and train volume—as well as wildlife abundance, behavior and habitat quality and use (i.e., migration or foraging) along rail corridors—could individually, or in combination, affect the likelihood and frequency of train strikes of wildlife. The relative abundance of wildlife along a railroad may be the primary factor affecting strike rates (Dorsey 2011), although Kusta et al. (2014) did not find abundance of roe deer in the Czech Republic and train strikes to be correlated. Dorsey (2011) cited several studies that have documented more herbivore than carnivore mortalities from train strikes, which reflects their relatively greater abundance in most landscapes. Although Dorsey (2011) points out that foods found on and along railroads may also be a factor affecting strikes by increasing the time wildlife spend directly on or adjacent to railroads. Foods found along railroads may consist of natural vegetation, carrion and agricultural products spilled from train cars.

Overall, the Proposed Action would increase the number of trains traveling through Washington State by approximately 16 trains per day at full build-out (8 loaded trains arriving and 8 empty trains leaving each day). This increase in train traffic from the Proposed Action through Washington State would increase the risk of wildlife strikes by trains.

4.8.5.2 No-Action Alternative

Under the No Action Alternative, the Applicant would not construct the Proposed Action. Current operations would continue, and the existing bulk product terminal site would be expanded. However, any expansion would be limited to activities that would not require a permit from the U.S. Army Corps of Engineers (Corps) or a shoreline permit. Therefore, no construction impacts on aquatic habitats would be expected to occur as a result of an expansion of the existing bulk product terminal under the No-Action Alternative.

Growth in the region would continue, which would allow continued operation of the coal export terminal and the adjacent bulk terminal site within the 20-year analysis period (2018 to 2038). New construction, demolition, or related activities to expand the bulk product terminal could occur on previously developed upland portions of the project area. This could affect upland areas and terrestrial habitats that provide suitable wildlife habitat. The specific extent cannot be determined at this time.

Cleanup activities, relative to past industrial uses, would continue to occur. These could affect developed areas and associated disturbed upland habitats. Vessel traffic would continue and any aquatic wildlife disturbance or injury associated with vessel movements would continue at levels similar to current conditions.

4.8.6 Required Permits

The Proposed Action would require the following permits for wildlife.

- **Endangered Species Act Consultation—U.S. Fish and Wildlife Service and National Marine Fisheries Service.** The Proposed Action could affect wildlife species or designated critical habitats protected under the ESA. 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.
- **Clean Water Act Authorization, Section 404—U.S. Army Corps of Engineers.** Construction and operation of the Proposed Action would affect waters of the United States, including wetlands. Because impacts would exceed 0.5 acre, Individual Authorization from the Corps under Section 404 of the Clean Water Act and appropriate compensatory mitigation for the acres and functions of the impacted wetlands would be required.
- **Clean Water Act, Section 401 Water Quality Certification—Washington State Department of Ecology.** The Proposed Action would result in the construction and operation of a facility that would discharge into the navigable waters and 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.
- **Local Critical Areas and Construction Permits—Cowlitz County.** The Proposed Action would require local permits related to clearing and grading of the project area and relative to impacts on regulated critical areas. Cowlitz County would issue a fill and grade permit, and would review the Proposed Action for consistency with the County's critical areas ordinance.
- **Hydraulic Project Approval—Washington Department of Fish and Wildlife.** The Proposed Action would require a hydraulic project approval from WDFW because project elements would affect and cross the shoreline of the Columbia River.

The following 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 identified above that would be issued for the project, and thus are described here.

The following measures were considered when evaluating the potential impacts of the project.

- While the Applicant would plan to limit construction for an 8- to 10-hour day, 5 days per week, on occasion, dredging may occur 7 days per week to complete work within specific fish windows.
- The Applicant would limit the impact of turbidity to a defined mixing zone and would otherwise comply with WAC 173-201A.
- The Applicant would not stockpile dredged material on the river bottom surface.

- The Applicant would 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 would not operate the hydraulic pumps unless the dredge intake is within 3 feet of the bottom.
- The Applicant would remove any floating oil, sheen, or debris within the work area as necessary to prevent loss of materials from the site. The contractor would 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 would 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 would also be removed.
- The Applicant would 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 would 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 would install and maintain a noise-monitoring station at an appropriate location on or near the site boundary to create 24-hours-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 would 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 would plan construction for an 8- to 10-hour day, 5 days per week. On occasion, it may be necessary to work 6 or 7 days per week depending on the nature of the task. For example, dredging may occur 7 days per week to complete work within specific fish windows.
- The Applicant would use activity-specific work windows designed to minimize specific impact mechanisms that may 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 would 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 would 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 would place a containment boom around the perimeter of the work area to capture wood debris and other materials released into the waters as a result of construction activities. The Applicant would collect all accumulated debris and dispose of it upland at an approved disposal site. The contractor would deploy absorbent pads should any sheen be observed.
- The Applicant would provide a containment basin on the work surface on the barge deck or pier for piles and any sediment removed during pulling.
- Upon removal from substrate, the Applicant would move the pile expeditiously from the water into the containment basin. The contractor would 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.

4.8.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to wildlife from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

4.8.7.1 Applicant Mitigation

The Applicant would implement the following mitigation measures to mitigate impacts on wildlife.

MM FISH-2. Implement a "Soft-Start" Method during Pile-Driving.

To minimize underwater noise impacts on fish during pile driving, the Applicant will commence impact pile-driving using a "soft-start," or other similar method. The "soft-start" method is a method of slowly building energy of the pile driver over the course of several pile strikes until full energy is reached. This "soft-start" method cues fish and wildlife to pile-driving commencing and allows them to move away from the pile-driving activity.

MM FISH-3. Monitor Pile-Driving and Dredging Activities for Distress to Fish and Wildlife.

To minimize the potential harm to marine mammals, diving birds, or fish, a professional biologist will observe the waters near pile-driving and dredging activities for signs of distress from fish and wildlife during these activities. If any of fish or wildlife species were to show signs of distress during pile driving, the biologist will issue a stop work order until the species are recovered, moved, or relocated from the area. The Applicant will immediately report any distressed fish or wildlife observed to the appropriate agencies (i.e., Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and National Marine Fisheries Service) and determine the appropriate course of action.

MM CDUST-1. Monitor and Reduce Coal Dust Emissions in the Project Area.

To address coal dust emissions, the Applicant will monitor coal dust during operation of the Proposed Action at locations approved by the Southwest Clean Air Agency (SWCAA). A method for measuring coal dust concentration and deposition will be defined by SWCAA. If coal dust levels exceed nuisance levels, as determined by SWCAA, the Applicant will take further action to reduce coal dust emissions. Potential locations to monitor coal dust concentration and deposition will be along the facility fence line in close proximity to the coal piles, where the rail line enters the facility and operation of the rotary dumper occurs, and at a location near the closest residences to the project area, if agreed to by the property owner(s). The Applicant will conduct monthly reviews of the concentration and deposition data and maintain a record of data for at least 5 years after full operations, unless otherwise determined by SWCAA. If measured concentrations exceed particulate matter (PM) air quality standards, the Applicant will report this information to SWCAA, Cowlitz County and Ecology. The Applicant will gather 1 year of fence line data on PM2.5 and PM10 prior to beginning operations and maintain the data as reference. This data will be reported to the SWCAA, Cowlitz County, and Ecology.

MM CDUST-3. Reduce Coal Dust Emissions from Rail Cars.

To address coal dust emissions, the Applicant will not receive coal trains unless surfactant has been applied at the BNSF Railway Company (BNSF) surfactant facility in Pasco, Washington for BNSF trains traveling through Pasco. While other measures to control emissions are allowed by BNSF, those measures were not analyzed in this EIS and would require additional environmental review. For trains that will not have surfactant applied at the BNSF surfactant facility in Pasco, before beginning operations, the Applicant will work with rail companies to implement advanced technology for application of surfactants along the rail routes for Proposed Action-related trains.

MM-WQ-2. Develop and Implement a Coal Spill Containment and Cleanup Plan

To limit the exposure of spilled coal to the terrestrial, aquatic, and built environments during coal handling, the Applicant will develop a containment and cleanup plan. The plan will be reviewed by Cowlitz County and Ecology and implemented prior to beginning export terminal operations. In the event of a coal spill in the aquatic environment by the Applicant during export terminal operations, action will be taken based on the specific coal spill, and the Applicant will develop a cleanup and monitoring plan consistent with the approved containment and cleanup plan. This plan will include water quality and sediment monitoring to determine the potential impact of the coal spill on the aquatic habitat and aquatic species. The Applicant will develop the cleanup and monitoring plan in coordination with Cowlitz County, Ecology, and the Corps. The cleanup and monitoring will be similar in scope to the monitoring completed for the Aquatic Impact Assessment (Borealis 2015) associated with a coal spill in British Columbia, Canada in 2014.

4.8.7.2 Other Measures to Be Considered

The co-lead agencies recommend BNSF identify and monitor wildlife-train collision and migration barrier hotspots along the rail corridors to determine whether current and projected levels of rail traffic would result in levels of mortality or migration barrier effects that could measurably affect the status of local wildlife populations. If levels of collision mortality and delays to wildlife movement are determined to have a measurable effect on the status of local wildlife populations, suitable wildlife crossing structures and other measures, such as fencing, should be considered as appropriate. BNSF should consult with WDFW and USFWS in designing approaches to identify and monitor hotspots and in identifying suitable crossing structures and other measures.

4.8.8 Unavoidable and Significant Adverse Environmental Impacts

Compliance with laws and implementation of the voluntary measures and mitigation measures described above would reduce impacts on wildlife. There would be no unavoidable and significant adverse environmental impacts.

4.9 Energy and Natural Resources

The availability and conservation of energy and natural resources are important factors to consider for large projects, such as the Proposed Action. Construction, operations, and transportation to and from the project area would require energy and natural resources.

This section describes energy and natural resources in the study area. It then describes impacts on energy and natural resources that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

4.9.1 Regulatory Setting

Laws and regulations relevant to energy and natural resources are summarized in Table 4.9-1.

Table 4.9-1. Regulations, Statutes, and Guidelines for Energy and Natural Resources

Regulation, Statute, Guideline	Description
State	
Washington State Energy Code, Commercial Provisions (WAC 51-11C)	Regulates the design and construction of buildings for the use and conservation of energy over the life of each building.
Local	
Cowlitz County Building Code (CCC 16.05)	Establishes standards for construction and the use of buildings and structures within unincorporated Cowlitz County. Requires conformance with the Washington State Energy Code, CCC 1605.130.

Notes:
WAC = Washington Administrative Code; CCC = Cowlitz County Code

4.9.2 Study Area

The study area for direct impacts on energy and natural resources is the project area. The study area for indirect impacts on energy and natural resources is the area within 0.25 mile of the project area. When assessing the availability of energy and natural resources, the analysis considers those resources that are available regionally, beyond the 0.25-mile study area.

4.9.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on energy and natural resources associated with the construction and operation of the Proposed Action and No-Action Alternative.

4.9.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on these resources in the study area.

- Applicant-provided data
- Cowlitz Public Utility District
- Cowlitz Conservation District
- Cascade Natural Gas
- U.S. Energy Information Administration

4.9.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on energy and natural resources.

Energy Consumption

Energy consumption was evaluated quantitatively. Potential impacts on energy were evaluated based on the estimated energy consumed during construction and operation of the Proposed Action and the estimated change in fuel consumption in the study area. Estimated hours of operation and types of fuel consumed were used to quantify energy consumption. Baseline energy usage and energy usage with the Proposed Action were estimated using data provided by the Applicant.

Natural Resource Consumption

Natural resource consumption was evaluated qualitatively. Potential impacts on natural resources were estimated based on the proposed consumption of resources during construction. The following assumptions were made for the analysis.

- Heavy construction materials, such as gravel, sand, concrete, and timber would be sourced locally to the extent possible.
- Adequate quantities of natural resources needed to support the Proposed Action would be readily available.
- Long-distance transport of these materials would be undesirable because of associated transportation costs.
- Steel used in construction would be available from both local and regional sources.

4.9.4 Existing Conditions

This section describes the existing environmental conditions in the study area related to energy and natural resources that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

4.9.4.1 Energy

This section describes the energy sources and usage local to the area and project area.

Local Energy Sources

The project area is served by multiple local energy sources and providers, including electricity, natural gas, and diesel fuel facilities. The following provides an overview of these local energy sources.

Electricity

Electricity is provided to the project area by Cowlitz Public Utility District (PUD), which supplies electricity throughout Cowlitz County. Cowlitz PUD buys over 90% of its wholesale power from Bonneville Power Administrative (BPA). The majority of the BPA power comes from the Columbia River system hydroelectric projects.

Cowlitz PUD provides service throughout Cowlitz County and is among the largest public utility districts in Washington State. Cowlitz PUD estimates that customers will use 609 average megawatts and 821 peak megawatts of electricity in 2015 (Cowlitz Public Utility District 2015). Approximately 14% of Cowlitz PUD's power is sold to residential users, and approximately 8% to small industrial users (22 companies or industries). Major industrial users consume approximately 71% of the power. Small general service and street/area lighting account for the other electrical usage (Cowlitz Public Utility District 2015).

Natural Gas

Natural gas is provided to the project area by Cascade Natural Gas, which supplies residential, commercial, and industrial users throughout Cowlitz County and beyond. The Cascade Natural Gas service area is concentrated in western and central Washington, and central and eastern Oregon. Interstate pipelines transmit the company's natural gas from production areas in the Rocky Mountains and western Canada (Cascade Natural Gas Company 2014).

Diesel Fuel

Local suppliers provide diesel fuel in the Longview-Kelso area. In Washington State, approximately 88.36 million gallons of diesel fuel were sold annually to railroad-related uses in 2012 (U.S. Energy Information Administration 2014). This represents approximately 9% of total diesel sales for all uses in the state. The largest consumers were on-highway users, or motor vehicles, accounting for 62% of diesel sales, or approximately 618 million gallons, in Washington State in 2012.

Tank vessels primarily use diesel or residual fuel oil. Diesel fuel sales for vessel uses in Washington State (excluding the military) totaled 80.5 million gallons in 2012, which accounted for 8.2% of the total diesel sales in the state (U.S. Energy Information Administration 2014). In 2013, the total prime supplier sales volume of fuel oil was 469.86 million gallons for Washington State (U.S. Energy Information Administration 2014).

Project Area Energy Usage

Cowlitz PUD provides electricity to the project area via overhead 230-kilovolt and 115-kilovolt power lines along Industrial Way. Other power lines run perpendicular to the north end of the project area, where they converge with a BPA substation. The existing power configuration is sufficient for the current operations at the project area (URS Corporation 2014). The existing annual electricity use for the existing bulk product terminal (outside the project area but within the Applicant's leased area) averages 20 megawatts based on the average electrical usages for 2014.

Within the project area, electricity is provided by Cowlitz PUD. Other energy consumed comes from diesel- or gasoline-powered generators provided by local fuel suppliers.

4.9.4.2 Natural Resources

This section describes the natural resources local to the area and the natural resources available specifically in the project area.

Local Natural Resources

The Cowlitz County economy was historically centered on forestry and timber products. Weyerhaeuser manufactures wood and paper products at a facility near the project area along the Columbia River. Many other timber-industry companies are located in nearby Longview. Groundwater resources in the vicinity are an upper alluvium aquifer (i.e., shallow groundwater), and the deeper confined aquifer from which industries, small farms, and domestic well users withdraw groundwater. The Mint Farm Regional Water Treatment Plant, operated by the Beacon Hill Water and Sewer District and located less than 1 mile north of the project area, began withdrawing groundwater from the deep confined aquifer in January 2013 (URS Corporation 2014). Numerous quarries and mines in Cowlitz County provide crushed stone, sand, and gravel.

Project Area Natural Resources

No forest products are located in the project area. The project area landowner, Northwest Alloys, holds several historical water rights to extract groundwater from a deep aquifer. The Applicant has a ground lease with Northwest Alloys that includes use of water rights. Refer to Section 4.4, *Groundwater*, for additional information on existing water rights in the project area.

4.9.5 Impacts

This section describes the potential direct and indirect impacts related to energy and natural resources that would result from construction and operation of the Proposed Action and the No-Action Alternative.

4.9.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area as a result of construction and operation of the Proposed Action.

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Heavy machinery would be operated to prepare foundations and footings for construction of the coal export terminal, associated services, and utilities. Diesel fuel and gasoline would be used in most construction equipment such as cranes, wheel loaders, dozers, dump trucks, excavators, graders, rollers, compactors, drill rigs, pile-driving equipment, portable ready-mix batch plant, ready-mix trucks, concrete pumps, elevated work platforms, forklifts, rail-track-laying equipment, water pumps, and other similar machinery (URS Corporation 2014). A fuel truck would visit the site as required. The frequency during construction would vary based on usage and activities and could range from once or twice per day to once or twice per week. Fuel trucks that would be used during construction would have a 3,000-gallon to 4,000-gallon capacity. A temporary increase in fuel use would result from the need to transport employees and materials to the project area and to operate construction equipment.

Increase Energy Use

Construction-related energy uses would include the use of electricity, diesel fuel, gasoline, oil, and natural gas. Construction would require on average each month approximately 500 gallons of gasoline, 50 gallons of oil, and 20,000 gallons of diesel fuel.

Electricity from Cowlitz PUD would be consumed to provide construction lighting and power tools and equipment. Natural gas would be used for minor purposes, including to heat water for showers and other sanitary uses, but not for industrial uses. Heavy machinery would operate during construction, which would increase fuel use. The demand for gasoline, oil, diesel fuel, and natural gas during construction would be minor compared to the current regional demand for these fuels and could be met by the existing local and regional supply.

Increase the Use of Natural Resources

Natural resources that would be consumed during construction would include water, gravel, fill dirt, steel, and wood.

Groundwater available in the project area would be used during upland construction as necessary for dust suppression, which would be approximately 40,000 gallons per day (URS Corporation 2014). Approximately 2.1 million cubic yards of fill material would be imported to the project area to be used as preload material, and approximately 2.5 million cubic yards of material would be moved around the project area during preloading activities (URS Corporation 2014). Dredging would occur as part of the construction of the two docks (Docks 2 and 3), which would include removing approximately 500,000 cubic yards of fill material. All regularly used roads in the project area would require gravel. Any new impervious surface area would generate stormwater, but all stormwater would be collected and treated to meet state and federal water quality requirements prior to discharge to the Columbia River. Rail loop construction would require importing and placing approximately 130,000 cubic yards of ballast rock for the rail foundations; placing railroad ties; laying steel rail lines; and installing signaling, switching equipment, and track lighting (URS Corporation 2014).

The demand for these natural resources during construction would be minor compared to the current regional demand for these resources and could be met by existing local and regional supply.

Construction—Indirect Impacts

Construction of the Proposed Action would result in the following indirect impacts.

Increase Energy Use

A temporary increase in fuel consumption would result from the transport of employees and materials to the project area during construction. This fuel consumption would be a minor amount compared to the current demand for these fuels in the study area, and could be met by the existing local and regional supply.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Increase Energy Use

Electricity, gasoline, oil, propane, and diesel fuel would be the primary energy types consumed during operations of the Proposed Action. Electricity would be used to heat buildings and light indoor and outdoor areas, to power the automated system used to unload coal from trains, store coal, reclaim the coal from storage, and load the vessels. Specific types of equipment used for these processes include rail car unloading facilities, stacking conveyers, bucket wheel reclaimers, the belt conveyer system, and shiploaders.

The Applicant estimates electricity usage during full operations of the terminal would be approximately 6,624,000 kilowatt hours per year, and electricity requirements would be 20 to 25 megawatts per year. The Proposed Action's energy use would represent an average of approximately 4% of the total electricity supplied to users in the Cowlitz PUD service area. This electricity demand is anticipated to be met by existing regional supply because Cowlitz PUD currently has the capacity to meet the electricity demand.

Gasoline, propane, and diesel would be used to power vehicles and equipment used for standard operations and routine maintenance. Operation of the Proposed Action is anticipated to require each month on average approximately 100 gallons of gasoline, 75 gallons of oil, and 865 gallons of diesel.

The demand for energy during operations would be minor compared to the current regional demand for these fuels and could be met by the existing local and regional supply.

Increase the Use of Natural Resources

Natural resources that would be used would include water, gravel, fill dirt, and wood. Impacts on these resources are discussed below. Impacts on groundwater and water quality are discussed in Sections 4.4, *Groundwater*, and 4.5, *Water Quality*, respectively.

A water treatment facility would be designed to treat all surface runoff and process water with capacity to store the water for reuse. The use of stormwater in combination with a storage reservoir and groundwater would be used for processing water and fire protection. All of the stormwater would be processed through the water treatment facility prior to reuse. Water uses would include dust control, stockpile sprays, wash down, and clean up (URS Corporation 2014). Water would also be used to control dust from operating conveyors, transfer points, rail car unloaders, stockpiling, and ship loading. Approximately 120 million gallons per year would be reused from runoff during operations. Combined with the groundwater demand from existing activities in the project area (approximately 1,994 acre-feet per year), the total demand on groundwater supplies during operation of the Proposed Action would be approximately 3,019 acre-feet per year. Water would be sourced from existing production wells with water rights, and there would be no need for new wells.

Specific quantities of gravel, fill dirt, and wood during operation of the Proposed Action are not known at this time. However, the quantities are anticipated to be met by existing local and regional supply considering the availability of these resources.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Increase Fuel Consumption

The Proposed Action would increase fuel consumption by the following.

- Approximately 240 unit trains arriving and 240 unit trains departing each month, which would increase rail locomotive fuel consumption in the study area.
- Approximately 140 vessel transits each month, which would increase vessel fuel consumption in the study area.
- Approximately 135 employees to operate the facility, which would generate approximately 270 trips per day assuming two employee trips per day. These vehicle traffic operations would increase vehicle fuel consumption in the study area.
- A fuel truck with a 3,000- to 4,000-gallon capacity would come to the project area as needed to supply vehicles and equipment with fuel for operations and maintenance. The frequency would vary based on usage and activities. This activity would increase fuel consumption in the study area.

Trains and vessels would not be fueled in the project area. Fuel consumption from employee and fuel truck trips would be a minor amount compared to the current demand for fuel within the study area, and could be met by the existing local and regional supply.

4.9.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal, and the existing use of energy and natural resources would continue. However, the Applicant could expand the existing bulk product terminal onto the project area. Any new construction would be limited to uses allowed under existing Cowlitz County development regulations and federal and state permits. Potential impacts of the No-Action Alternative are described below.

Expanding the existing bulk terminal would increase the demand for energy (natural gas, electricity, diesel fuel, and gasoline). Cowlitz PUD and Cascade Natural Gas have the capacity to meet the anticipated demand and local suppliers would be able to accommodate diesel and gasoline demand.

Expanding the existing bulk terminal would also increase the demand for natural resources. Use of natural resources would not cause a noticeable impact on supplies in the area, and demand for natural resources would not adversely affect the supply from local and regional service providers.

4.9.6 Required Permits

The Proposed Action would require building and site development permits from the Cowlitz County Department of Building and Planning in relation to the use of energy and natural resources (such as electrical and mechanical permits).

4.9.7 Proposed Mitigation Measures

This section describes the voluntary mitigation measures that would reduce impacts related to energy and natural resources from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

4.9.7.1 Voluntary Mitigation

The Applicant has committed to implementing the following measures prior to or during construction to mitigate impacts on energy and natural resources.

- Prior to construction, prepare a Waste Management Plan in coordination with Cowlitz County's Solid Waste Management Plan. The plan will include measures to avoid and minimize the generation of wastes and promote waste reuse and recycling.
- Where feasible, turn off construction vehicles rather than idling engines.

The Applicant has committed to implementing the following measures during operations to mitigate impacts on energy and natural resources.

- Where appropriate, implement energy conservation measures, such as energy-efficient electrical system specifications, lighting, mechanical equipment, and building insulation.
- Switch on lighting in unoccupied areas only when needed and turn off lighting automatically.
- Maximize energy efficiency in facility and equipment specifications and selection, such as electric motors that have high power factors, conveyor drives with "quiet drives" that require less power to operate, and life-cycle costs advantage of energy efficient components.
- Use power factor correction equipment in substations.
- Use conveyor idlers to specify rim drag to reduce conveyor start up power.
- Revert office equipment to standby mode or switch off when not in use.
- Match vehicle size to the need of the task.
- Choose vehicles based on fuel efficiency.
- Use controlled temperature settings on switch room and office air conditioning.
- Use automatic shutdown controls for idle plant and equipment.
- Manage energy load by using submetering of offices, workshops, conveyors stackers, reclaimers, and shiploaders.
- Use soft-start electric motors to minimize peak power demand.

4.9.8 Unavoidable and Significant Adverse Environmental Impacts

Implementation of the voluntary mitigation measures and design features described above would reduce impacts on energy and natural resources. There would be no unavoidable and significant adverse environmental impacts on energy and natural resources.

Chapter 5
Operations: Existing Conditions, Project Impacts, and Proposed Mitigation Measures

5.0 Introduction

For the purposes of this Final Environmental Impact Statement (Final EIS), environmental resource areas have been divided into three categories: the Built Environment, the Natural Environment, and Operations (Chapters 3, 4, and 5, respectively). The purpose of this chapter is to provide a discussion of the operations resource areas assessed for the Millennium Bulk Terminals—Longview project (Proposed Action).

Information contained in this Final EIS was extracted from technical reports prepared specifically for the Proposed Action. Provided in Volume III of this Final EIS, the technical reports are incorporated by reference and include the determination of study areas, analysis methods, existing conditions, and potential impacts.

Information sources used for this analysis are briefly discussed for each resource. In addition, a detailed list of sources is provided in Appendix A, *References*, of this Final EIS.

5.0.1 Operations Resource Areas

Chapter 5, *Operations: Existing Conditions, Project Impacts, and Proposed Mitigation Measures*, evaluates the operational resource areas relevant to the Proposed Action. The resource areas reviewed as part of the operations analysis include rail transportation; rail safety; vehicle transportation; vessel transportation; noise and vibration; air quality; coal dust; and greenhouse gas emissions and climate change (Table 5.0-1). Additional detailed information about these resources can also be found in the corresponding technical reports in Volume III of this Final EIS.

In addition to these resource areas, Chapter 6, *Cumulative Impacts*, discusses cumulative impacts resulting from the Proposed Action combined with other past, present, and reasonably foreseeable actions.

Table 5.0-1. Resource Areas and Corresponding Final EIS Chapters

Chapter	Section Number	Environmental Resource Area
Chapter 3, Built Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures	3.1	Land and Shoreline Use
	3.2	Social and Community Resources
	3.3	Aesthetics, Light, and Glare
	3.4	Cultural Resources
	3.5	Tribal Resources
	3.6	Hazardous Materials
Chapter 4, Natural Environment: Existing Conditions, Project Impacts, and Proposed Mitigation Measures	4.1	Geology and Soils
	4.2	Surface Water and Floodplains
	4.3	Wetlands
	4.4	Groundwater
	4.5	Water Quality
	4.6	Vegetation
	4.7	Fish
	4.8	Wildlife
	4.9	Energy and Natural Resources
Chapter 5, Operations: Existing Conditions, Project Impacts, and Proposed Mitigation Measures	5.1	Rail Transportation
	5.2	Rail Safety
	5.3	Vehicle Transportation
	5.4	Vessel Transportation
	5.5	Noise and Vibration
	5.6	Air Quality
	5.7	Coal Dust
	5.8	Greenhouse Gas Emissions and Climate Change

5.0.2 Alternatives and Timeframe for Analysis

This chapter analyzes the impacts that could occur as a result of construction and operation of the Proposed Action. The analysis contained in this chapter assumes construction beginning in 2018 and full operations[1] occurring by 2028. The impacts identified for 2028 would be similar to the impacts for the lifetime of the Proposed Action. Proposed mitigation measures are intended to apply for the lifetime of the Proposed Action.

This chapter also refers to Proposed Action-related rail and vessel traffic during construction and operations. Table 5.0-2 illustrates the Proposed Action-related rail and vessel traffic for the peak year of construction and full operations evaluated in this chapter, and the rail and vessel activity for the two stages between the peak year of construction and full operations. Throughout this chapter, the 190-acre coal export terminal site is referred to as the *project area*.

[1] Full operation means an export terminal throughput of up to 44 million metric tons of coal per year, as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

This chapter also analyzes impacts that could occur if the Proposed Action were not approved (the No-Action Alternative). Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, of this Draft EIS provides a description of the Proposed Action and No-Action Alternative.

Table 5.0-2. Proposed Action-Related Rail and Vessel Activity by Construction and Operation Stage[a]

	Peak Year of Construction (2018)	Stage 1a Start-up Operations	Stage 1b Increased Operations	Full Operations (by 2028)
Coal Export Terminal Maximum Throughput (million metric tons per year)	0	10	25	44
Rail Traffic				
Average loaded train trips per day	0.65[b]	2	5	8
Average empty train trips per day	0.65[b]	2	5	8
Average total train trips per day	1.3[b]	4	10	16
Vessel Traffic				
Average vessels per month	63 barges[c]	15[d]	40[d]	70[d]

Notes:
[a] For additional information on the stages, see Chapter 2, Section 2.3.2, *Potential Future Operations and Transport*.
[b] If construction materials are delivered by rail to the project area, as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.
[c] If construction materials are delivered by barge and transported via truck to the project area, as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.
[d] Approximately 80% Panamax and 20% Handymax.

5.0.3 Study Areas and Type of Impacts Analyzed

Each resource area has its own study area depending on its physical characteristics or regulations that oversee the resource area. Two types of study areas were identified—a direct impacts study area and an indirect impacts study area. Table 5.0-3 explains the differences between these two study areas; in some cases, both study areas are the same. Table 5.0-4 provides a summary of the direct impacts and indirect impacts study areas by Chapter 5 resource.

Table 5.0-3. Types of Impacts

Type of Impact[a]	Description	Description of Impacts Categories
Direct	An impact resulting from either construction or operation of the Proposed Action that occurs in the project area.	• **Construction:** Temporary impacts within the project area that are resolved or mitigated by the end of construction activity, or permanent impacts that result from changes to the project area due to construction of the coal export terminal. • **Operations:** Impacts occurring in the project area resulting from rail unloading, coal storage, machinery operations, equipment, vessel loading, etc.
Indirect	An impact resulting from operations of the Proposed Action that occurs beyond the project area.	• **Construction:** Impacts from activities beyond the project area during construction, such as vehicle and rail traffic. • **Operations:** Impacts from activities beyond the project area during operations, such as rail, vehicle and vessel traffic.

Notes:
[a] Washington Administrative Code (WAC) 197-11-192.

Table 5.0-4. Summary of Direct and Indirect Impacts Study Areas by Resource

		Indirect Impacts Study Area	
Section and Resource	**Direct Impacts Study Area**	**Cowlitz County**	**Washington State**
Section 5.1, Rail Transportation	Project area	• Reynolds Lead and BNSF Spur • BNSF main line	Rail routes for Proposed Action-related trains
Section 5.2, Rail Safety	Project area	• Reynolds Lead and BNSF Spur • BNSF main line	Rail routes for Proposed Action-related trains
Section 5.3, Vehicle Transportation	Project area	Public and private at-grade crossings on the Reynolds Lead and BNSF Spur, and all at-grade public crossings on the BNSF main line	Selected at-grade rail crossings along the rail routes for Proposed Action-related trains
Section 5.4, Vessel Transportation	Area surrounding Docks 2 and 3 where vessel loading would occur	Columbia River	Waterways that would be used by, or could be affected by vessels calling at the project area, including the waters out to 3 nautical miles offshore, the Columbia River Bar, the Columbia River upstream to Vancouver and the Willamette River upstream to the Port of Portland.
Section 5.5, Noise and Vibration	Noise and vibration impacts within 1 mile of the project area	• Area within 1 mile of the BNSF Spur and Reynolds Lead • BNSF main line • Columbia River	• Rail routes for Proposed Action-related trains • Columbia River between the project area and 3 nautical miles offshore
Section 5.6, Air Quality	The area in and near the project area that could be affected by construction and operation activities in the project area	Cowlitz County, to account for rail operations in Cowlitz County, and vessel activity on the Columbia River	• Rail routes for Proposed Action-related trains • Columbia River between the project area and 3 nautical miles offshore

		Indirect Impacts Study Area	
Section and Resource	**Direct Impacts Study Area**	**Cowlitz County**	**Washington State**
Section 5.7, Coal Dust	The area in and near the project area that could be affected by construction and operation activities in the project area	• The areas within 1,000 feet of the Reynolds Lead and BNSF Spur • The areas within 1,000 feet of the rail routes for Proposed Action-related trains on the BNSF main line in Washington State (Ecology study area only)	Rail routes for Proposed Action-related trains (Ecology study area only)
Section 5.8.1, Greenhouse Gas Emissions	• Cowlitz County • Rail and vessel transportation routes and combustion of coal in Asia (i.e., beyond Washington State) (Ecology study area only)	Same as direct impacts (direct and indirect impacts were not differentiated for the analysis)	
Section 5.8.2, Climate Change	Project area and transportation routes leading to the project area	Same as direct impacts (direct and indirect impacts were not differentiated for the analysis)	

5.0.4 Mitigation Measures Development Approach

Applicable regulations, potential permit conditions, and required planning documents were evaluated to determine if they would address potentially significant adverse impacts identified in this Final EIS. When applicable, each section describes specific voluntary measures (Voluntary Mitigation) to be executed by the Applicant during construction or operations. When potential significant environmental impacts remained, other proposed mitigation measures were identified to reduce the impact (Applicant Mitigation). Mitigation measures included in permit conditions would become legal requirements of the Applicant. In addition to the proposed mitigation measures identified in each section of this chapter, the following measure is proposed.

- The Applicant will provide to Cowlitz County and the Washington State Department of Ecology an annual report of compliance with mitigation requirements of an issued permit. Mitigation compliance reports will be part of the public record.

Proposed mitigation measures were identified as required by the Washington State Environmental Policy Act (SEPA) consistent with Washington Administrative Code (WAC) 197-11-660, which states that mitigation shall be reasonable, capable of being accomplished and imposed to the extent attributable to the identified adverse impact of the proposal.

The thresholds of significance and proposed mitigation measures were determined by the co-lead agencies (Cowlitz County and the Washington State Department of Ecology). Additionally, when applicable, each section identifies mitigation measures to be considered by other agencies, groups, or companies (Other Measures to be Considered) to reduce potential Proposed Action-related impacts that are beyond the Applicant's control or authority.

5.1 Rail Transportation

Railroads provide transportation for passengers and a wide range of commercial goods, and support regional economic activity. Similar to other forms of transportation, rail traffic is subject to various regulatory requirements, including requirements for tracks, rail cars and locomotives, crew, operations, inspection and maintenance, tariffs, and methods and types of goods and services that can be transported.

This section assesses the potential rail transportation impacts of the Proposed Action and No-Action Alternative. For this assessment, rail transportation refers to unit trains[1] that would service the project area (Proposed Action-related trains), as well as the type and volume of other rail traffic using the same rail lines. The Proposed Action, at full operations, would bring approximately 8 incoming unit trains carrying coal to the project area and send out approximately 8 empty unit trains each day from the project area. No rail construction or infrastructure improvements outside of the project area are proposed by the Applicant.

This section describes the regulatory setting, presents the historical and current rail transportation conditions in the study area, establishes the methods for assessing potential rail transportation impacts, assesses potential impacts, and identifies measures to mitigate those impacts, where applicable.

5.1.1 Regulatory Setting

Laws and regulations relevant to rail transportation are summarized in Table 5.1-1.

Table 5.1-1. Regulations, Statutes, and Guidelines for Rail Transportation

Regulation, Statute, Guideline	Description
Federal	
Federal Railroad Safety Act of 1970	Gives FRA rulemaking authority over all areas of rail line safety. FRA has designated that state and local law enforcement agencies have jurisdiction over most aspects of highway/rail grade crossings, including warning devices and traffic law enforcement.
Highway Safety Act and the Federal Railroad Safety Act	Gives FHWA and FRA regulatory jurisdiction over safety at federal highway/rail grade crossings.
Federal Railroad Administration general regulations (49 CFR Parts 200–299)	Establishes railroad regulations, including safety requirements related to tracks, operations, and cars.
Interstate Commerce Commission Termination Act of 1995 (49 USC 101)	Establishes the STB and upholds the common carrier obligations of railroads; requires railroads to provide service upon reasonable request.

[1] A unit train is a train in which all rail cars carry the same commodity and are shipped from the same origin to the same destination.

Regulation, Statute, Guideline	Description
State	
Washington Utilities and Transportation Commission	Inspects and issues violations for hazardous materials, tracks, signal and train control, and rail operations. WUTC regulates the construction, closure, or modification of public railroad crossings. In addition, WUTC inspects and issues defect notices if a crossing does not meet minimum standards.
WSDOT Local Agency Guidelines M 36-63.28, June 2015, Chapter 32, Railroad/Highway Crossing Program	Focuses on adding protection that improves safety and efficiency of railroad/highway crossings. Provides a process for investigating alternatives for improving grade-crossing safety, such as closure, consolidation, and installation of warning devices.
WSDOT Design Manual M 22.01.10, November 2015, Chapter 1350, Railroad Grade Crossings	Provides specific guidance for the design of at-grade railroad crossings.
Rail Companies—Operation (WAC 480-62)	Establishes operating procedures for railroad companies operating in Washington State.
Local	
Longview Municipal Code 11.40.080 (Trains Not to Block Streets)	Prohibits trains from using any street or highway for a period of time longer than five minutes, except trains or cars in motion other than those engaged in switching activities.

Notes:
FRA = Federal Railroad Administration; FHWA = Federal Highway Administration; STB = Surface Transportation Board; CFR = Code of Federal Regulations; USC = United States Code; WUTC = Washington Utilities and Transportation Commission; WSDOT = Washington State Department of Transportation; WAC = Washington Administrative Code

5.1.2 Study Area

The study area for direct impacts on rail transportation is the project area for the Proposed Action. The study area for indirect impacts on rail transportation includes the rail routes expected to be used by Proposed Action-related trains between the project area and the Powder River Basin in Montana and Wyoming and Uinta Basin in Utah and Colorado.

The assessment of potential indirect impacts focuses on the Reynolds Lead and BNSF Spur and the BNSF Railway Company (BNSF) main line in Cowlitz County. An assessment along the BNSF main line in Washington State and to and from the Powder River Basin and the Uinta Basin is also presented.

5.1.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on rail transportation associated with the construction and operation of the Proposed Action and No-Action Alternative.

5.1.3.1 Information Sources

The following sources of information were used to define the existing conditions relevant to rail transportation and identify the potential impacts of the Proposed Action and No-Action Alternative on rail transportation in the study areas.

Rail Traffic

Existing and projected rail traffic for the Reynolds Lead and BNSF Spur were based on information from the Longview Switching Company (LVSW) as operator of the Reynolds Lead and BNSF Spur and field observations. Existing and projected rail traffic for routes within Washington State was based on the *Washington State Rail Plan* (Washington State Department of Transportation 2014a). Existing and projected rail traffic on main line routes outside of Washington State were based on state rail planning documents, Federal Railroad Administration (FRA) data, and a Surface Transportation Board (STB) study (Surface Transportation Board 2015). The Applicant provided estimates of rail traffic under the No-Action Alternative (approximately 2 trains per day in 2028 on the Reynolds Lead and BNSF Spur).

Rail Operations

The following information sources were used for Proposed Action-related rail operations.

- **Volumes.** Proposed Action-related rail traffic to the project area at full terminal operations would include 8 loaded trains per day and 8 empty trains per day.

  The types and number of trains from Longview Junction to the project area for 2015 and 2028 were developed from meetings with LVSW and the Port of Longview. The types and number of baseline train traffic beyond Longview Junction on main line routes were developed from the *Washington State Rail Plan* using linear extrapolation of 2010 and 2035 projected train traffic to 2015 and 2028. The type and number of baseline train traffic on main line routes outside Washington State were developed from the state rail planning documents.[2] FRA crossing inventory reports (Federal Railroad Administration 2016) and an STB study (Surface Transportation Board 2015) were also used to develop existing rail traffic estimates.

- **Capacity.** The *Washington State Rail Plan* was used to estimate rail segment capacity on BNSF main line routes in Washington State. The capacity of main line routes outside Washington State was estimated from the state rail planning documents.

- **Routes.** Representative coal mines were selected to identify rail routes outside Washington State. Routes to and from the project area within Washington State were based on existing BNSF and Union Pacific Railroad (UP) operational practices and Washington State Department of Transportation (WSDOT) documents including the *Washington State Rail Plan* and *Washington State Freight Mobility Plan* (Washington State Department of Transportation 2014b).

- **Train parameters.** Train parameters including the number of rail cars per unit train (125 rail cars for unit train) and number of locomotives (4 per unit train) were based on information

[2] State rail planning documents include the Montana State Rail Plan, Final Report (Cambridge Systematics, Inc. 2010); Wyoming Statewide Rail Plan (Wyoming Department of Transportation 2015); Idaho Statewide Rail Plan (David Evans and Associates 2013); and Oregon State Rail Plan Freight and Passenger Rail System Inventory Draft Report (Cambridge Systematics, Inc. 2014).

provided by the Applicant, input from BNSF, and existing BNSF coal train operations (BNSF Railway Company 2016).

- **Reynolds Lead, BNSF Spur, and project area operations**. Operations of the Reynolds Lead, BNSF Spur, and the project area were based on information provided by LVSW and the Applicant.

5.1.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on rail transportation. For this analysis, potential impacts resulting from operations impacts are based on the Applicant's planned throughput capacity of up to 44 million metric tons of coal per year.

Train Parameters

For this analysis, all Proposed Action-related trains were assumed to have the parameters shown in Table 5.1-2.

Table 5.1-2. Train Parameters for Proposed Action-Related Trains

Rail Cars	
Type	Alum Rotary Gondola
Gross rail load (tons)	143
Empty weight (tons)	20.9
Weight of coal (tons)	122.1
Coupled Length (feet)	53
Locomotives	
Type	4400 HP AC
Weight (tons)	216
Length (feet)	73
Number in train	4
Configuration[a]	3 at head and 1 at rear
Total Train	
Cars per train	125
Total empty weight of cars (tons)	2,613
Total weight of coal (tons)	15,263
Locomotive weight (tons)	648
Total train weight (tons)	18,780
Total train length (feet)	6,917

Notes:
[a] Locomotives are distributed through trains (distributed power) in various configurations. Proposed Action-related trains would likely have three locomotives at the head and one at the rear of the train.

According to the Applicant, proposed rail operations would support terminal throughput of 40 million metric tons of coal per year. The Proposed Action is based on a throughput of up to 44 million metric tons of coal per year. The Applicant assumes a 10% increase in throughput (4 million metric tons of coal per year) is possible, with rail car capacity increases, through process efficiencies and technological improvements by 2028.

Rail Segment Capacity

The theoretical capacity[3] for the Reynolds Lead and BNSF Spur was calculated based on the number of main tracks, train parameters, speed, and distance. Capacity estimates for main line routes in Washington State were obtained from the *Washington State Rail Plan*.[4] The capacity estimates involve estimating maximum practical capacity in number of trains per day, determined by signal type, number of tracks, and geometric limitations.

Traffic-control systems dictate capacity and help maintain a safe distance between trains passing or meeting on the same track. There are three basic types of systems.

- **Automatic Block Signals (ABS).** ABS is an electronic signal system that can control when a train can advance into the next block. A block is a section of track with signals at each end. Only one train can occupy a block at one time at normal speed.
- **Track Warrant Control (TWC).** Under this control system, train crews obtain authority to occupy and move on a main track from the dispatcher in the form of a completed track warrant form. Usually the track warrant information is transmitted to the train crew by phone, radio, or electronic transmission to the locomotive.
- **Centralized Traffic Control (CTC)**. With CTC, electrical circuits monitor the location of trains, allowing dispatchers to control train movements from a remote location, usually a central dispatching office. The signal system prevents trains from being authorized to enter sections of track occupied by other trains moving in the opposite direction.

In 2008, Congress passed the Rail Safety Improvement Act of 2008, which requires all passenger railroads and Class I freight railroads to install Positive Train Control (PTC) on all lines that carry passengers or certain hazardous liquids. PTC is designed to reduce train accidents caused by human error. PTC is a system that automatically stops a train if the engineer does not respond properly to a signal indication. While future generations of PTC may help railroads increase capacity on individual corridors, the PTC technology currently being installed on U.S. railroads is not expected to have a meaningful impact on corridor capacity (Association of American Railroads 2014).

Train Routes

Proposed Action-related train routes from mines in the Powder River Basin in Montana and Wyoming, and Uinta Basin in Utah and Colorado to the project area, and the return of empty trains, was assumed to be the same as current BNSF and UP routes and as documented in adopted WSDOT publications, including the *Washington State Rail Plan* and *Washington State Freight Mobility Plan*. The *Washington State Rail Plan* examines rail volume and capacity for all BNSF routes in Washington State because volume and capacity, and thus routing decisions, are dynamic.

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[3] Theoretical capacity is the number of trains that could run over a route in a mathematically generated environment at minimum spacing between trains.

[4] Capacity estimates in the *Washington State Rail Plan* for 2010 were used for existing conditions and capacity estimates for 2035 were used for 2028 conditions. As described in the *Washington State Rail Plan*, Class I railroads (BNSF and UP) and other infrastructure owners will likely address key capacity issues as they emerge.

In 2012, BNSF changed its train operations protocol to enhance use of existing capacity using directional running. This strategy routes all westbound-loaded unit trains (including coal trains) from Pasco via the Columbia River Gorge to Vancouver, where they continue north on the BNSF main line to their final destination. Empty unit bulk trains from north of Vancouver, including Cowlitz County, return to Pasco and to points east via Stampede Pass. This analysis assumes this protocol would be used for Proposed Action-related trains. The following describes the expected routes for BNSF and UP empty and loaded Proposed Action-related trains.

- **Loaded BNSF trains.** Loaded BNSF trains would originate in the Powder River Basin in Montana and Wyoming, and travel over BNSF and Montana Rail Link lines through Billings, Montana, and Sandpoint, Idaho, crossing into Washington east of Spokane. Trains would proceed through Spokane and Pasco to Vancouver. From Vancouver, trains would move north to Longview Junction and enter the BNSF Spur at Longview Junction, cross the Cowlitz River Bridge and continue on the Reynolds Lead to the project area. Trains would be unloaded, inspected, and prepared for empty movement.
- **Empty BNSF trains.** Empty BNSF trains would move from the project area over the Reynolds Lead and BNSF Spur to Longview Junction. From Longview Junction, trains would move north on the BNSF main line to Auburn. From Auburn, trains would move east over Stampede Pass to Pasco. From Pasco, empty BNSF trains would move over the same route as loaded trains to the Powder River Basin in Montana and Wyoming.
- **Loaded UP trains.** Loaded UP trains from the Uinta Basin in Utah and Colorado and the Powder River Basin in Wyoming would move via the UP main line through Salt Lake City and Pocatello following the Columbia River on the Oregon side to North Portland Junction in Portland, Oregon. From North Portland Junction, trains would cross the Columbia River and move on the BNSF main line to Longview Junction. All loaded UP trains would operate on the same track between Longview Junction and the project area as described for loaded BNSF trains.
- **Empty UP trains.** Empty UP trains would move back to Longview Junction via the Reynolds Lead and BNSF Spur. From Longview Junction, UP trains would move south to North Portland Junction in Portland, Oregon, and back to the Uinta Basin and Powder River Basin via the same route as loaded UP trains.

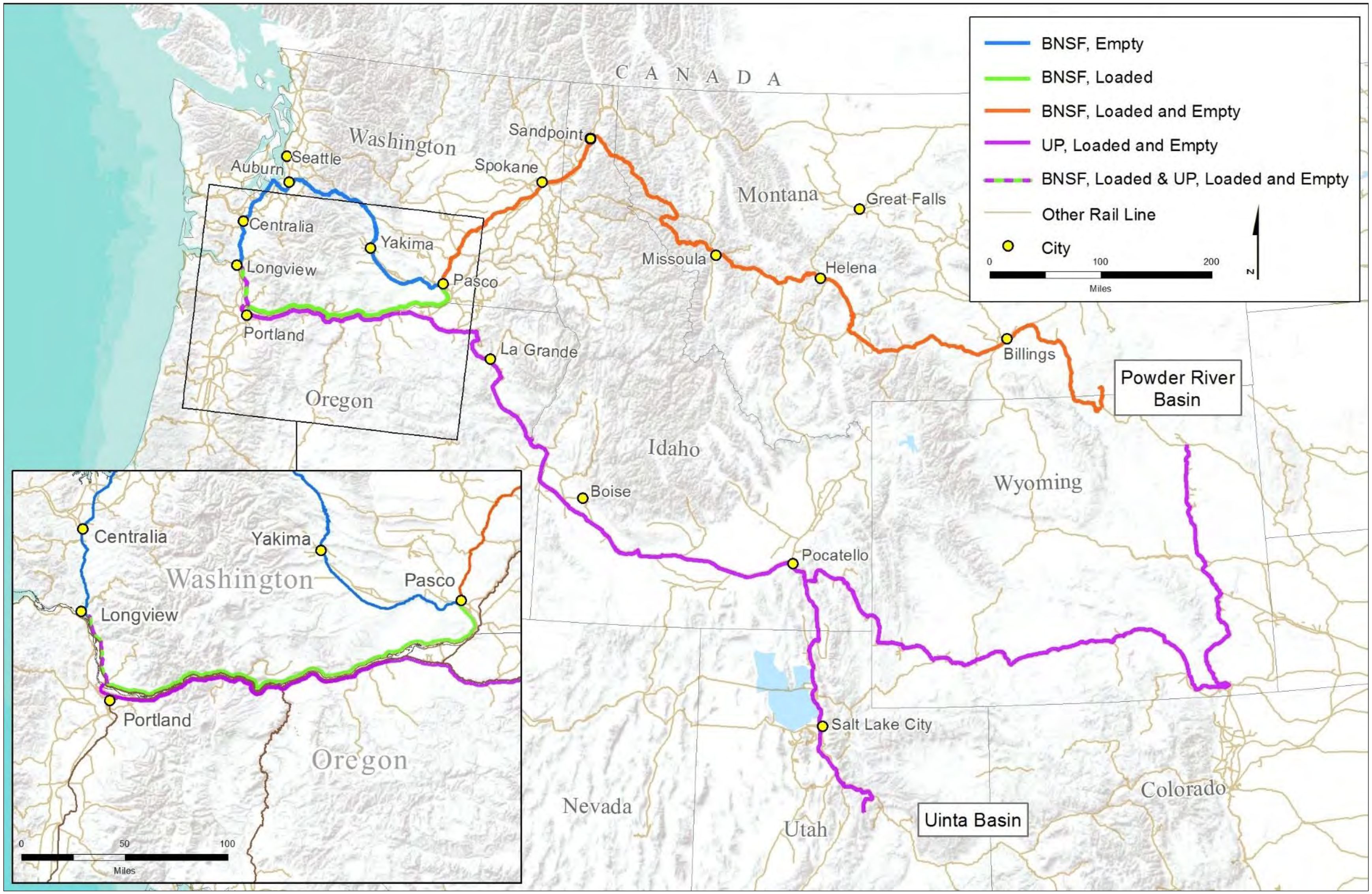
Figure 5.1-1 illustrates the routes used for this analysis. However, BNSF and UP have alternative routes. As volume increases on any one-line segment, BNSF and UP may revise operations to distribute traffic over existing infrastructure. BNSF and UP may also expand their infrastructure, which occurs on an ongoing basis based on demand.

Future Rail Traffic

Future rail traffic estimates in the *Washington State Rail Plan* were used to determine potential impacts of Proposed Action-related trains to rail traffic capacity in Washington State. The types and number of baseline train traffic on main line routes in Washington State were developed using linear extrapolation of 2010 and 2035 projected train traffic to 2015 and 2028.[5]

[5] The rail traffic estimates in the *Washington State Rail Plan* are based on data collected between 2010 and 2013. Rail traffic is highly dynamic and fluctuates as a result of changing demand. The 2028 rail traffic estimates are intended to provide a "snapshot" of estimated rail traffic volumes; the rail traffic estimates do not represent actual volumes for 2028.

Figure 5.1-1. Expected Routes of Loaded and Empty Proposed Action-Related Trains



The freight demand analysis methods in the *Washington State Rail Plan* used an economic forecast to estimate the future freight rail traffic demand. These rail traffic estimates do not include the rail traffic for proposed coal or crude oil projects in Washington State. Therefore, Proposed Action-related rail traffic was added to 2028 baseline rail traffic estimates for the purposes of this analysis.

Rail traffic information derived from state rail planning documents was used to determine potential impacts of Proposed Action-related trains on rail capacity outside of Washington State in Idaho, Montana, Oregon, Utah, and Wyoming where sufficient publicly available data were available.

Train Speed and Travel Time

The current maximum speed for the Reynolds Lead is 10 miles per hour (mph). The maximum speed over the Reynolds Lead could increase from 10 mph to up to 25 mph if track improvements are made by LVSW.[6] This improvement would reduce the train travel time from the BNSF main line to the project area from approximately 49 minutes to approximately 32 minutes. For this analysis, it was assumed that Proposed Action-related trains would reach a maximum speed of 20 mph if the planned improvements were made, with an average speed of approximately 11 mph on the BNSF Spur and Reynolds Lead. Because these improvements are not certain, the impact analysis includes train speeds and transit time over each road crossing with and without planned improvements to the Reynolds Lead and BNSF Spur.

5.1.4 Existing Conditions

This section describes the existing conditions in the study area related to rail transportation that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

5.1.4.1 Project Area

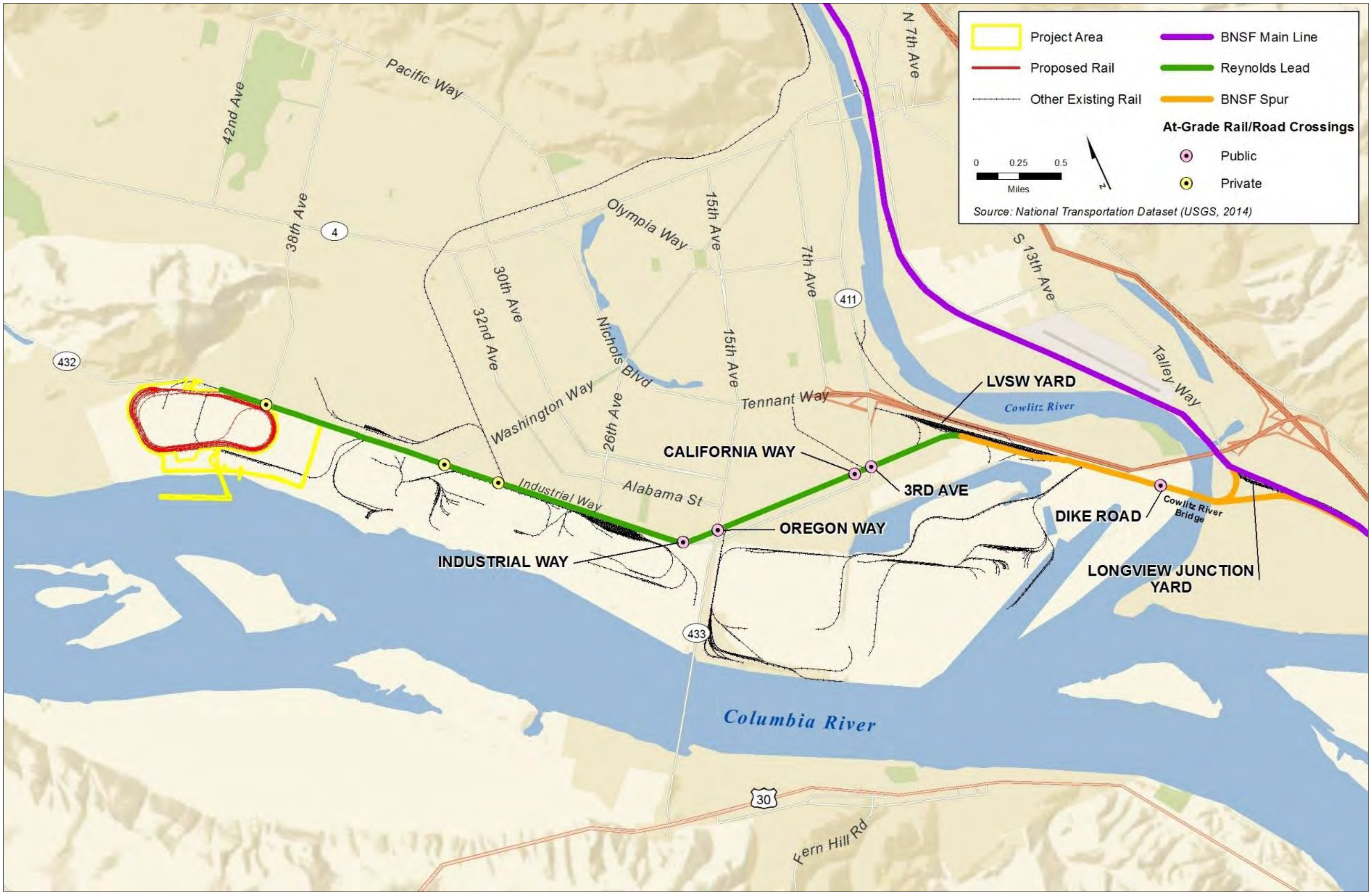
As described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, the project area is located on 190 acres within the 540-acre Applicant's leased area. The project area includes a portion of a rail loop that transitions from the Reynolds Lead onto the project area and extends from the project area to the Applicant's leased area. Rail traffic within the project area serves the existing bulk product terminal adjacent to the project area and within the Applicant's leased area as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

5.1.4.2 BNSF Spur and Reynolds Lead

The project area is located at the terminus (end) of the Reynolds Lead, an existing rail line that serves the Port of Longview and several industries, and connects via the BNSF Spur to the BNSF main line. The junction of the BNSF Spur and BNSF main line is called Longview Junction (Figure 5.1-2). The speed limit on Reynolds Lead and BNSF Spur is 10 mph. At an average speed of 9 mph, the existing travel time from Longview Junction to the project area is approximately 49 minutes.

[6] As described in Section 5.1.5, LVSW would likely upgrade the Reynolds Lead and BNSF Spur as a separate action to meet additional future volume increases. These upgrades would include adding ballast, replacing ties, upgrading rail, and upgrading the traffic control system.

Figure 5.1-2. Reynolds Lead and BNSF Spur



Between Longview Junction and the project area there are five public and three private active at-grade road crossings (Figure 5.1-2). These road crossings are affected by current rail traffic operating to and from the Port of Longview and/or from industrial switching activities at locations along the Reynolds Lead. The following describes the BNSF Spur and Reynolds Lead.

BNSF Spur

The BNSF Spur runs from the BNSF Seattle Subdivision main line switch at Longview Junction, across the Cowlitz River Bridge to the LVSW yard (Figure 5.1-2). Dike Road is the only public at-grade road crossing on the BNSF Spur and there are no private crossings. There is one main track with TWC traffic control. The Cowlitz River Bridge is a manually operated drawbridge controlled by LVSW. The bridge opens once every 4 to 5 years to allow passage of river-dredging vessels. The speed limit on the BNSF Spur is 10 mph because of speed restrictions on the bridge. The co-lead agencies obtained the Cowlitz River Bridge public bridge inspection report generated by BNSF from FRA on January 4, 2017. The Condition of Bridge subsection of the report states: "Bridge confirmed to have the capacity to carry traffic operated over the bridge."

Existing rail traffic on the BNSF Spur is about 7 trains per day. Capacity is approximately 24 trains per day, which supports the current volume. The 7 trains average 78 rail cars per train and 4,920 feet in length.

Existing trains consist of approximately 4 grain trains per day (2 loaded and 2 empty) to and from the EGT grain terminal at the Port of Longview, 2 to 3 manifest trains[7] per day from the BNSF main line to the LVSW yard, and an occasional unit train of clay, soda ash, or other trains destined to or from the Port of Longview. The Port Industrial Rail Corridor connects with the BNSF Spur just east of the LVSW yard. The switch is a remotely controlled switch operated by the BNSF dispatcher. Trains to or from Port of Longview facilities leave or enter the BNSF Spur at the Industrial Rail Corridor switch. Other trains originate or terminate in the LVSW yard.

Reynolds Lead

The Reynolds Lead runs from the west end of the LVSW yard to the project area (Figure 5.1-2). There is one main track with TWC traffic control. The speed limit is 10 mph, and capacity is approximately 24 trains per day. Average existing traffic is approximately 2.3 trains per day. Each train averages 21 rail cars per train with an average train length of approximately 1,450 feet. There are four public at-grade road crossings on the Reynolds Lead between the LVSW yard and the project area: 3rd Avenue (State Route 432), California Way, Oregon Way (State Route 433), and Industrial Way (State Route 432) (Figure 5.1-2).

Existing trains operating on the Reynolds Lead include an LVSW local crew that places and pulls cars at industrial facilities along the Reynolds Lead 3 days per week, and a local crew that delivers and picks up cars that are interchanged to and from the Columbia & Cowlitz Railway at two sidings just west of California Way. The Columbia & Cowlitz Railway also operates on the Reynolds Lead between the Weyerhaeuser plant near Industrial Way and these sidings to deliver and pick up interchange cars to or from the LVSW rail line.

[7] Unlike unit trains, manifest trains are composed of rail cars with different commodities originating in different locations and delivered to different locations.

5.1.4.3 Main Line Routes in Washington State

Proposed Action-related trains would travel on BNSF main line routes within Washington State. Table 5.1-3 summarizes infrastructure and traffic data for the route segments expected to be used by Proposed Action-related trains and the route segments are summarized below. Figure 5.1-3 illustrates estimated 2015 rail traffic and capacity using estimates provided in the *Washington State Rail Plan*.

- **Idaho/Washington State Line–Spokane.** This segment covers 18.6 miles and is part of BNSF's Kootenai River Subdivision. It is a double track with CTC. Capacity is approximately 76 trains per day and volume is approximately 70 trains per day. All BNSF trains between the eastern part of BNSF's system and points in Washington State move over this segment. Train traffic includes intermodal, grain, coal and general manifest trains. Amtrak's Empire Builder passenger service between Chicago, Illinois; Seattle, Washington; and Portland, Oregon also uses this segment.
- **Spokane–Pasco.** This corridor covers 145.5 miles and is part of BNSF's Lakeside Subdivision. This line is mostly single track with CTC. Capacity is approximately 37 trains per day and volume is approximately 39 trains per day. Train traffic on this segment includes intermodal, grain, coal and general manifest trains. The Portland section of Amtrak's Empire Builder passenger service uses this segment. BNSF is currently making upgrades to this segment, including adding a second main line in some areas.
- **Pasco–Vancouver.** This segment covers 221.4 miles and is BNSF's Fallbridge Subdivision, also known as the Columbia River Gorge route. It is mostly single track with CTC. Capacity is approximately 40 trains per day and volume is approximately 34 trains per day. Train traffic on this route includes intermodal, grain, coal and manifest. The Portland section of Amtrak's Empire Builder passenger service also uses this route. BNSF uses directional operations on this segment, which increases capacity by running westbound loaded unit trains on this segment and eastbound empty unit trains via Stampede Pass.
- **Vancouver–Longview Junction.** This segment covers 34.8 miles of BNSF's Seattle Subdivision. It is double track with CTC. About 21 miles of this segment is in Cowlitz County. Capacity is approximately 78 trains per day and volume is approximately 50 trains per day. This line also carries all UP trains between Portland, Oregon and Tacoma. Traffic includes intermodal, grain, coal and other unit trains along with manifest trains. This section of the BNSF line is also a key route for passenger trains. Amtrak's Coast Starlight trains to and from California and Amtrak Cascades trains between Eugene, Oregon and Seattle, Washington use this segment.

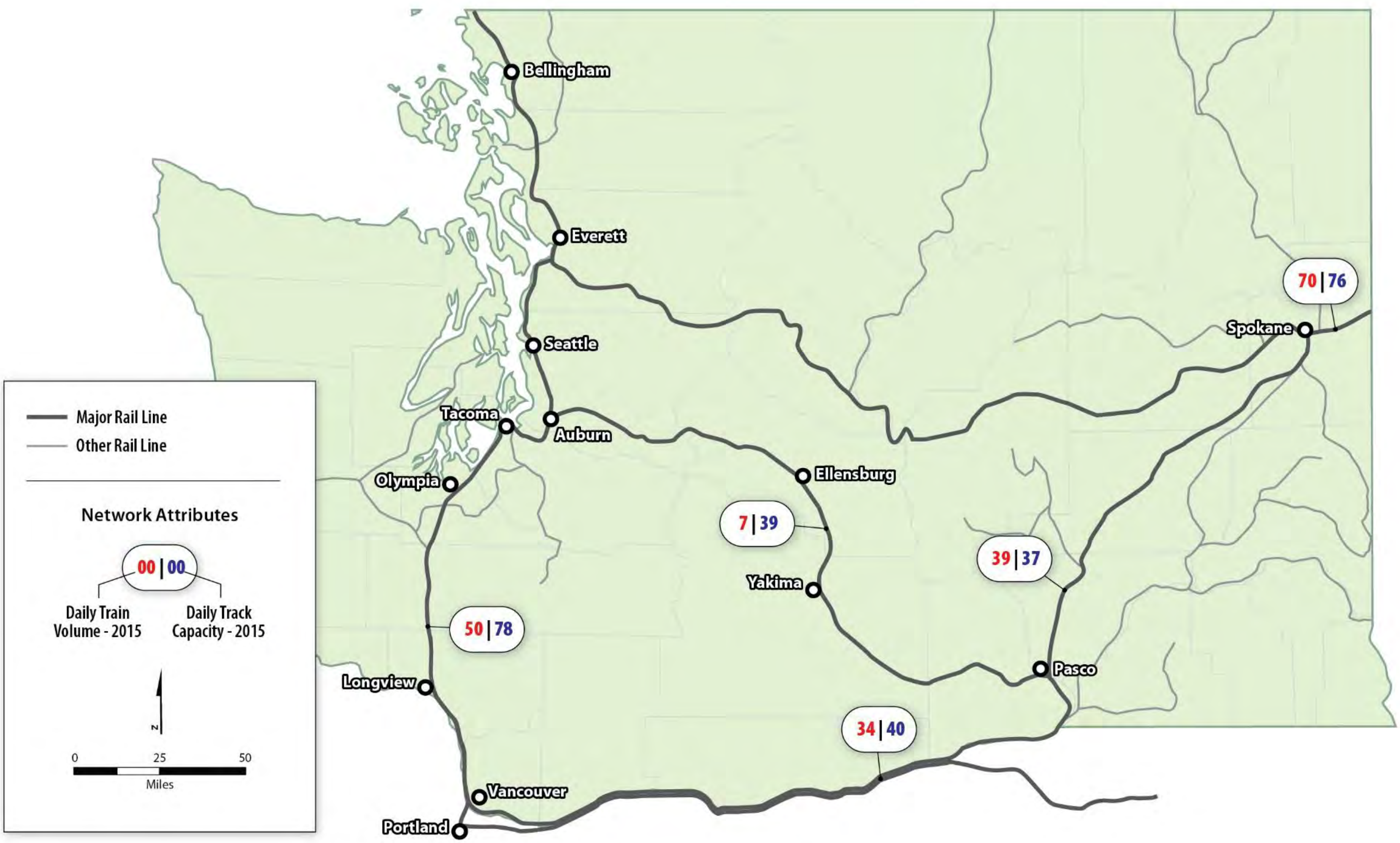
  Scheduled to be completed in 2017, WSDOT is constructing 3.7 miles of a third main track on the BNSF Seattle Subdivision main line between Longview Junction and Kelso. The purpose of the third main track is to enable 2 trains to pass while a train is simultaneously moving into or out of the Longview Junction yard (Washington State Department of Transportation 2014a). This would reduce the potential for delays to passenger and freight trains running through the area.
- **Longview Junction–Auburn.** This segment includes 118.6 miles of BNSF's Seattle Subdivision. About 18 miles of this segment are in Cowlitz County. There are two main tracks and traffic control is CTC. Current capacity is approximately 78 trains per day and volume is about 50 trains per day. Traffic on this line includes intermodal, empty coal, and grain trains returning to the east and manifest trains. This segment is also a key section for passenger trains. Amtrak's Coast Starlight trains to/from California and Amtrak Cascades trains use this route as do Sound Transit Sounder commuter trains on the section between Tacoma and Auburn.

Table 5.1-3. Washington State Rail Route Segments

Route Segment	Railroad	Subdivision	Miles	Current Traffic Control System[a]	Current Main Tracks[a]	Current Passenger Train Route?[a]	Future Passenger Train Route?[a]	Estimated 2015 Capacity (Trains/day)[a]	Estimated 2015 Trains Per Day[a,b]	Projected 2035 Trains per Day[a]
Idaho/Washington State Line–Spokane	BNSF	Spokane	18.6	CTC	2	Yes	Yes	76	70	125
Spokane–Pasco	BNSF	Lakeside	145.5	CTC	1	Yes	Yes	37	39	66
Pasco–Vancouver	BNSF	Fallbridge	221.4	CTC	1	Yes	Yes	40	34	56
Vancouver–Longview Junction	BNSF	Seattle	34.8	CTC	2	Yes	Yes	78	50	85
Longview Junction–LVSW Yard (BNSF Spur)	BNSF	LVSW	2.1	TWC	1	No	No	24	7	N/A
LVSW Yard–Project Area (Reynolds Lead)	BNSF	LVSW	5.0	TWC	1	No	No	24	2	N/A
Longview Junction–Auburn	BNSF	Seattle	118.6	CTC	2	Yes	Yes	78	50	85
Auburn–Yakima	BNSF	Stampede	139.6	TWC	1	No	No	39	7	13
Yakima–Pasco	BNSF	Yakima Valley	89.4	TWC	1	No	No	39	7	13

Notes:
[a] Source: Washington State Department of Transportation 2014b.
[b] Source: LVSW pers. comm.; Port of Longview pers. comm.
LVSW = Longview Switching Company; CTC = Centralized Traffic Control; TWC = Track Warrant Control; N/A = No projection available for route segment

Figure 5.1-3. Estimated 2015 Rail Traffic Volumes



- **Auburn–Yakima.** This segment is known as BNSF's Stampede Pass route. The Auburn–Yakima segment covers 139.6 miles and makes up BNSF's Stampede Subdivision. The track structure is mostly single track and traffic control is mostly TWC with some segments of CTC. Current capacity is approximately 39 trains per day and volume is approximately 7 trains per day. Traffic volume consists largely of empty coal and grain trains. BNSF uses directional operations on this segment, which increases capacity by running eastbound unit trains on this segment and westbound loaded unit trains via the Columbia River Gorge.
- **Yakima–Pasco.** This segment covers 89.4 miles. It makes up BNSF's Yakima Valley Subdivision. The track structure is mostly single track and traffic control is mostly TWC with some segments of CTC. Current capacity is approximately 39 trains per day and volume is approximately 7 trains per day. Traffic volume consists largely of empty coal and grain trains returning to the east and some manifest trains.

5.1.4.4 Main Line Routes Beyond Washington State

Proposed Action-related trains from the Powder River Basin operating on BNSF rail lines would move west to Huntley, Montana. From Huntley, Montana to Sandpoint, Idaho, BNSF typically operates coal and other trains over Montana Rail Link tracks. This route is mostly single track with primarily CTC traffic control; however, some sections have two main tracks. From Sandpoint, Idaho, trains would move back to BNSF tracks and cross into Washington State moving toward Spokane. Capacity along the route is approximately 18 to 75 trains per day, depending upon the specific location and track characteristics, and volume is 17 to 54 trains per day depending on the specific location (Surface Transportation Board 2015). Proposed Action-related trains from the Uinta Basin and Powder River Basin operating on UP rail lines would travel through Pocatello and Boise, Idaho; then along the Oregon side of the Columbia River to the North Portland Junction. From North Portland Junction, UP trains would operate on BNSF tracks, crossing the Columbia River to Vancouver and heading north on the BNSF Seattle Subdivision to Longview Junction. Most of these routes have one main track with CTC or ABS although some segments have four mail tracks and other traffic control system types. Capacity is approximately 16 to 173 trains per day, depending on the specific location and track characteristics, and volume is 20 to 60 trains per day.

5.1.5 Impacts

This section describes the potential direct and indirect impacts related to rail transportation that would result from construction and operation of the Proposed Action and No-Action Alternative.

Per the Applicant, LVSW would expand system capacity of the Reynolds Lead and BNSF Spur as needed to meet additional future volume increases. LVSW would likely upgrade the traffic control technology on both the BNSF Spur and the Reynolds Lead from TWC to CTC. However, this improvement is not currently funded or authorized. In addition to converting to the CTC system, LVSW indicated that it would upgrade the track on the Reynolds Lead and BNSF Spur by adding ballast, replacing ties, and upgrading the rails. These improvements would provide safer operation and increase in maximum speed from 10 mph to up to 25 mph on the Reynolds Lead. The speed limit on the BNSF Spur is limited by the Cowlitz River Bridge, which would remain at 10 mph. LVSW would also install a remotely operated electric switch connecting the BNSF Spur to the Reynolds Lead to allow continuous movement and more consistent operation. The electronic switch would eliminate the need for Proposed Action-related trains to stop while a train crew member operates the switch. While LVSW has developed upgrade plans, it has not begun work or applied for permits. LVSW would start the permit and funding processes once future volume increases become reasonably certain. Because these improvements are not certain, the impact analysis considers infrastructure with and without these planned improvements.

5.1.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area as a result of construction and operation of the Proposed Action.

At full operation, Proposed Action-related trains would add 8 loaded and 8 empty coal trains per day (16 total trains per day) to the rail lines between the Powder River Basin or the Uinta Basin and the project area. Section 5.1.3.2, *Impact Analysis,* describes and Figure 5.1-1 illustrates the expected rail routes for Proposed Action-related trains.

Construction—Direct Impacts

The Reynolds Lead would be modified within the project area to accommodate unit train access to and from the coal export terminal. Because the project area is at the terminus of the Reynolds Lead, this construction would not affect existing rail traffic on the Reynolds Lead. Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, describes construction-related activities and scenarios to transport materials to the project area. Under the rail scenario, trains transporting construction materials would travel to and from the project area. The unloading and maneuvering of these trains during construction within the project area would not affect the operations of existing rail traffic on the Reynolds Lead.

Construction—Indirect Impacts

Construction of the Proposed Action would result in the following indirect impact on rail transportation.

Add Temporary Rail Traffic for Transport of Construction Materials

The Applicant proposes approximately 2.1 million yards of suitable material would be needed for construction. This material would be transported to the project area by truck or rail, as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*. The Applicant estimates approximately two-thirds of the volume (1.4 million yards) would move during the first year of construction, assumed to be 2018. The Applicant has further proposed moving materials by rail would require an estimated 350 loaded trains of 100 cars each, equivalent to 700 train trips (loaded and empty) over the entire construction period. During the first year of construction, when two–thirds of the volume would be transported, this would amount to approximately 467 train trips, or an average of 1.3 train trips per day in 2018.

The baseline rail traffic from Longview Junction to the LVSW yard in 2018 is an average of 7 trains per day. The current capacity over these segments is approximately 24 trains per day. Baseline rail traffic and Proposed Action-related construction trains per would not exceed the capacity of the Reynolds Lead and BNSF Spur.

Proposed Action-related construction rail traffic would use BNSF main line routes in Washington State in 2018. Due to the low number of trains per day compared to existing rail traffic volumes and the daily variability of rail traffic volumes, Proposed Action-related construction trains would not adversely affect capacity on BNSF main line routes.

Operations—Direct Impacts

During operations, 8 loaded trains would travel to the project area daily, and 8 empty trains would travel outbound from the project area daily. These trains would maneuver along the rail loop in the project area. Rail traffic operations within the project area would not affect rail traffic on the Reynolds Lead because rail operations would be limited to the project area.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the indirect impacts on rail transportation described below. Impacts were determined by comparing the baseline rail traffic in 2028 with the anticipated rail capacity in 2028 and evaluating if the addition of Proposed Action-related trains could cause the capacity of a segment to be exceeded, or contribute to the capacity of a segment being exceeded. As noted in Section 5.1.3.2, *Impact Analysis,* 2028 baseline rail traffic estimates are based on linear extrapolation of data collected between 2010 and 2013 for the Washington State Rail Plan. Rail traffic is highly dynamic and fluctuates as a result of changing demand. The projected 2028 rail traffic volumes are intended to provide a “snapshot” of rail traffic volumes. The rail traffic volumes do not represent actual volumes for 2028 because uncertainties exist and the actual volume of freight rail traffic in 2028 cannot be predicted with precision.

Add Rail Traffic on the BNSF Spur and Reynolds Lead

Proposed Action-related loaded trains would move from Longview Junction to the project area, and the reverse, moving empty trains from the project area to Longview Junction. This movement would add rail traffic to the BNSF Spur and Reynolds Lead. The coal export terminal at full throughput in 2028, would receive an average of 8 loaded trains and return an average of 8 empty trains per day. Therefore, 16 Proposed Action-related trains per day would operate on the Reynolds Lead and BNSF Spur.

Capacity of the Reynolds Lead and BNSF Spur is approximately 24 trains per day. The baseline volume is an average of 7 trains per day on the BNSF Spur and 4 trains per day on the Reynolds Lead (2 existing trains and 2 trains with the No-Action Alternative, as described in Section 5.1.5.2, *No-Action Alternative*). Proposed Action-related trains would add 16 trains per day (8 loaded and 8 empty) on each of these segments for a total of 23 trains on the BNSF Spur and 20 trains on the Reynolds Lead. The Reynolds Lead and BNSF Spur have the capacity to handle baseline rail traffic plus future Proposed Action-related rail traffic.

As described previously, LVSW has indicated it would expand system capacity as needed to meet additional future volume increases. LVSW would likely upgrade the traffic control technology on both the BNSF Spur and the Reynolds Lead from TWC to CTC. However, this improvement is not currently funded or authorized.

In addition to converting to the CTC system, LVSW indicated it would upgrade the track on the Reynolds Lead and BNSF Spur by adding ballast, replacing ties, and upgrading the rails. These improvements would provide safer operation and increase in maximum speed from 10 mph to up to 25 mph on the Reynolds Lead. The speed limit on the BNSF Spur is limited by the Cowlitz River Bridge, which would remain at 10 mph. LVSW would also install a remotely operated electric switch connecting the BNSF Spur to the Reynolds Lead to allow continuous movement and more consistent operation. The electronic switch would eliminate the need for Proposed Action-related trains to stop while a train crew member operates the switch. While LVSW developed upgrade plans, it has not begun work or applied for permits. LVSW would start the permit and funding processes once future volume increases become reasonably certain.

Table 5.1-4 provides information on anticipated operations over the Reynolds Lead and BNSF Spur, including the average time for Proposed Action-related trains to cross each of the at-grade road/rail crossings with current track infrastructure and with planned infrastructure improvements. Trains would accelerate or decelerate at various points along the route and estimates of the time that trains would transit each road crossing considered this acceleration and deceleration.

Table 5.1-4. BNSF Spur and Reynolds Lead At-Grade Public Crossing Detail for Proposed Action-Related Trains

	Dike Road	3rd Avenue	California Way	Oregon Way	Industrial Way
Current Track Infrastructure					
Estimated speed	10 mph	8 mph	8 mph	10 mph	10 mph
Estimated passing time	8 minutes	10 minutes	10 minutes	8 minutes	8 minutes
Planned Track Infrastructure					
Estimated speed	10 mph	15 mph	15 mph	20 mph	20 mph
Estimated passing time	8 minutes	5 minutes	5 minutes	4 minutes	4 minutes

Notes:
mph = miles per hour

Add Rail Traffic on the BNSF Main Line in Cowlitz County

The Proposed Action would add rail traffic on the BNSF main line to and from Longview Junction within Cowlitz County.

This segment has two main tracks with CTC. Projected 2028 capacity without improvements or operating changes is approximately 80 trains per day. Projected 2028 volume with Proposed Action-related BNSF trains to and from the Powder River Basin is approximately 81 trains per day; therefore, the projected volume on this segment with Proposed Action-related trains would approximately equal the projected capacity. Proposed Action-related trains would contribute to this segment reaching capacity if no improvements were made to expand capacity by 2028. It is expected that BNSF and UP would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

If all 16 Proposed Action-related trains use the segment between Vancouver and Longview Junction (UP trains), the 2028 volume on this segment in Cowlitz County south of Longview Junction would be 89 trains daily and would exceed capacity without improvements (80 trains daily). Proposed Action-related trains would contribute to this segment exceeding capacity if no improvements were made to expand capacity by 2028. It is expected that BNSF and UP would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

Add Rail Traffic on BNSF Main Line Routes in Washington State beyond Cowlitz County

The Proposed Action would add rail traffic to the BNSF main line routes in Washington State, as summarized in Table 5.1-5. Figure 5.1-4 illustrates the projected 2028 rail traffic volume and capacity on BNSF main line routes in Washington State with Proposed Action-related trains. The projected rail traffic assumes that directional running continues per existing BNSF operational policies, by routing westbound-loaded unit trains via Vancouver through the Columbia River Gorge, and eastbound empty unit trains via Stampede Pass.

The projected increase in rail traffic relative to capacity is described for segments in Washington State beyond Cowlitz County below.

- **Idaho/Washington State Line–Spokane**. All Proposed Action-related BNSF trains to and from the Powder River Basin would move over this segment. This segment has two main tracks with CTC. Projected 2028 capacity without improvements is 76 trains per day. The capacity concerns for this segment extend beyond Washington State to Sandpoint, Idaho. This potential constraint is identified in the *Washington State Rail Plan* as a key potential chokepoint.

  The projected volume in 2028 is 122 trains per day with Proposed Action-related trains. The Proposed Action would add 16 trains to a segment that would exceed capacity under 2028 baseline conditions. Without improvements or operating changes, Proposed Action-related trains would contribute to congestion or delays on this segment, or the inability of BNSF to handle its rail traffic. It is expected that BNSF would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

- **Spokane–Pasco**. All Proposed Action-related BNSF trains to and from the Powder River Basin would move over this segment. This segment has one main track and CTC. Projected 2028 capacity without improvements or operating changes is 38 trains per day. This potential constraint is identified in the *Washington State Rail Plan* as a key potential chokepoint.

  The projected volume in 2028 is 72 trains per day with Proposed Action-related trains. The Proposed Action would add 16 trains to a segment that would exceed capacity under 2028 baseline conditions. Without improvements or operating changes, Proposed Action-related trains would contribute to congestion or delays on this segment, or the inability of BNSF to handle its rail traffic. It is expected that BNSF would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

- **Pasco–Vancouver**. Loaded Proposed Action-related BNSF trains from the Power River Basin would move over this segment. The segment has one main track with CTC. Proposed Action capacity without improvements is 41 trains per day. This potential constraint is identified in the *Washington State Rail Plan* as a significant capacity concern.

Table 5.1-5. Infrastructure Capacity and Projected Rail Traffic

Route Segment	Railroad	Subdivision	Current Traffic Control System[a]	Current Main Tracks[a]	Projected 2028 Capacity (trains/day)[a]	Miles	Estimated Baseline 2015 (trains/day)[a,b]	Projected Baseline Trains 2028 (trains/ day)[a,b]	Projected 2028 Capacity Surplus (Deficit)[c]	2028 with Proposed Action (trains/day)	Projected 2028 Capacity Surplus (Deficit) with Proposed Action-Related Trains[c]
Idaho/Washington State Line–Spokane	BNSF	Spokane	CTC	2	76	18.6	70	106	**(30)**	122	**(46)**
Spokane–Pasco	BNSF	Lakeside	CTC	1	38	145.5	39	56	**(18)**	72	**(34)**
Pasco–Vancouver	BNSF	Fallbridge	CTC	1	41	221.4	34	48	**(7)**	56	**(15)**
Vancouver–Longview Junction	BNSF	Seattle	CTC	2	80	34.8	50	73	7	81	**(1)**
Longview Junction–LVSW Yard (BNSF Spur)	BNSF	LVSW	TWC	1	24	2.1	7	7	17	23	
LVSW Yard–Project Area (Reynolds Lead)	BNSF	LVSW	TWC	1	24	5.0	2	4	20	20	
Longview Junction–Auburn	BNSF	Seattle	CTC	2	80	118.6	50	73	7	81	**(1)**
Auburn–Yakima	BNSF	Stampede	TWC	1	39	139.6	7	11	28	19	20
Yakima–Pasco	BNSF	Yakima Valley	TWC	1	39	89.4	7	11	28	19	20

Notes:

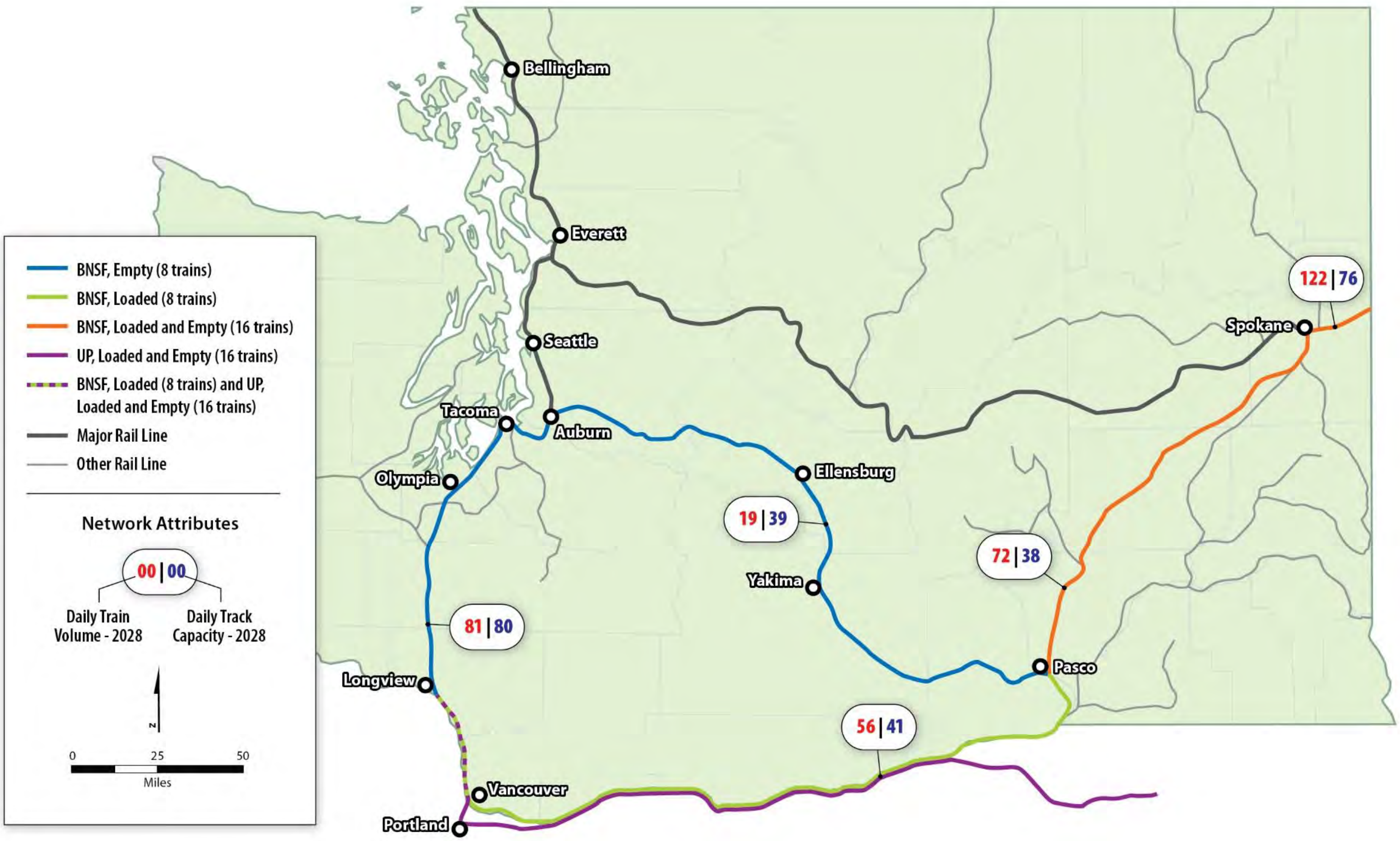
[a] Source: Washington State Department of Transportation 2014b.

[b] Source: Wolter pers. comm.; Port of Longview pers. comm.

[c] Projected capacity surplus/deficit without infrastructure improvements or changes in operations. Shaded black values indicate a projected capacity deficit applying the methods used for the analysis. It is expected that BNSF would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

CTC = Centralized Traffic Control; TWC = Track Warrant Control

Figure 5.1-4. Projected 2028 Daily Train Volumes with Proposed Action–Related Trains



The projected volume in 2028 is 56 trains per day with Proposed Action-related trains. The Proposed Action would add 8 trains to a segment that would exceed capacity under 2028 baseline conditions. Without improvements or operating changes, Proposed Action-related trains would contribute to congestion or delays on this segment, or the inability of BNSF to handle its rail traffic. It is expected that BNSF would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

- **Vancouver–Longview Junction and Longview Junction–Auburn (outside Cowlitz County)**. This is the same segment described for Cowlitz County. This segment has two main tracks with CTC. Projected 2028 capacity without improvements or operating changes is approximately 80 trains per day. Projected 2028 volume with Proposed Action-related BNSF trains to and from the Powder River Basin is 81 trains per day; therefore, the projected volume on this segment with Proposed Action-related trains would be approximately equal to capacity (80 trains per day).

  If all 16 Proposed Action-related trains use the segment between Vancouver and Longview Junction (UP trains), the 2028 volume on this segment would be 89 trains daily and would exceed capacity without improvements (80 trains daily). Without improvements or operating changes, Proposed Action-related trains would contribute to congestion or delays on this segment, or the inability of BNSF to handle its rail traffic. It is expected that BNSF would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

- **Auburn–Yakima and Yakima–Pasco.** Empty Proposed Action-related BNSF trains returning to the Powder River Basin would move over these segments. With Proposed Action-related rail traffic, the projected rail traffic on these segments is 19 trains per day in 2028. Projected 2028 capacity is 39 trains per day so these segments would not exceed capacity with Proposed Action-related trains in 2028.

Add Rail Traffic on BNSF and UP Rail Routes Outside Washington State

The Proposed Action would add 8 loaded and 8 empty trains per day (16 trains) to existing rail traffic beyond Washington State. The current rail traffic on the BNSF main lines between Washington State and the Powder River Basin is approximately 17 to 54 trains per day and the capacity is approximately 18 to 75 trains per day, depending on location and track characteristics. Along some segments, existing rail traffic is near capacity and any future rail traffic growth would cause capacity to be exceeded.

The current rail traffic on the UP routes between Washington State and the Uinta Basin and Powder River Basin is approximately 20 to 60 trains per day and a capacity of 16 to 173 trains per day, depending on location and track characteristics.

Along the BNSF and UP routes, without improvements or operating changes, Proposed Action-related trains would contribute to congestion or delays on certain segments, or the inability of BNSF or UP to handle its rail traffic. It is expected that BNSF and UP would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

5.1.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the proposed coal export terminal. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

The Applicant's anticipated planned growth under the No-Action Alternative would require approximately 2 trains per day on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County. The existing infrastructure on the Reynolds Lead, BNSF Spur, and BNSF main line would provide sufficient capacity to handle the projected growth in baseline traffic and investments to increase capacity would not be necessary. Some BNSF main line segments would exceed capacity in 2028 if BNSF does not make capital investments or operating changes to expand capacity. Projected 2028 baseline traffic volumes are included in Table 5.1-5 and illustrated in Figure 5.1-5.

5.1.6 Required Permits

No permits related to rail transportation would be required for the Proposed Action.

5.1.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to rail transportation from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and environmental compliance that are assumed as part of the Proposed Action. Impacts on vehicle safety at grade crossings and measures by the Applicant to mitigate such impacts are discussed in Section 5.3, *Vehicle Transportation*.

5.1.7.1 Applicant Mitigation

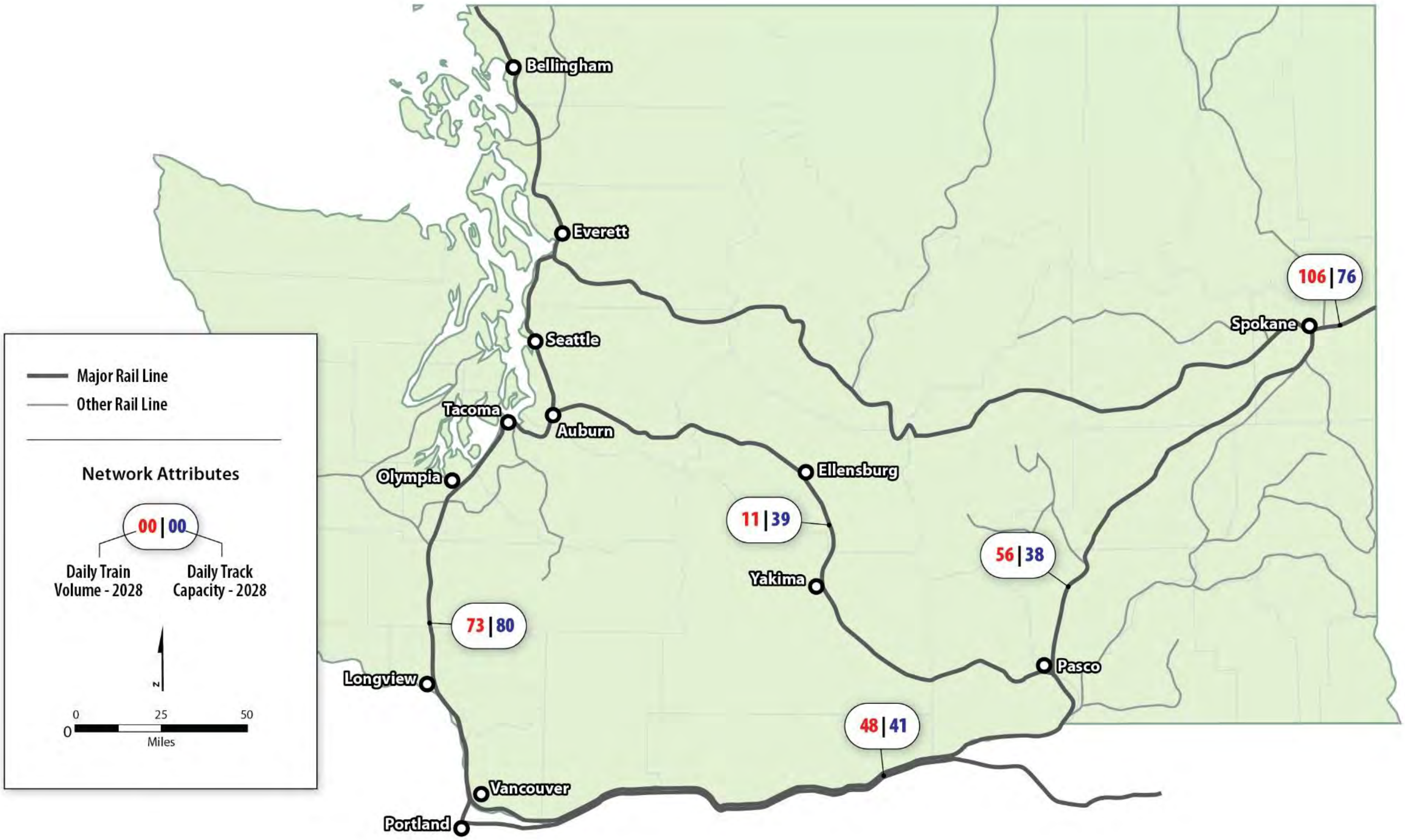
The Applicant will implement the following mitigation measure to mitigate impacts on rail transportation.

MM RT-1. Notify BNSF and UP about Operations on Main Line Routes.

To allow for adequate planning to address Proposed Action-related trains contributing to segments exceeding rail capacity on main line routes in Washington State, the Applicant will notify BNSF and UP before each identified operational stage (Stage 1a, Stage 1b, and Stage 2) begins that will change average daily rail traffic on main line routes in Washington State. The Applicant will prepare a report to document the notification of BNSF and UP and changes to average daily rail traffic. The report will be submitted to BNSF, UP, WSDOT, the Utilities and Transportation Commission, and Cowlitz County at least 6 months before the change in average daily rail traffic.

Impacts on vehicle safety at grade crossings and measures by the Applicant to mitigate such impacts are discussed in Section 5.3, *Vehicle Transportation*.

Figure 5.1-5. Projected 2028 Daily Train Volumes without Proposed Action–Related Trains



5.1.7.2 Other Measures to Be Considered

The following measures should be considered by LVSW, BNSF, and UP to accommodate Proposed Action-related trains for permitting or planning.

- **LVSW.** Consider improvements to track infrastructure along the Reynolds Lead and BNSF Spur. This could include installing traffic control systems, installing a new switch from the BNSF Spur to Reynolds Lead, upgrading rail, adding new main track, or adding siding.
- **BNSF and UP (in Washington State).** Consider improvements to track infrastructure or changes in operations to increase track capacity. This could include upgrading main track, adding new main track, or extending or adding siding.
- **BNSF and UP (outside Washington State).** Consider improvements to track infrastructure or changes in operations to increase track capacity and service. This could include upgrading main track, adding new main track, extending or adding siding, or installing new traffic control systems.

Impacts on vehicle traffic delay and vehicle traffic safety at grade crossings and measures to mitigate such impacts are discussed in Section 5.3, *Vehicle Transportation*.

5.1.8 Unavoidable and Significant Adverse Environmental Impacts

Three segments on the BNSF main line routes in Washington State (Idaho/Washington State Line–Spokane, Spokane–Pasco, and Pasco–Vancouver) are projected to exceed capacity with projected baseline rail traffic in 2028. Proposed Action-related trains would contribute to these three segments exceeding capacity in 2028, based on the analysis in this EIS and assuming existing infrastructure. It is expected that BNSF would make the necessary investments or operating changes to accommodate the rail traffic growth, but it is unknown when these actions would be taken or permitted. If improvements to increase capacity were not made, Proposed Action-related trains would contribute to these capacity exceedances and could result in an unavoidable and significant adverse impact on rail transportation.

5.2 Rail Safety

Railroads provide transportation for passengers and a wide range of commercial goods, and support regional economic activity. Similar to other forms of transportation, rail traffic is subject to various regulatory requirements to protect public safety.

This section assesses impacts on rail safety that could result from construction and operation of the Proposed Action and No-Action Alternative. This section describes the regulatory setting, presents historical and current rail safety conditions in the study area, and assesses potential rail safety impacts for the Proposed Action and No-Action Alternative. Section 5.3, *Vehicle Transportation*, addresses grade crossing safety related to vehicle transportation. This section also presents measures to mitigate impacts resulting from the Proposed Action and any remaining unavoidable and significant adverse impacts.

5.2.1 Regulatory Setting

Laws and regulations relevant to rail safety are summarized in Table 5.2-1. Regulations pertaining to at-grade rail crossings are presented in Section 5.3*, Vehicle Transportation.*

Table 5.2-1. Regulations, Statutes, and Guidelines for Rail Safety

Regulation, Statute, Guideline	Description
Federal	
Federal Railroad Safety Act of 1970	Gives FRA rulemaking authority over all areas of rail line safety. FRA has designated that state and local law enforcement agencies have jurisdiction over most aspects of highway/rail at-grade crossings, including warning devices and traffic law enforcement.
Highway Safety Act and the Federal Railroad Safety Act	Gives FHWA and FRA regulatory jurisdiction over safety at federal highway/rail at-grade crossings.
Federal Railroad Administration General Regulations (49 CFR 200–299)	Establishes railroad regulations, including safety requirements related to track, operations, and cars.
State	
Title 81, Transportation—Railroads, Employee Requirements and Regulations (RCW 81.40)	Establishes general requirements for railroad employee environment and working conditions, the minimum crew size for passenger trains, and requirements for flaggers.
Rail Companies—Clearances (WAC 480-60)	Establishes operating procedures for railroad companies in Washington State. Includes rules of practice and procedure, walkway clearances, side clearances, track clearances, side clearances, track clearances, and rules for operation of excess dimension loads.
Rail Companies—Operation (WAC 480-62)	Establishes railroad operating procedures in Washington State.

Regulation, Statute, Guideline	Description
Local	
No local regulation, statutes, or guidelines apply to rail safety.	

Notes:
FRA = Federal Railroad Administration; FHWA = Federal Highway Administration; CFR = Code of Federal Regulations; USC = United States Code; RCW = Revised Code of Washington; WAC = Washington Administrative Code

5.2.2 Study Area

The study area for direct impacts on rail safety is the project area. The study area for indirect impacts on rail safety is the expected rail routes of Proposed Action-related trains within Washington State, as illustrated in Figure 5.1-1 in Section 5.1, *Rail Transportation*.

5.2.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on rail safety associated with the construction and operation of the Proposed Action and No-Action Alternative.

The analysis used the definition of a rail accident from the Federal Railroad Administration (FRA):[1]

> Collisions, derailments, fires, explosions, acts of God, or other events involving the operation of railroad on-track equipment (standing or moving) and causing reportable damages greater than the reporting threshold for the year in which the accident/incident occurred.

The FRA reporting threshold was $10,500 in 2016. Therefore, accidents include a wide variety of incidents and are not limited to collisions or derailments.

5.2.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on rail safety in the study area.

Existing and Projected Rail Traffic

- **Reynolds Lead and BNSF Spur.** Existing (2015) and projected (2028) rail traffic on the Reynolds Lead and BNSF Spur was based on estimates from the Longview Switching Company (LVSW) and field observations.
- **BNSF main line routes**. Existing (2015) and projected (2028) rail traffic for BNSF Railway Company (BNSF) main line routes within Washington State were based on estimates from the *Washington State Rail Plan* (Washington State Department of Transportation 2014a).

[1] The Federal Railroad Administration (FRA) was created by the U.S. Department of Transportation Act of 1966. It is one of ten agencies within the U.S. Department of Transportation concerned with intermodal transportation. FRA's mission is to enable the safe, reliable, and efficient movement of people and goods. FRA has established federal regulations pertaining to the safety of interstate commerce. These regulations set standards for all railroads dealing with the interchange of railroad cars and equipment.

Proposed Action-Related Train Operations

- **Volumes.** Proposed Action-related rail traffic to the project area was provided by the Applicant, notably 8 loaded and 8 empty trains per day if the coal export terminal is constructed and operated at full terminal throughput in 2028.
- **Routes.** Routes to and from the project area within Washington State were based on existing BNSF operations and Washington State Department of Transportation (WSDOT) documents including the *Washington State Rail Plan* and *Washington State Freight Mobility Plan* (Washington State Department of Transportation 2014b).[2] Figure 5.1-1 in Section 5.1*, Rail Transportation*, illustrates the expected routes for Proposed Action-related trains in Washington State.
- **Train parameters.** Train parameters including the number of rail cars were based on information provided by the Applicant and existing BNSF train operations.

Accident Rates

Rail accident data from FRA were used as the basis for the analysis. While the Washington Utilities and Transportation Commission gathers information on accidents that occur in Washington State, it does not have the corresponding data on train miles within the state for determining accidents per million train miles traveled.

Accident rates were compiled from FRA data for year 2012 through 2014.[3] Published literature was also used to identify derailment rates by track class.[4]

5.2.3.2 Impact Analysis

The following methods were used to evaluate the potential rail safety impacts of the Proposed Action and No-Action Alternative.

Accident Frequency

Accident rates for BNSF freight trains, Union Pacific Railroad (UP) freight trains, and all railroads (freight and passenger trains combined) were calculated using FRA data for the 3 most recent years of available data (Table 5.2-2). Specific train accident rates for BNSF in Washington State were not available in FRA data. LVSW did not have any reported train accidents in the FRA database because no train accidents occurred on the Reynolds Lead or BNSF Spur 2012 through 2014.

[2] In 2012, BNSF introduced a directional routing strategy to enhance existing capacity, which routes all westbound-loaded unit trains (including coal trains) from Pasco to Vancouver via the Columbia River Gorge. Empty unit bulk trains (including coal trains) generated north of Vancouver, including Cowlitz County, travel to Pasco and to points east via Stampede Pass.

[3] 2014 data were the most recent available data when the analysis was completed.

[4] As part of its jurisdiction, FRA categorizes all tracks into track classes, segregated by maximum speed limits for freight and passenger trains. FRA maintenance and inspection requirements vary by track class.

Table 5.2-2. Nationwide Train Accident Rates

Year	Accident Rate per Million Train Miles All Railroads (Passenger and Freight Trains)	BNSF (Freight Trains)	UP (Freight Trains)
2012	2.41	2.20	3.04
2013	2.43	2.11	3.02
2014	2.27	1.89	2.82

Notes:
Source: Federal Railroad Administration (2015).
BNSF = BNSF Railway Company; UP = Union Pacific Railroad

Historically, accident rates (accidents per million train miles) do not change dramatically from year to year, but generally trend downward over time because of improved control systems, communications, and inspection practices. Because Proposed Action-related rail traffic in Washington State would be on BNSF routes, a rate of two accidents per million train miles, based on the data in Table 5.2-2, was used for the analysis.

FRA track safety standards establish nine specific classes of track (Class 1 to Class 9). Class of track is based on standards for track structure, geometry, and inspection frequency. Each class of track has a maximum allowable operating speed for both freight and passenger trains. The higher the class of track, the greater the allowable track speed and the more stringent the applicable track safety standards. Accident rates have been shown to vary considerably by track class, with higher accident rates occurring on lower track classes. However, lower track classes have lower maximum operating speeds, which can reduce the consequences of more frequent accidents.

Data on accident rates by track class were used to generate a baseline accident rate in the study area. The Reynolds Lead and BNSF Spur are currently maintained in accordance with the Track Class 1 standard. LVSW plans to upgrade the Reynolds Lead and BNSF Spur to a Track Class 2 designation for the Proposed Action or other future action, as described in Section 5.1, *Rail Transportation*. The Reynolds Lead and BNSF Spur would be maintained as Track Class 1 if planned improvements are not made. This analysis conservatively assumed Track Class 3 for all BNSF main line routes in Washington State.

Train accident rates are generally distinguished only by freight versus passenger service, not by specific cargoes. The predicted number of accidents per year was calculated by multiplying segment length by the number of trains per year and applicable accident rate; the number was then adjusted for track classification based on published accident data research by track class.

The predicted accident per year for a segment can be summarized as follows.

> *(Segment length) x (Number of trains) x (Accident rate for segment x) = Predicted accidents per year for segment x*

More information on these methods is provided in the *SEPA Rail Safety Technical Report* (ICF 2017).

5.2.4 Existing Conditions

Section 5.1, *Rail Transportation*, describes existing conditions for Proposed Action-related train routes in more detail.

Based on FRA data, there were two accidents in Cowlitz County in 2014, and neither accident involved an injury or fatality. One incident was in a rail yard with no derailment and the other involved a derailment of 11 cars on main line track. In Washington State, there were 36 accidents in 2014, two of which involved an injury. Thirteen accidents were on main line track, and the others were in rail yards or on industry track. Derailments (main line and industry track) involved between 0 and 11 rail cars.

5.2.5 Impacts

This section describes the potential direct and indirect impacts related to rail safety (train accidents) that would result from construction and operation of the Proposed Action and the No-Action Alternative.

5.2.5.1 Proposed Action

This section describes the potential impacts on rail safety that could occur in the study area as a result of construction and operation of the Proposed Action. Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, describes construction-related activities and scenarios for transporting materials to the project area. Under the rail scenario, an average of 1.3 construction trains would travel to and from the project area per day. Construction impacts are based on the peak construction period, assumed to be in 2018. Operations impacts are based on the maximum coal export terminal throughput capacity (up to 44 million metric tons of coal per year), which would result in 8 loaded and 8 empty trains per day in 2028.

Construction—Direct Impacts

Any accidents in the project area would be related to construction in the project area and would not affect rail safety on the Reynolds Lead.

Construction—Indirect Impacts

Construction-related activities associated with the Proposed Action could result in indirect impacts on rail safety as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Increase the Potential for Train Accidents

According to the Applicant, construction materials could be delivered by rail. This would require an estimated 350 loaded trains of 100 cars each and 350 empty trains of 100 cars each. It is anticipated two-thirds of the construction material would be transported during the first year of construction in 2018 (approximately 467 trains, an average of 1.3 trains per day). Construction trains would use the Reynolds Lead and BNSF Spur. Because the specific main line routes for Proposed Action-related construction trains are not known, the expected routes for Proposed Action-related trains in Washington State during operations was used to illustrate the possible range of accident frequencies.

The predicted accident frequencies during the peak year of construction are shown in Table 5.2-3. Proposed Action-related construction rail traffic would have a relatively small increase on predicted train accidents.

Table 5.2-3. 2018 Predicted Train Accidents during Peak Year of Construction

Route Segment	Length (miles)	Predicted Proposed Action-Related Construction Train Accidents[a]
Loaded Trains		
Idaho/Washington State Line–Spokane	18.6	0.03
Spokane–Pasco	145.5	0.27
Pasco–Vancouver	221.4	0.41
Vancouver–Longview Junction	34.8	0.07
Longview Junction–LVSW Yard (BNSF Spur)	2.1	0.01
LVSW Yard–Project Area (Reynolds Lead)	5.0	0.03
Empty Trains		
Project Area–LVSW Yard (Reynolds Lead)	5.0	0.03
LVSW Yard–Longview Junction (BNSF Spur)	2.1	0.01
Longview Junction–Auburn	118.6	0.22
Auburn–Yakima	139.6	0.26
Yakima–Pasco	89.4	0.17
Pasco–Spokane	145.5	0.27
Spokane–Idaho/Washington State Line	18.6	0.03

Notes:
[a] Accidents related to Proposed Action-related trains; these would be additive to baseline conditions.

Operations—Direct Impacts

At full terminal operations, 8 loaded trains would travel to the project area, and 8 empty trains would travel from the project area daily. These trains would maneuver along the rail loop in the project area. The accident rates described previously are not applicable to the project area. Any accidents in the project area would be related to operations in the project area and would not affect rail safety on the Reynolds Lead.

Operations—Indirect Impacts

Based on current operations, BNSF loaded and empty Proposed Action-related trains would be expected to travel via the same route between the coal mines in the Powder River Basin in Montana and Wyoming, and Pasco, Washington.

- West of Pasco, loaded BNSF trains would be expected travel to the project area via the Columbia Gorge through Vancouver to Longview Junction, and travel along the BNSF Spur and Reynolds Lead to the project area.

- Empty BNSF trains would be expected to travel from the project area along the Reynolds Lead and BNSF Spur and return from Longview Junction via Stampede Pass route through Auburn and Yakima to Pasco.

Loaded and empty Proposed Action-related UP trains would be expected to move between Vancouver and Longview Junction in Washington State. Because UP operates over the same track that carries BNSF trains, no additional analysis was required for Proposed Action-related rail traffic in Washington State for UP trains.

Operation of the Proposed Action would result in the following indirect impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

Increase the Potential for Train Accidents

The Proposed Action would increase the potential for train accidents by adding loaded and empty rail traffic on rail routes in Washington State. The predicted accident frequencies in 2028 are shown in Table 5.2-4.

Table 5.2-4. 2028 Predicted Train Accidents per Year[a]

Route Segment	Length (miles)	2028 Proposed Action-Related Trains	2028 Baseline Conditions
Loaded Trains			
Idaho/Washington State Line–Spokane	18.6	0.22	2.88
Spokane–Pasco	145.5	1.70	11.90
Pasco–Vancouver	221.4	2.59	15.52
Vancouver–Longview Junction	34.8	0.41	3.71
Longview Junction–LVSW Yard (BNSF Spur)	2.1	0.07	0.06
LVSW Yard–Project Area (Reynolds Lead)	5.0	0.18	0.04
Empty Trains			
Project Area–LVSW Yard (Reynolds Lead)	5.0	0.18	0.04
LVSW Yard–Longview Junction (BNSF Spur)	2.1	0.07	0.06
Longview Junction–Auburn	118.6	1.39	12.64
Auburn–Yakima	139.6	1.63	2.24
Yakima–Pasco	89.4	1.04	1.44
Pasco–Spokane	145.5	1.70	11.90
Spokane–Idaho/Washington State Line	18.6	0.22	2.88

Notes:

[a] Assumes the Reynolds Lead and BNSF Spur would be improved to Class 2 standards by LVSW. If the Reynolds Lead and BNSF Spur are not improved to Class 2 standards, the predicted train accidents per year would increase approximately 1.5 to 3 times higher than the Class 2 accident rate.

The following summarizes the predicted accident frequencies.

- **With track improvements to the Reynolds Lead and BNSF Spur (Track Class 2).** The predicted number of accidents is 0.25 per year for loaded Proposed Action-related trains, and 0.25 accident per year for empty Proposed Action-related trains. Therefore, 1.0 accident for each type of train (loaded and empty) every 4 years is predicted. Proposed Action–

related traffic would increase the predicted accident frequency on the Reynolds Lead and BNSF Spur from 0.11 accident per year to 0.61 accident per year for all rail traffic.

- **Without track improvements to the Reynolds Lead and BNSF Spur (Track Class 1).** Accident rates for Track Class 1 are more uncertain given the small percentage of train miles that occur on Track Class 1. Therefore, it is difficult to predict accident rates for Track Class 1, but data indicate the 2028 Proposed Action-related predicted train accidents per year in Table 5.2-4 would be approximately 1.5 to 3 times higher without planned improvements to the Reynolds Lead and BNSF Spur.

- **BNSF Main Line Routes in Washington State (Track Class 3).** The predicted number of accidents for loaded Proposed Action-related trains on BNSF main line varies between 0.22 accident per year to 2.59 accidents per year.

Not every accident of a loaded Proposed Action-related train would result in a coal spill and spills that would occur would vary in size. Coal spills on the Reynolds Lead or BNSF Spur would be expected to be less frequent and smaller than on main line routes due to lower train speeds. Impacts from coal spills on the natural environment are addressed in Chapter 4, Sections 4.5, *Water Quality,* 4.6, *Vegetation*, 4.7, *Fish,* and 4.8, *Wildlife*.

Cowlitz County Impacts

The predicted number of loaded Proposed Action-related train accidents in Cowlitz County (BNSF main line, BNSF Spur, and Reynolds Lead) is 0.46 per year, or approximately 1.0 accident every 2 years. The predicted number of empty Proposed Action-related train accidents is slightly higher (0.50 per year), due to the greater number of miles within Cowlitz County on the empty train route.

The baseline predicted number of accidents is approximately 4.30 per year. The number of predicted accidents per year would be 5.25 with Proposed Action-related trains (an increase of approximately 22%), which illustrates the relative contribution of Proposed Action-related trains to overall rail safety within Cowlitz County. Additional information is provided in the *SEPA Rail Safety Technical Report.*

Statewide Impacts

The predicted number of loaded train accidents related to the Proposed Action in Washington State (including Cowlitz County) is 5.16 per year. The predicted number of Proposed Action-related empty train accidents is 6.23 per year, due to the greater length of the empty train rail route.

Adding the train accidents from the inbound and outbound trains related to the Proposed Action to the total accident baseline would increase accidents from 50.43 accidents per year to 61.81 accidents per year. This means that within Washington State, the predicted increase in rail traffic accidents related to the Proposed Action is approximately 11.38 accidents per year (an increase of approximately 22% over the baseline).

5.2.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the proposed coal export terminal. The Applicant would continue with current and proposed future increased operations in the project area. The project area could be developed for other industrial uses including an expanded bulk product terminal. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

The Applicant anticipates planned growth under the No-Action Alternative would require approximately 2 trains per day; therefore, the predicted number of accidents would be lower than the Proposed Action and higher than the baseline conditions (Table 5.2-4). Various types of rail cars would be needed for the range of expected cargoes. No-Action Alternative-related rail traffic would have various cargoes (mixed-load train). The potential for a mixed-load train derailment or accident on the Reynolds Lead and BNSF Spur would presumably be lower than for a unit train because mixed-load trains tend to have fewer rail cars than a unit train.

5.2.6 Required Permits

No permits related to rail safety would be required for the Proposed Action.

5.2.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to rail safety from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

5.2.7.1 Applicant Mitigation

The proposed mitigation measure identified in Section 5.1, *Rail Transportation*, to mitigate impacts on rail transportation would also mitigate impacts on rail safety.

MM RT-1. Notify BNSF and UP about Operations on Main Line Routes.

To allow for adequate planning to address Proposed Action-related trains contributing to segments exceeding rail capacity on main line routes in Washington State, the Applicant will notify BNSF and UP before each identified operational stage (Stage 1a, Stage 1b, and Stage 2) begins that will change average daily rail traffic on main line routes in Washington State. The Applicant will prepare a report to document the notification of BNSF and UP and changes to average daily rail traffic. The report will be submitted to BNSF, UP, WSDOT, Utilities and Transportation Commission, and Cowlitz County at least 6 months before the change in average daily rail traffic.

Impacts on vehicle safety at grade crossings and measures by the Applicant to mitigate such impacts are discussed later in Section 5.3, *Vehicle Transportation*.

5.2.7.2 Other Measures to Be Considered

The following measure is provided for consideration by agencies, organizations, and others for permitting or planning.

- LVSW should consider improvements to track infrastructure on the Reynolds Lead and BNSF Spur. This could include installing traffic control systems, installing a new switch from the BNSF Spur to Reynolds Lead, upgrading rail, adding new main track, or adding siding. The improvements would benefit rail safety by upgrading the Reynolds Lead and BNSF Spur per Track Class 2 requirements, which would lower the expected accident rate.

5.2.8 Unavoidable and Significant Adverse Environmental Impacts

Proposed Action-related trains would add rail traffic along rail routes in Cowlitz County and Washington State, which would increase the potential for train accidents. LVSW, BNSF, and UP could improve rail safety through investments or operational changes, but it is unknown when those actions would be taken or permitted. Therefore, Proposed Action-related trains could result in an unavoidable and significant adverse impact on rail safety.

5.3 Vehicle Transportation

Vehicles provide transportation for individuals to travel to work, school, public services, and for recreational and commercial purposes. Vehicles also are used for emergency response and for delivering commercial goods that support economic activity. Vehicle delays increase travel time for motorists and can affect quality of life, air quality, and economic growth.

This section describes vehicle transportation in the study area. It then describes impacts on vehicle transportation that could result from construction and operation of the Proposed Action and No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action and any remaining unavoidable and significant adverse impacts.

5.3.1 Regulatory Setting

Laws and regulations relevant to vehicle transportation are summarized in Table 5.3-1.

Table 5.3-1. Regulations, Statutes, and Guidelines for Vehicle Transportation

Regulation, Statute, Guideline	Description
Federal	
Federal Railroad Safety Act of 1970	Gives FRA rulemaking authority over all areas of rail line safety. FRA has designated that state and local law enforcement agencies have jurisdiction over most aspects of highway/rail grade crossings, including warning devices and traffic law enforcement.
Highway Safety Act and the Federal Railroad Safety Act	Gives FHWA and FRA regulatory jurisdiction over safety at federal highway/rail grade crossings.
Railroad-Highway Grade Crossing Handbook (Federal Highway Administration 2007); *Manual on Uniform Traffic Control Devices* (23 USC 109(d))	Guidance document on grade-crossing safety issues, including the selection and placement of warning devices and enforcement of traffic laws. Provides guidelines for traffic control devices that consider delay, roadway classification, average daily traffic, number of trains per day, and train speed at grade crossings.
State	
Washington State Department of Transportation, Design Manual M 22.01.10, November 2015, Chapter 1350, Railroad Grade Crossings	Sets forth requirements and guidance on the design and treatment of state highway-rail grade crossings.
Motor Vehicles, Rules of the Road (RCW 46.61.340)	Sets forth that train traffic has the right-of-way at grade crossings.
Washington Utilities and Transportation Commission	Inspects and issues violations for hazardous materials shipments; track, signal, and train control; and rail operations. WUTC also regulates the construction, closure, or modification of public railroad crossings. In addition, WUTC inspects and issues defect notices if a crossing does not meet minimum standards. However, WUTC has no jurisdiction over public crossings in first-class cities.[a]

Regulation, Statute, Guideline	Description
Local	
Longview Municipal Code 11.40.080 (Railroad Trains Not to Block Streets)	Prohibits trains from using any street or highway for a period of time longer than five minutes, except trains or cars in motion other than those engaged in switching activities.

Notes:
[a] Per RCW 35.01.01, a first-class city is a city with a population of 10,000 or more at the time of organization or reorganization that has adopted a charter.
FRA = Federal Railroad Administration; FHWA = Federal Highway Administration; USC = United States Code; RCW = Revised Code of Washington; WUTC = Washington Utilities and Transportation Commission

5.3.2 Study Area

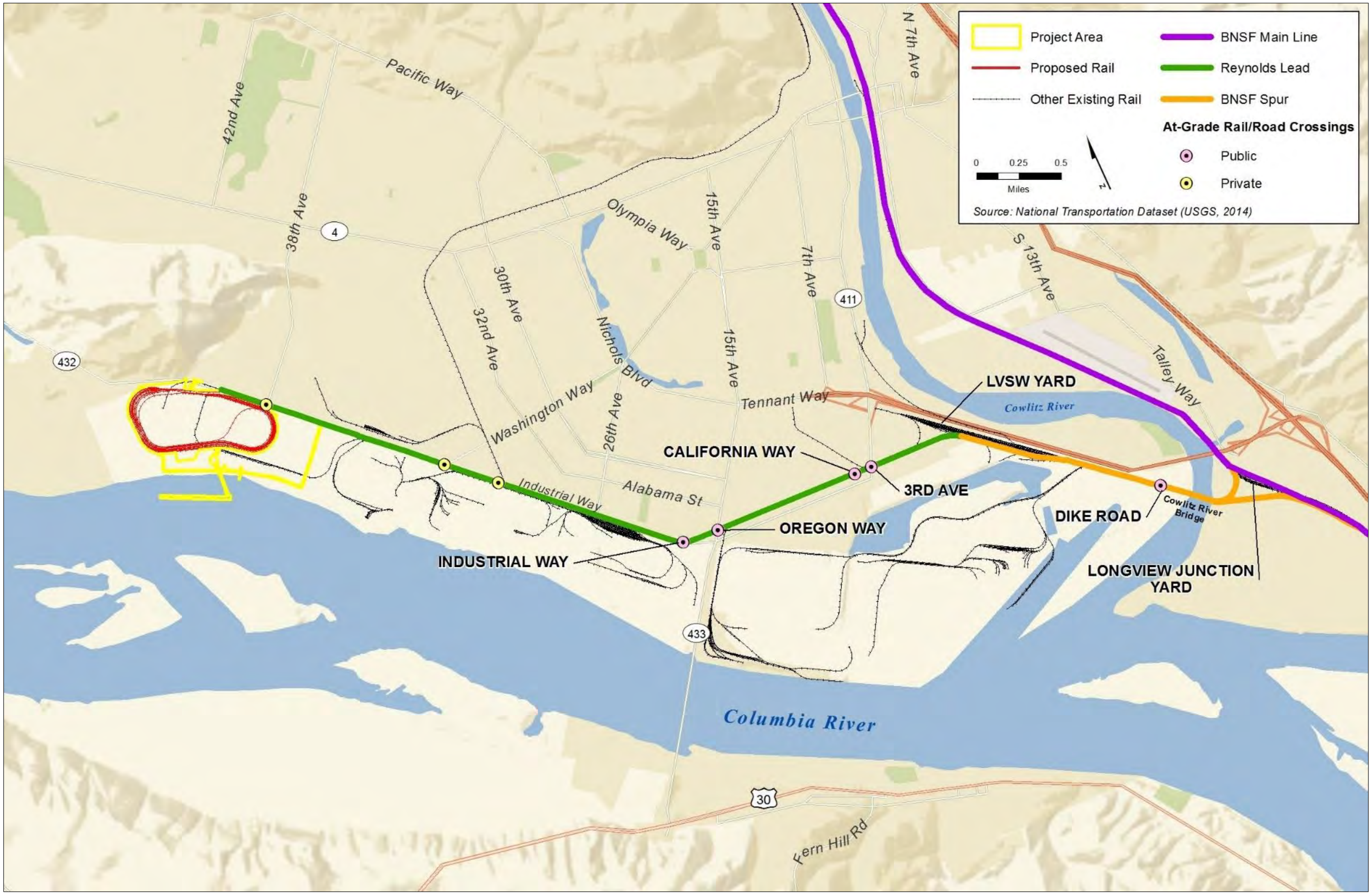
The study area for direct impacts is the project area as shown in Figure 5.3-1. The study area for indirect impacts is active public and private at-grade crossings within Cowlitz County on the Reynolds Lead and BNSF Spur, and all at-grade public crossings on the BNSF main line. A review of at-grade crossings of interest along the BNSF Railway Company (BNSF) main line in Washington State is also considered.

The following are the at-grade rail crossings along the Reynolds Lead and BNSF Spur in the study area. The United States Department of Transportation (USDOT) crossing identification number for the public at-grade rail crossings is also provided. Figure 5.3-1 illustrates the location of these rail crossings.[1]

- Project area access at 38th Avenue, south of Industrial Way (State Route [SR] 432)
- Weyerhaeuser access at Washington Way, south of Industrial Way
- Weyerhaeuser North Pacific Paper Corporation (NORPAC) access, south of Industrial Way
- Industrial Way, west of Oregon Way (SR 433) (101806G)
- Oregon Way, north of the Industrial Way/Oregon Way intersection (101805A)
- California Way, north of Industrial Way (101821J)
- 3rd Avenue (SR 432), north of the 3rd Avenue/Industrial Way intersection (101826T)
- Dike Road, south of Tennant Way (101791U)

[1] The intersections upstream from each of the eight at-grade railroad crossings along the Reynolds Lead and BNSF Spur were also analyzed during the peak vehicle traffic hour.

Figure 5.3-1. Reynolds Lead and BNSF Spur Study Crossings



The following are the at-grade crossings along the BNSF main line in Cowlitz County. Figure 5.3-2 illustrates the locations of these rail crossings.

- Taylor Crane Road, west of Barnes Drive in Castle Rock (092481X)
- Cowlitz Street, west of Pioneer Avenue in Castle Rock (092476B)
- Cowlitz Gardens Road, west of Pacific Avenue in Kelso (092466V)
- Mill Street, west of 1st Avenue in Kelso (092458D)
- S River Road, west of Pacific Avenue in Kelso (092457W)
- Toteff Road/Port Road in Kalama (092446J)
- W Scott Avenue, east of Pekin Road in Woodland (092437K)
- Davidson Avenue, east of Pekin Road in Woodland (092435W)
- Whalen Road, east of Kuhnis Road in Woodland (092434P)

A review of at-grade rail crossings of interest identified by the Washington State Department of Transportation (WSDOT) on the routes for Proposed Action-related trains beyond Cowlitz County was also conducted. These statewide study crossings are at-grade state highway crossings or at-grade crossings near state highways.[2]

5.3.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on vehicle transportation associated with the construction and operation of the Proposed Action and No-Action Alternative. For additional information, see the *SEPA Vehicle Transportation Technical Report* (ICF and DKS Associates 2017).

5.3.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on vehicle transportation in the study area.

- Data provided by the Washington Utilities and Transportation Commission (WUTC)
- USDOT Grade Crossing Inventory, Federal Railroad Administration (FRA)
- *SR 432 Highway Improvements and Rail Realignment Study* (Cowlitz-Wahkiakum Council of Governments 2014)
- Traffic volume data provided in local studies and field-collected data
- Data and information provided by the Applicant

[2] Figure 5.3-6 in Section 5.3.5, *Impacts*, illustrates the statewide study crossings.

Figure 5.3-2. BNSF Main Line in Cowlitz County Study Crossings

5.3.3.2 Impact Analysis

This section describes the methods used to evaluate the potential impacts on vehicle transportation associated with the construction and operation of the Proposed Action and potential impacts under the No-Action Alternative.

The potential vehicle impacts addressed in this analysis include changes in average vehicle delay in a 24-hour period (average vehicle delay), changes in peak hour vehicle delay, changes in vehicle queuing, and changes to vehicle safety.[3] Unlike passenger trains, freight trains do not run on a schedule. Railroad companies evaluate each situation and dispatch trains based on a number of criteria, including available crew, number of cars, cost of fuel, and overall revenue. Analysis and projection of rail impact operations requires analyzing the rail traffic and identifying typical operations. Because freight trains do not operate on a schedule, the 24-hour average vehicle delay was analyzed to represent the potential typical delay for the average driver in the study area. The potential increase in vehicle delay during the PM (afternoon) peak hour was also analyzed to identify the highest potential vehicle delay impacts.

Analysis Scenarios

The following scenarios were analyzed.

- **2018 No-Action**. This scenario represents conditions in 2018 without construction of the coal export terminal. This scenario includes activities currently ongoing and planned for the existing bulk materials terminal in the Applicant's leased area, as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.
- **2018 Proposed Action Construction**. This scenario represents the construction year for the Proposed Action with the most construction vehicle traffic. It assumes the motor vehicle and train volumes from the 2018 No-Action scenario, but with the added traffic and rail growth related to construction of the Proposed Action. It also assumes the planned project area activities included in the 2018 No-Action scenario. This scenario considers that construction materials would be delivered by truck (Truck Delivery), or construction materials would be delivered by rail (Rail Delivery), as described in the *Construction Impact Analysis* subsection.
- **2028 No-Action**. This scenario represents conditions without the coal export terminal in 2028. It includes the motor vehicle and train volumes from the 2018 No-Action scenario, but with added growth to represent estimated 2028 traffic conditions. It also assumes planned bulk product terminal activities and potential future activities for the existing bulk product terminal.
- **2028 Proposed Action**. This scenario represents conditions during full operation of the coal export terminal in 2028. It includes the motor vehicle and train volumes from the 2028 No-Action scenario, but with the added traffic and train growth related to full operation of the coal export terminal. It also assumes the planned and potential expansion of bulk product terminal activities included in the 2028 No-Action scenario. This scenario considers the potential effect of current track infrastructure along the Reynolds Lead and BNSF Spur, and planned track infrastructure improvements along the Reynolds Lead and BNSF Spur.

[3] Indicates changes to vehicle safety conditions at study crossings.

The *SR 432 Highway Improvements and Rail Realignment Study* completed in September 2014 (Cowlitz-Wahkiakum Council of Governments 2014) developed various design concepts for rail and highway improvements to improve safety, mobility, congestion, and freight capacity. The top concept that emerged from this study was a grade-separated intersection at Industrial Way (SR 432)/Oregon Way (SR 433). This project, called the Industrial Way/Oregon Way Intersection Project and led by Cowlitz County Public Works, is currently in the preliminary design and National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA) environmental compliance phase to address traffic congestion, freight mobility, and safety issues at this intersection. In January 2017, one of two design options advanced to the Environmental Impact Statement would grade-separate the Reynolds Lead crossing with Oregon Way and Industrial Way.

Grade-separating the Industrial Way and Oregon Way at-grade rail crossings on the Reynolds Lead would eliminate motor vehicle delay and vehicle queuing at these two crossings. Trains on the Reynolds Lead would travel beneath these roadways without delaying motor vehicle traffic at these crossings. However, this project was not included in the vehicle transportation analysis because a preferred alternative for the intersection has not been identified and implementation by 2028 is not certain. The other concepts identified in the *Highway Improvements and Rail Realignment Study* were not included in the vehicle transportation analysis for the Proposed Action because funding for implementation has not been secured.

Construction Impact Analysis

The Applicant has identified three construction-material-delivery scenarios: delivery by truck, rail, or barge.

- **Truck.** If material is delivered by truck, it is assumed approximately 88,000 truck trips would be required over the construction period. Approximately 56,000 truck trips would be needed during the peak construction year.
- **Rail.** If material is delivered by rail, it is assumed approximately 700 train trips would be required over the construction period. Approximately two-thirds of the rail trips would occur during the peak construction year.
- **Barge.** If material is delivered by barge, it is assumed approximately 1,130 barge trips would be required over the construction period. Approximately two-thirds of the barge trips would occur during the peak construction year. Because the project area does not have an existing barge dock, the material would be off-loaded at an existing dock elsewhere on the Columbia River and transported to the project area by truck.

For the vehicle transportation analysis, the barge scenario is the same as the truck scenario because materials would be transferred from barge to truck and delivered to the project area by truck.

The analysis of potential vehicle transportation impacts during the peak construction year is based primarily on information provided by the Applicant, as documented in the *SEPA Vehicle Transportation Technical Report*, including the following.

- The amount of construction material that would be delivered to the project area via truck or rail (applicable to all three construction material delivery scenarios).
- Daily and peak hour estimates of construction truck traffic to deliver materials (applicable to the truck delivery and barge delivery construction material delivery scenarios).

- Average number of daily construction trains (applicable to the rail delivery construction material delivery scenario).
- Daily and peak hour construction worker vehicle traffic (applicable to all three construction material delivery scenarios).

Operations Impact Analysis

Full operations of the coal export terminal (up to 44 million metric tons of coal per year) would add 16 new daily train trips (8 loaded and 8 empty trains), each an average of 6,917 feet (approximately 1.3 miles) long.

Trip Generation and Trip Distribution

Based primarily on estimates provided by the Applicant, approximately 135 employees would be needed to operate the coal export terminal; 50% of the employees would exit and 30% would enter the project area during the PM peak hour.

Construction and operations traffic generated by the Proposed Action was distributed onto the transportation network based on current traffic patterns in the study area. For the construction materials delivered to the project area by truck, it is assumed that 75% of the trucks would arrive from the east using 3rd Avenue, and 25% from the south along Oregon Way. For the construction workers and terminal employees, it is assumed that 60% of the traffic would arrive from the north using Washington Way (35%) and Oregon Way (25%), 15% from the south along Oregon Way, 20% from the east along 3rd Avenue, and 5% from the west along Industrial Way.

Baseline and Future Volumes

The following describes the baseline and future vehicular and train volumes.

Vehicles

Vehicle traffic count data were obtained from recent studies and field-collected turning movement counts. Where recent traffic count data were unavailable, average daily traffic volumes were obtained from the FRA or WUTC databases and estimated PM peak hour traffic volumes were derived from the average daily traffic volumes. Hourly traffic volumes over 3 days were compared at select locations to identify a peak hour, which was identified as 4:00 p.m. to 5:00 p.m. The data also indicated that the PM peak hour (hereafter referred to as peak hour) represents approximately 10% of the daily traffic volumes. This factor was used to convert count data from peak hour to average daily traffic or vice versa.

Traffic volumes in 2018 and 2028 included a combination of background traffic, as well as growth associated with the Proposed Action. Year 2028 background traffic was estimated by developing a linear growth rate between existing and forecast traffic volumes at study crossings along the Reynolds Lead and BNSF Spur. The derived growth rates were applied to the collected count data to develop 2018 and 2028 No-Action scenario traffic volumes. At study crossings along the BNSF main line where forecast traffic volumes were unavailable, data suggest traffic volumes will increase 2% annually. For comparison purposes, a 2% annual growth rate was applied to expand older count data to reflect baseline traffic conditions in the *SR 432 Highway Improvements and Rail Realignment Study* completed in September 2014 (Cowlitz-Wahkiakum Council of Governments 2014). Therefore, at the study crossings along the BNSF main line in Cowlitz County, the 2% annual growth rate was applied to the collected count data to develop 2018 and 2028 No-Action scenario traffic volumes. Table 5.3-2 illustrates the average daily traffic and peak hour count data for all study crossings.

Trains

The following describes the methods to estimate train volumes on the Reynolds Lead and BNSF Spur, and the BNSF main line in Cowlitz County.

Reynolds Lead and BNSF Spur

Section 5.1, *Rail Transportation*, describes methods to estimate the types, numbers, and speed of trains on the Reynolds Lead and BNSF Spur in 2018 and 2028. As described in Section 5.1, *Rail Transportation*, Longview Switching Company (LVSW) plans to upgrade the Reynolds Lead and BNSF Spur as a separate action should it be warranted by increased rail traffic from current and future customers. Upgrades would include replacing ballast, ties, and rails to provide safer operation and allow increased train speed. LVSW would also install signals and upgrade traffic control and switching systems, which would increase capacity. Impacts with current track infrastructure and with planned track improvements are analyzed.

Table 5.3-2 illustrates the assumed number of trains for each scenario in 2018 and 2028. In summary, Table 5.3-2 shows the following.

- The 2018 Proposed Action Construction (Rail Delivery) scenario would add an average of 1.3 train trips per day in 2018 at study crossings on the Reynolds Lead and BNSF Spur. It was assumed that one Proposed Action-related train could travel during the peak hour. The 2018 Construction (Truck Delivery) scenario would not add any trains to the Reynolds Lead or BNSF Spur.
- The 2028 Proposed Action scenario would add 16 train trips per day to the Reynolds Lead and BNSF Spur. It was assumed that 1 Proposed Action-related train could travel during the peak hour with current track infrastructure on the Reynolds Lead and BNSF Spur, and up to 2 Proposed Action-related trains could travel during the peak hour with planned track infrastructure on the Reynolds Lead and BNSF Spur.

Table 5.3-2. Motor Vehicle and Train Volumes at Study Crossings by Scenario

Crossing Name (USDOT Crossing ID)	Time Period	2018 No-Action Scenario		2018 Proposed Action Construction (Truck Delivery) Scenario		2018 Proposed Action Construction (Rail Delivery) Scenario		2028 No-Action Scenario		2028 Proposed Action Scenario	
		Vehicle	Train	Vehicle	Train	Vehicle	Train	Vehicle	Train	Vehicle	Train
Reynolds Lead and BNSF Spur Study Crossings											
Project area access at 38th Avenue	Per Day	400	2.3	3,250	2.3	2,200	3.6	600	4.0	1,700	20.0
	Peak Hour	40	1	305	1	220	1	60	1	170	1 or 2
Weyerhaeuser access at Washington Way	Per Day	3,200	2.3	3,200	2.3	3,200	3.6	3,800	4.0	3,800	20.0
	Peak Hour	320	1	320	1	320	1	380	1	380	1 or 2
Weyerhaeuser NORPAC access	Per Day	700	2.3	700	2.3	700	3.6	950	4.0	950	20.0
	Peak Hour	70	1	70	1	70	1	95	1	95	1 or 2
Industrial Way-SR 432 (101806G)	Per Day	9,600	2.3	11,500	2.3	10,700	3.6	10,800	4.0	11,450	20.0
	Peak Hour	960	1	1,150	1	1,070	1	1,080	1	1,145	1 or 2
Oregon Way-SR 433 (101805A)	Per Day	13,400	2.3	13,850	2.3	13,850	3.6	16,750	4.0	17,000	20.0
	Peak Hour	1,340	1	1,385	1	1,385	1	1,675	1	1,700	1 or 2
California Way (101821J)	Per Day	3,750	2.3	3,750	2.3	3,750	3.6	5,450	4.0	5,450	20.0
	Peak Hour	375	1	375	1	375	1	545	1	545	1 or 2
3rd Avenue-SR 432 (101826T)	Per Day	16,300	2.3	17,300	2.3	16,650	3.6	20,000	4.0	20,200	20.0
	Peak Hour	1,630	1	1,730	1	1,665	1	2,000	1	2,020	1 or 2
Dike Road (101791U)	Per Day	400	7.1	400	7.1	400	8.4	400	7.1	400	23.1
	Peak Hour	40	1	40	1	40	1	40	1	40	1 or 2
BNSF Main Line in Cowlitz County Study Crossings											
Taylor Crane Road in Castle Rock (092481X)	Per Day	50	55.1	50	55.1	50	56.1	50	72.7	50	80.7
	Peak Hour	5	3.9	5	3.9	5	4.9	5	4.6	5	6.6
Cowlitz Street in Castle Rock (092476B)	Per Day	1,200	55.1	1,200	55.1	1,200	56.1	1,450	72.7	1,450	80.7
	Peak Hour	120	3.9	120	3.9	120	4.9	145	4.6	145	6.6

Crossing Name (USDOT Crossing ID)	Time Period	2018 No-Action Scenario		2018 Proposed Action Construction (Truck Delivery) Scenario		2018 Proposed Action Construction (Rail Delivery) Scenario		2028 No-Action Scenario		2028 Proposed Action Scenario	
		Vehicle	Train	Vehicle	Train	Vehicle	Train	Vehicle	Train	Vehicle	Train
Cowlitz Gardens Road in Kelso (092466V)	Per Day	700	55.1	700	55.1	700	56.1	850	72.7	850	80.7
	Peak Hour	70	3.9	70	3.9	70	4.9	85	4.6	85	6.6
Mill Street in Kelso (092458D)	Per Day	2,550	55.1	2,550	55.1	2,550	56.1	3,000	72.7	3,000	80.7
	Peak Hour	255	3.9	255	3.9	255	4.9	300	4.6	300	6.6
S River Road in Kelso (092457W)	Per Day	1,850	55.1	1,850	55.1	1,850	56.1	2,200	72.7	2,200	80.7
	Peak Hour	185	3.9	185	3.9	185	4.9	220	4.6	220	6.6
Toteff Road/ Port Road in Kalama (092446J)	Per Day	1,200	55.1	1,200	55.1	1,200	56.1	1,450	72.7	1,450	80.7
	Peak Hour	120	3.9	120	3.9	120	4.9	145	4.6	145	6.6
W Scott Avenue in Woodland (092437K)	Per Day	2,650	55.1	2,650	55.1	2,650	56.1	3,100	72.7	3,100	80.7
	Peak Hour	265	3.9	265	3.9	265	4.9	310	4.6	310	6.6
Davidson Avenue in Woodland (092435W)	Per Day	2,000	55.1	2,000	55.1	2,000	56.1	2,350	72.7	2,350	80.7
	Peak Hour	200	4	200	3.9	200	4.9	235	4.6	235	6.6
Whalen Road in Woodland (092434P)	Per Day	1,550	55.1	1,550	55.1	1,550	56.1	1,800	72.7	1,800	80.7
	Peak Hour	155	3.9	155	3.9	155	4.9	180	4.6	180	6.6

Notes:
USDOT = U.S. Department of Transportation

BNSF Main Line in Cowlitz County

Section 5.1, *Rail Transportation*, describes methods to estimate the types, numbers, and speed of trains on the BNSF main line in Cowlitz County in 2018 and 2028. Table 5.3-2 illustrates the assumed number of trains for each scenario in 2018 and 2028.

In summary the table states the following.

- The 2018 Proposed Action Construction (Rail Delivery) scenario would add an average of 0.65 Proposed Action-related train trips per day at study crossings on the BNSF main line in Cowlitz County. It was assumed that one Proposed Action-related train could travel during the peak hour. The 2018 Construction (Truck Delivery) scenario would not add any trains to the BNSF main line in Cowlitz County.
- The 2028 Proposed Action scenario would add 8 Proposed Action-related train trips per day at study crossings on the BNSF main line in Cowlitz County (8 loaded trains would arrive from the south and 8 unloaded trains would travel to the north). It was assumed that up to 2 Proposed Action-related trains could travel during the peak hour.

Railroad Crossing Performance Measures

The following performance measures were used to determine vehicle transportation impacts and are defined below.

- **Level of service impact:** A study crossing or upstream intersection that would operate below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year.
- **Queuing impact:** An estimated queue length that would extend from a study crossing or upstream intersection that exceeds available storage length (to the nearest intersection) under the Proposed Action that would not otherwise exceed the available storage length under the No-Action scenario from the same year.
- **Vehicle safety impact:** A study crossing that would have a predicted accident probability above 0.075 accident per year under the Proposed Action that would be at or below 0.075 accident per year under the No-Action Alternative.

The following section provides additional information on the performance measures.

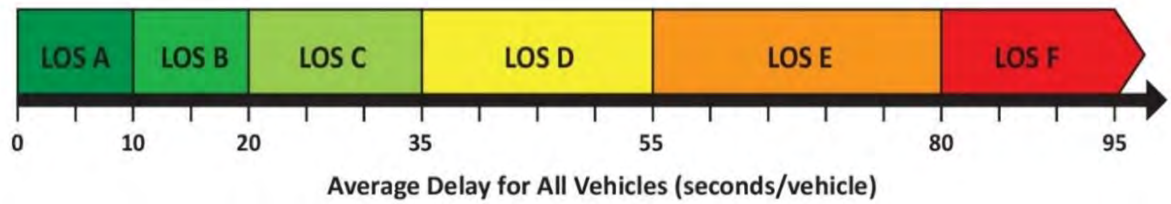
Vehicle Delay

The following describes vehicle delay measures, including level of service, and vehicle queuing.

Level of Service

Level of service represents a “report card” rating (A through F) based on the delay experienced by vehicles at an intersection, or in this case, a railroad crossing, as shown in Figure 5.3-3. Levels of service A, B, and C indicate conditions where traffic moves without substantial delays. Levels of service D and E represent progressively worse operating conditions. Level of service F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity.

Figure 5.3-3. Level of Service



The Cities of Kelso (2015), Longview, and Woodland (2005) and WSDOT (2010) use a peak hour standard of level of service D or better.[4] The transportation element of the *City of Longview Comprehensive Plan* (December 2006) defines a capacity deficiency on arterial segments as a volume-to-capacity ratio of 0.85 or higher (representing a generalized level of service of D or worse). As a conservative approach, level of service D (average delay for all vehicles equal to or less than 55 seconds) was applied as a standard to all study crossings and upstream intersections, regardless of the street functional classification or jurisdiction.

A level of service impact was defined as a study crossing or upstream intersection that operates below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year.

For the peak hour analysis, the traffic operating conditions at study crossings were determined based on the *2000 Highway Capacity Manual* (Transportation Research Board 2000) methods for signalized intersections (the at-grade railroad crossings were assumed to be pretimed traffic signals). The average vehicle delay in the peak hour (in seconds) for a study crossing was determined based on the peak hour number of trains, average train length, train speed, and peak hour traffic volume in both directions. This average vehicle delay in seconds per vehicle was then converted to the applicable level of service designation (Figure 5.3-3) for comparison with the No-Action scenario. For the upstream intersections, traffic operating conditions for the peak hour were determined based on the *2010 Highway Capacity Manual* (Transportation Research Board 2010) methods for signalized and unsignalized intersections. Level of service and delay were reported as the intersection average for signalized intersections and as the worst performing stop-controlled approach for unsignalized intersections.

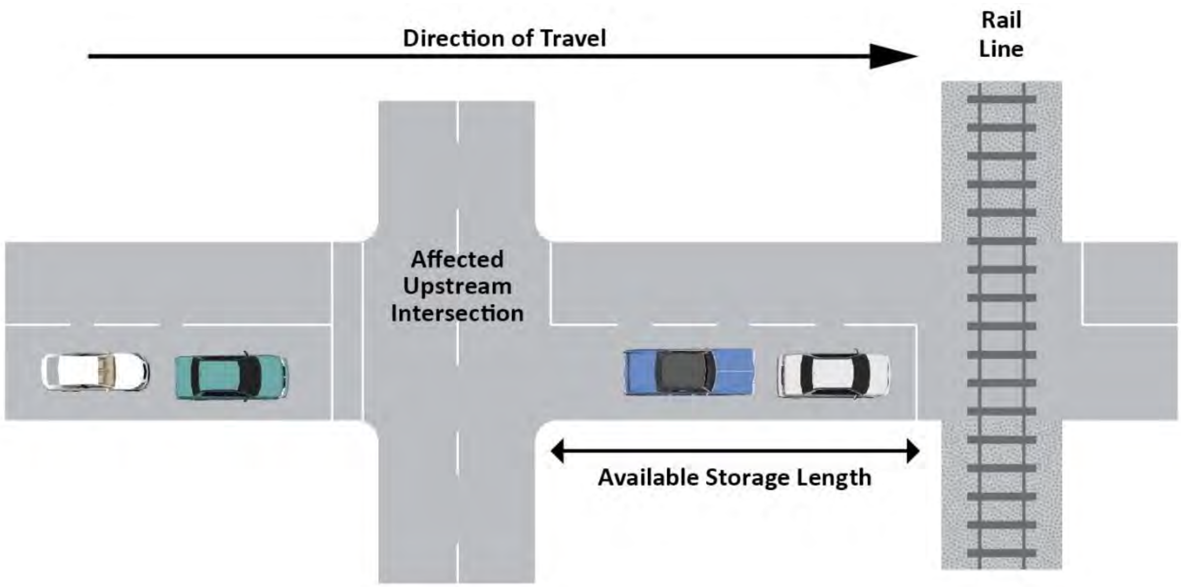
The same methods for the peak hour analysis were used for the 24-hour vehicle delay analysis for study crossings. The average delay per vehicle in a 24-hour period (in seconds) for a study crossing was determined based on the average number of daily trains, average train length, train speed, and average daily traffic volumes in both directions. This average vehicle delay in seconds per vehicle was then converted to the applicable level of service (Figure 5.3-3) to provide a qualitative measure of vehicle delay at study crossings in a 24-hour period for comparison with the No-Action scenario.

[4] Study crossings are also in the Cities of Castle Rock and Kalama. These cities have not adopted a peak hour standard.

Vehicle Queuing

Each study grade crossing has a storage length to store vehicles when the crossing is blocked. The available storage length is the distance between the crossing and the next intersection (upstream intersection), as shown in Figure 5.3-4. As vehicles queue, the distance that vehicles extend back from the crossing while waiting at a blocked crossing increases.

Figure 5.3-4. Vehicle Queuing



A queuing analysis was conducted using SimTraffic™ 8, which estimated the 95th percentile vehicle queue lengths, or the queue length that would not be exceeded in 95% of the queues formed during the peak hour.

A vehicle queuing impact was defined as a queue that would extend from a study crossing that would exceed the available storage length (to an upstream intersection) under the Proposed Action that would not otherwise exceed the available storage under the No-Action scenario for the same year.

Vehicle Safety

Vehicle safety at the Cowlitz County study crossings and statewide crossings was analyzed by estimating future accident frequency and the corresponding predicted interval between accidents with and without the addition of Proposed Action-related rail traffic. The FRA GradeDec.Net model was used to analyze vehicle safety (Federal Railroad Administration 2016). This model accounts for accident history and frequency of trains at existing at-grade crossings, traffic volumes, existing safety devices, and other factors to determine the potential impacts from an increase in rail traffic. Other physical factors that affect the frequency of collisions at a crossing, such as sight distance, approach grade, or vehicle storage between the crossing and upstream intersections, are not captured in this model. This analysis provides a frame of reference for crossings by estimating accident probability, but does not identify these crossings as safe or unsafe.

The *Railroad-Highway Grade Crossing Handbook–Revised Second Edition* (Federal Highway Administration 2007) indicates that grade separation or active devices with automatic gates should be considered as options when certain criteria are met. One criterion is whether the expected accident frequency, as calculated by the U.S. Department of Transportation Accident Prediction formula, exceeds 0.075 per year for active devices with automatic gates, and 0.50 per year for grade separation. For the purpose of this analysis, a vehicle safety impact was defined as a study crossing that would have an expected accident frequency above 0.075 per year under the Proposed Action that would be at or below 0.075 per year under the No-Action scenario.

5.3.4 Existing Conditions

This section describes the existing environmental conditions in the study area related to vehicle transportation that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

5.3.4.1 Study Crossing Characteristics

Table 5.3-3 provides vehicle and train traffic information at the study crossings on the Reynolds Lead and BNSF Spur. This table also presents information for vehicle and train traffic at the study crossings on the BNSF main line in Cowlitz County. Roadway characteristics are also listed, including roadway functional classifications and number of lanes at the crossing. The following describes vehicle safety at study crossings and emergency service providers that would use the study crossings.

Vehicle Safety

Ten years of collision records (2003 to 2013) for the at-grade railroad crossings along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County were obtained from FRA and WSDOT databases. The data identified one vehicle collision involving a train in the study area, at the Washington Way crossing, just south of the Industrial Way intersection. The crossing is ungated, and located less than 50 feet from Industrial Way. The collision involved a vehicle stopped at the traffic signal, beyond the stop bar and on the track, getting struck by a train. The collision resulted in property damage only.

On the BNSF main line, a collision involving a vehicle and a train occurred at the Cowlitz Gardens Road crossing. This crossing is gated and located less than 75 feet from Pacific Avenue. The collision involved an inoperable vehicle stopped on the tracks, getting struck by a train. The collision resulted in property damage only.

Emergency Services

The Cowlitz 2 Fire & Rescue District, the Longview Fire Department, and American Medical Response (AMR) provide emergency medical services and fire protection for the project area. Figure 5.3-5 illustrates the location of fire stations in the vicinity of the project area. Emergency medical service providers from multiple jurisdictions use the Lewis and Clark Bridge for emergency services and to access medical facilities. The Lewis and Clark Bridge/SR 433 is the only practical route for emergency service providers between medical facilities in Kelso-Longview and Rainier and other Oregon communities.

Table 5.3-3. Study Crossing Characteristics

Study Crossing Name (USDOT Crossing ID)	Roadway				Railroad (Trains)	
	Estimated AADT	Functional Classification[a]	Lanes	Protection[b]	Crossings per Day	Average Speed (mph)[c]
Reynolds Lead and BNSF Spur Study Crossings						
Project area access at 38th Avenue	400	Private	2	None	2.3	5 (freight)
Weyerhaeuser access at Washington Way	3,200	Private	4	None	2.3	8 (freight)
Weyerhaeuser NORPAC access	700	Private	2	None	2.3	10 (freight)
Industrial Way- SR 432 (101806G)	9,600	Principal Arterial	2	Overhead Lights	2.3	10 (freight)
Oregon Way- SR 433 (101805A)	13,400	Principal Arterial	4	Gates/ Overhead Lights	2.3	10 (freight)
California Way (101821J)	3,750	Minor Arterial	2	Overhead Lights	2.3	8 (freight)
3rd Avenue- SR 432 (101826T)	16,300	Principal Arterial	4	Gates/ Overhead Lights	2.3	8 (freight)
Dike Road (101791U)	400	Local	2	Overhead Lights	7.1	10 (freight)
BNSF Main Line in Cowlitz County Study Crossings						
Taylor Crane Road in Castle Rock (092481X)	50	Local	2	None	55.1	50 (freight); 50 (passenger)
Cowlitz Street in Castle Rock (092476B)	1,200	Minor Collector	2	Gates/ Overhead Lights	55.1	50 (freight); 50 (passenger)
Cowlitz Gardens Road in Kelso (092466V)	700	Local	2	Gates	55.1	60 (freight); 75 (passenger)
Mill Street in Kelso (092458D)	2,550	Local	2	Gates	55.1	40 (freight); 40 (passenger)
S River Road in Kelso (092457W)	1,850	Local	2	Gates	55.1	40 (freight); 40 (passenger)
Toteff Road/ Port Road in Kalama (092446J)	1,200	Local	2	Gates/ Overhead Lights	55.1	60 (freight); 79 (passenger)
W Scott Avenue in Woodland (092437K)	2,650	Minor Arterial	2	Gates	55.1	60 (freight); 75 (passenger)

	Roadway				Railroad (Trains)	
Study Crossing Name (USDOT Crossing ID)	**Estimated AADT**	**Functional Classification[a]**	**Lanes**	**Protection[b]**	**Crossings per Day**	**Average Speed (mph)[c]**
Davidson Avenue in Woodland (092435W)	2,000	Minor Arterial	2	Gates	55.1	60 (freight); 75 (passenger)
Whalen Road in Woodland (092434P)	1,550	Minor Arterial	2	Gates	55.1	60 (freight); 75 (passenger)

Notes:

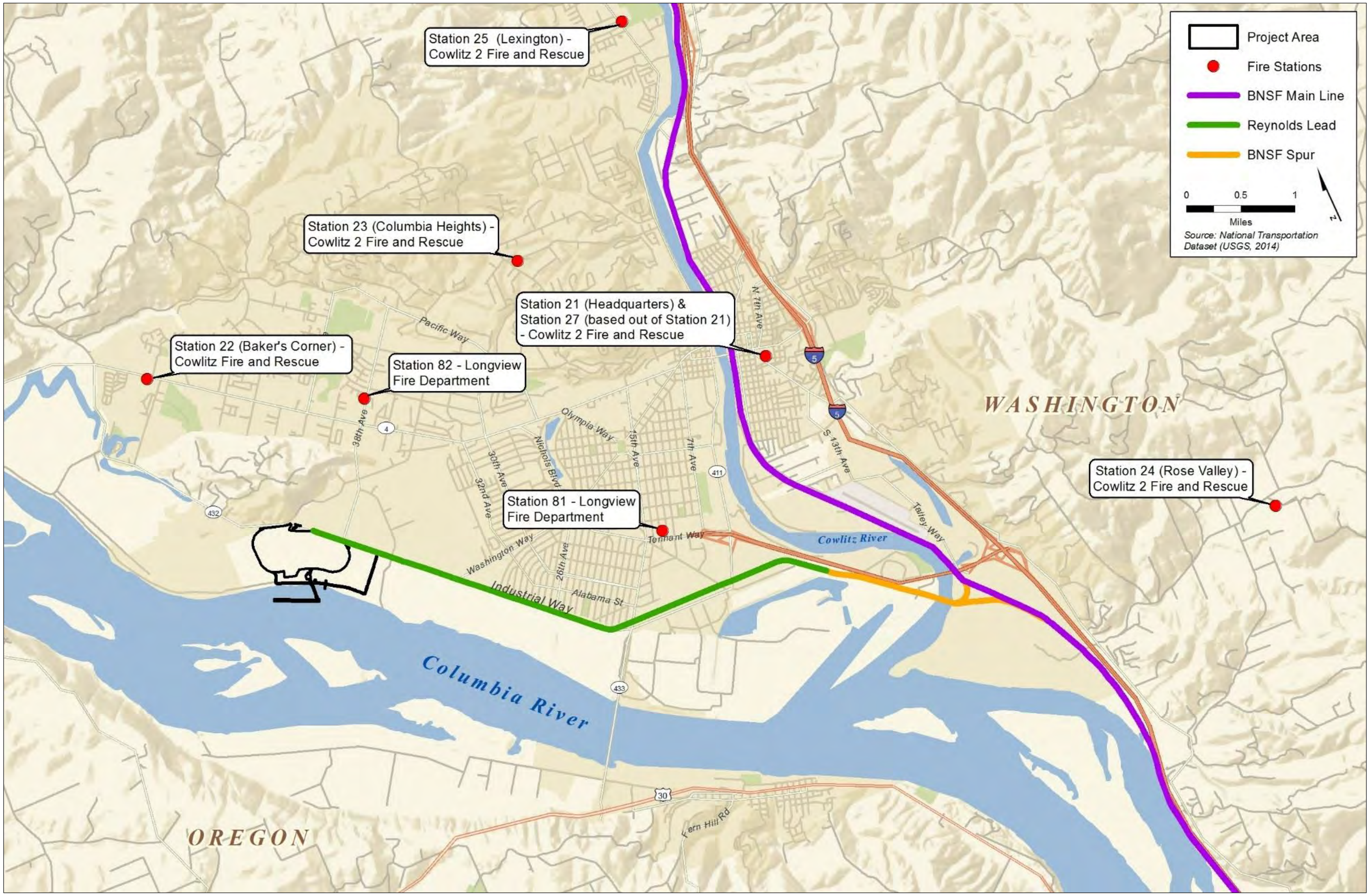
[a] Source: City of Longview 2015; City of Kelso 2015; City of Castle Rock 2006; City of Woodland 2005.

[b] Source: Field observations.

[c] Source: ICF and Hellerworx 2017 (for the Reynolds Lead and BNSF Spur study crossings) and Washington Utilities and Transportation Commission 2015 (for BNSF main line in Cowlitz County crossings).

USDOT = U.S. Department of Transportation; AADT = annual average daily traffic; mph = miles per hour

Figure 5.3-5. Fire Stations in the Kelso-Longview Area



Cowlitz 2 Fire & Rescue

Cowlitz 2 Fire & Rescue serves approximately 34,000 citizens in the City of Kelso and unincorporated Cowlitz County and responds to approximately 4,100 calls per year (Cowlitz 2 Fire & Rescue 2015).

The district is staffed by approximately 120 full-time and volunteer members in five active fire stations, two of which are staffed with full-time emergency medical technicians (EMTs) and paramedic firefighters. Volunteer firefighter EMTs also respond on an on-call basis.

The district includes the following stations and equipment.

- **Station 21 (Headquarters for Cowlitz 2 Fire & Rescue).** Station 21 is staffed with 27 full-time personnel and includes a main response fire engine, a volunteer/reserve-ready fire engine, an advanced life support ambulance, and a reserve-ready advanced life support ambulance. This station includes three rotating shifts 24 hours a day, 7 days a week, 365 days a year. During each shift, at least eight personnel staff a variety of equipment.
- **Station 22 (Baker's Corner).** Station 22 is a volunteer station and includes a main response fire engine, a 3,000-gallon water supply, an emergency medical services (EMS)/wildland response vehicle, and an EMS response ambulance. This is an all-volunteer station that serves as crucial first response before additional help arrives.
- **Station 23 (Columbia Heights).** Station 23 is staffed full time by firefighter/EMT, firefighter/paramedic, and volunteer personnel and includes a main response fire engine, an EMS/wildland response vehicle, an advanced life support ambulance, a basic life support ambulance, and a hazardous materials response apparatus.
- **Station 24 (Rose Valley).** Station 24 is a volunteer station and includes a main response fire engine and an EMS/wildland response vehicle. This is an all-volunteer station that serves as crucial first response before additional help arrives.
- **Station 25 (Lexington).** Station 25 is a volunteer station and includes an initial response fire engine, a 2,000-gallon water supply, and an EMS/wildland response vehicle. This is an all-volunteer station that serves as crucial first response before additional help arrives.
- **Station 27 (Kelso).** Station 27 is a volunteer station and includes a main response fire engine and a 3,000-gallon water supply. This is an all-volunteer station that backs up personnel at Station 21 (Headquarters) when they are on calls.

Longview Fire Department

The Longview Fire Department serves approximately 36,000 citizens spread over 14.7 square miles of urban/suburban development. The department is staffed with 39 full-time EMT/firefighters, and four paramedic/firefighters. Paramedic transport service is provided within the City of Longview by AMR, a private provider. The Longview Fire Department responds to approximately 4,500 calls per year from two fire stations (City of Longview 2015).

The department includes the following stations and equipment.

- **Station 81.** Station 81 is located at 740 Commerce Avenue in Longview. A minimum of six line firefighters and one battalion chief are on duty 24 hours a day. The station includes an aerial ladder truck and a fire engine.
- **Station 82.** Station 82 is located at 2355 38th Avenue in Longview. It has a minimum of three line firefighters on duty 24 hours a day, with a maximum of five firefighters. The station primarily responds to the west end of Longview; however, it responds as backup to Station 81, as needed. The station includes one fire engine.

American Medical Response

AMR is a private ambulance company that provides emergency and nonemergency medical transport service for the study area. AMR staffs approximately 35 paramedics and EMTs, and handles an average of 7,500 calls annually (American Medical Response 2015). The medical transport vehicles are based out of a facility near the Cowlitz Highway intersection with Long Avenue.

5.3.4.2 Washington State

As described in Section 5.1, *Rail Transportation*, loaded Proposed Action-related BNSF trains from the Powder River Basin are expected to travel from the Idaho border east of Spokane to the project area in Cowlitz County via Pasco, the Columbia River Gorge, and Vancouver. Empty Proposed Action-related trains are expected to return via Stampede Pass, Pasco, and Spokane. Loaded and empty UP trains to and from the Powder River Basin and Uinta Basin would travel north from Vancouver and return via the same route. WSDOT provided a list of statewide crossings of interest during the scoping process for the Proposed Action for crossings along the expected rail routes. These statewide study crossings are at-grade state highway crossings or at-grade crossings near state highways. Table 5.3-4 summarizes the existing conditions at these study crossings, including existing estimated annual average daily traffic, freight and passenger train speed, and estimated number of trains per day. Figure 5.3-6 illustrates the geographic location of these crossings.

5.3.5 Impacts

This section describes the potential direct and indirect impacts related to vehicle transportation that would result from construction and operation of the Proposed Action and No-Action Alternative. For more detailed information, see the *SEPA Vehicle Transportation Technical Report*.

5.3.5.1 Proposed Action

This section describes the potential impacts that could occur in the study areas as a result of construction and operation of the Proposed Action. During the peak year of construction, the Proposed Action would add an average 1.3 train trips per day to the Reynolds Lead, BNSF Spur, and BNSF main line. The trains would be approximately 6,219 feet long (1.2 miles long). At full operations, the Proposed Action would add 16 unit train trips per day (8 loaded and 8 empty trains) to the Reynolds Lead, BNSF Spur, and BNSF main line. Each unit train would consist of 125 rail cars and 4 locomotives and be approximately 6,917 feet long (1.3 miles long).

Table 5.3-4. Existing Conditions at Statewide Study Crossings

#[a]	Study Crossing	USDOT/FRA Crossing ID[b]	Railroad Milepost[b]	Estimated 2015 AADT[c]	Estimated Freight Train Speed (mph)[b]	Estimated Passenger Train Speed (mph)[b]	Estimated 2015 Trains/Day[d]
Spokane County							
1	Idaho Road	066236B	53.4	2,650	60	70	70
2	McKinzey Road	066239W	56.2	2,600	60	79	70
3	Harvard Road	066240R	56.8	8,400	60	79	70
4	Barker Road	066244T	58.9	13,900	60	79	70
5	Flora Road	066245A	59.9	6,600	60	79	70
6	Pines Road-SR 27	066367E	62.9	29,700	60	79	70
7	University Road	066371U	64.0	2,450	60	79	70
8	Park Road	066377K	66.1	16,400	60	79	70
9	Pine Street	066315M	15.8	750	35	35	39
10	F Street/Cheney-Spangle	065970L	16.4	3,650	35	35	39
11	Cheney-Plaza Road	065971T	16.8	1,050	35	35	39
Adams County							
12	Paha Packard Road	089665U	74.2	100	60	79	39
13	Kahlotus Road	089670R	80.6	300	60	79	39
14	1st Street	089672E	81.8	500	50	60	39
15	Wilbur/City Road	089673L	82.1	550	50	60	39
Franklin County							
16	Eltopia Road W	089699N	129.1	350	60	79	39
17	Sagemoor Road	089700F	134.2	450	60	79	39
Benton County							
18	East 3rd Avenue	090031U	229.2	2,800	35	35	34
19	Dague Road-East 25th Ave	090035W	227.5	800	60	60	34
20	Perkins Road	090036D	226.4	700	60	60	34
21	Bowles Road	090038S	225.7	2,450	60	60	34
22	Cochran Road	090039Y	225.0	100	60	60	34
23	Finley Road	090040T	224.5	3,100	60	60	34
24	Whitcomb Island	090061L	171.9	50	60	60	34

#[a]	Study Crossing	USDOT/FRA Crossing ID[b]	Railroad Milepost[b]	Estimated 2015 AADT[c]	Estimated Freight Train Speed (mph)[b]	Estimated Passenger Train Speed (mph)[b]	Estimated 2015 Trains/Day[d]
Klickitat County							
25	Maple Street	090169V	75.7	850	45	45	34
26	Walnut Street	090168N	75.5	1,400	45	45	34
27	South Dock Grade Road	090164L	74.2	100	55	60	34
Skamania County							
28	Indian Crossing	090159P	65.9	100	55	60	34
29	Home Valley Park	090155M	59.6	50	55	60	34
30	Cemetery Xing	090151K	54.7	50	N/A	N/A	34
31	Russell Avenue	090148C	53.9	350	20	20	34
32	Skamania Landing/Butler Rd	090135B	43.3	100	60	60	34
33	Walker/Skamania Landing	090134U	42.6	150	60	60	34
34	St Cloud Road	090133M	39.7	N/A	N/A	N/A	34
Lewis County							
35	SR 506-7th Street	092484T	77.8	1,400	50	75	50
36	Walnut Street (SR505/603)	092493S	71.6	2,850	50	50	50
37	E Locust Street	092519S	54.2	2,800	40	40	50
38	Main Street	092520L	54.1	2,650	40	40	50
39	Maple Street	092521T	53.8	3,500	40	40	50
40	Big Hanaford Road	092524N	51.8	2,550	10	N/A	50
Yakima County							
41	Jones Road East	099178A	79.4	1,600	55	40	7
42	Indian Church	104523U	63.8	2,450	55	40	7
43	SR241/Reservation	104534G	52.2	2,850	55	40	7
44	Gulden Road	104536V	51.1	300	55	40	7

Notes:

[a] See Figure 5.3-6 for study crossing location.

[b] Source: Washington Utilities Transportation Commission 2015.

[c] Source: Washington Utilities Transportation Commission 2015; Federal Railroad Administration 2015.

[d] Washington State Department of Transportation 2014. Linear extrapolation of 2010 and 2035 projected train traffic to 2015 volumes.

USDOT = U.S. Department of Transportation; FRA = Federal Railroad Administration; AADT = annual average daily traffic; Est. = estimated; mph = miles per hour; N/A = data not available

Figure 5.3-6. Statewide Study Crossings

Construction—Direct Impacts

Approximately 180 peak hour motor vehicle trips are estimated as a result of peak construction activities with the rail delivery scenario, or an estimated 260 peak hour motor vehicle trips with the truck delivery scenario. These vehicles would access the project area via the private driveway opposite 38th Avenue or a new driveway on Industrial Way. Parking would be provided for construction workers in the Applicant's leased area. Vehicle transportation in the project area during construction would not have a direct impact on vehicle transportation outside the project area.

Construction—Indirect Impacts

Construction of the Proposed Action would result in the following indirect impacts.

Cause Vehicle Delays from Rail Construction Traffic

The rail delivery scenario would add an average of 1.3 train trips per day during the peak construction year (2018). One Proposed Action-related construction train would take between 8 and 9 minutes to pass through the study crossings along the Reynolds Lead and BNSF Spur, and approximately 2 minutes along the BNSF main line in Cowlitz County.

The following describes the estimated 24-hour average and peak hour vehicle delay during the peak construction year.

24-Hour Average Vehicle Delay

All study crossings would operate at level of service A in 2018, indicating the low impact on 24-hour average daily vehicle delay from Proposed Action-related construction trains at the study crossings on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County.

Peak Hour Vehicle Delay

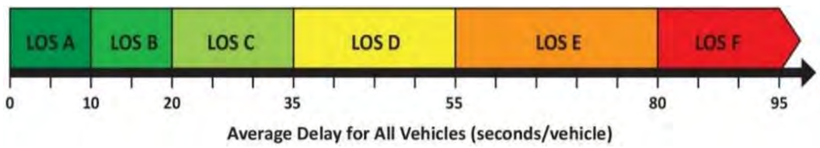
Table 5.3-5 illustrates the estimated peak hour vehicle delay at the study crossings and upstream intersections on the Reynolds Lead and BNSF Spur by scenario in 2018.

Table 5.3-5. Estimated Peak Hour Level of Service at Reynolds Lead and BNSF Spur Study Crossings and Upstream Intersections in 2018 by Scenario

		Proposed Action Construction	
Study Crossing/Upstream Intersection	**No-Action Scenario**	**Truck Delivery Scenario**	**Rail Delivery Scenario[a]**
Study Crossing			
Project Area Access at 38th Avenue	B	B	**F**
Weyerhaeuser Access at Washington Way	A	A	D
Weyerhaeuser NORPAC Access	A	A	D
Industrial Way	A	A	D
Oregon Way	A	A	D
California Way	A	A	**E**
3rd Avenue	B	B	**E**
Dike Road	C	C	C

Study Crossing/Upstream Intersection	No-Action Scenario	Proposed Action Construction	
		Truck Delivery Scenario	Rail Delivery Scenario[a]
Upstream Intersection			
Industrial Way/38th Avenue	A	B	B
Industrial Way/Washington Way	B	B	B
Industrial Way/NORPAC Access	C	C	C
Industrial Way/Weyerhaeuser Access	C	C	C
Industrial Way/Oregon Way	C	D	D
Industrial Way/California Way	C	C	C
3rd Avenue/Industrial Way	B	B	B
Dike Road/Frontage Road	A	A	A

Notes:



[a] The Proposed Action would result in this level of service only if a Proposed Action-related construction train travels during the peak hour. **Bolded, shaded gray** values indicate a vehicle level of service impact (a study crossing or upstream intersection that operates below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year).

Table 5.3-5 illustrates the following.

- The truck delivery scenario would have the same vehicle delay (level of service) at the study crossings as the No-Action scenario. The truck delivery scenario would not have a level of service impact at the study crossings on the Reynolds Lead and BNSF Spur.
- If a Proposed Action-related construction train travels during the peak hour, three study crossings, one of which would access the project area, would operate below level of service D. The rail delivery scenario would result in a level of service impact at these three study crossings on the Reynolds Lead if a Proposed Action-related construction train travels during the peak hour.

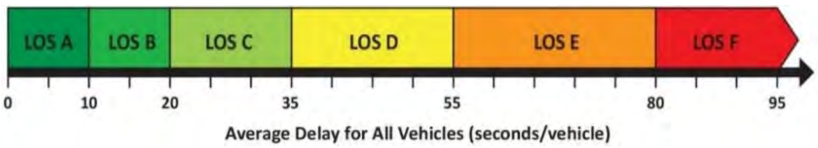
Table 5.3-6 illustrates the estimated peak hour vehicle delay at the BNSF main line study crossings in Cowlitz County by scenario.

Table 5.3-6. Estimated Peak Hour Level of Service at BNSF Main Line Study Crossings in 2018 by Scenario

Study Crossing	No-Action Scenario	Proposed Action Construction	
		Truck Delivery Scenario	Rail Delivery Scenario[a]
Taylor Crane Road (Castle Rock)	A	A	C
Cowlitz Street (Castle Rock)	A	A	C
Cowlitz Gardens (Kelso)	A	A	B
Mill Street (Kelso)	B	B	C
S River Road (Kelso)	B	B	C

		Proposed Action Construction	
Study Crossing	No-Action Scenario	Truck Delivery Scenario	Rail Delivery Scenario[a]
Toteff Road/Port Road (Kalama)	A	A	B
W Scott Avenue (Woodland)	A	A	B
Davidson Avenue (Woodland)	A	A	B
Whalen Road (Woodland)	A	A	B

Notes:



[a] The Proposed Action would result in this level of service only if a Proposed Action-related construction train travels during the peak hour.

Table 5.3-6 illustrates the following.

- The truck delivery scenario would have the same vehicle delay (level of service) as the No Action scenario. The truck delivery scenario would not have a level of service impact at study crossings on the BNSF main line in Cowlitz County.
- If a Proposed Action-related construction train travels during the peak hour, all study crossings would operate at a level of service C or better. The rail delivery scenario would not have a level of service impact at study crossings on the BNSF main line in Cowlitz County.

Queuing

Increased vehicle delay from trains blocking grade crossings can affect upstream intersections. As vehicles begin to queue while waiting for the crossing to open, roadway congestion can affect upstream intersections. Table 5.3-7 illustrates estimated 2018 peak hour queue lengths if a Proposed Action-related construction train travels during the peak hour. Table 5.3-7 also illustrates the queue length under the No-Action scenario for comparison.

Two queue lengths under the rail delivery scenario would exceed the available storage length that would not be exceeded under the No-Action scenario if a Proposed Action-related construction train travels during the peak hour as described below.

- Vehicles traveling southbound on Oregon Way would queue on Oregon Way at the Reynolds Lead crossing if a Proposed Action-related construction train travels during the peak hour. Because the queue length on Oregon Way would exceed the available storage length (extend to Alabama Street) that would not be exceeded under the No-Action scenario, the rail delivery scenario would result in a queuing impact at this crossing.
- On the BNSF main line, vehicles traveling westbound on S River Road would queue approximately 100 feet if a Proposed Action-related construction train travels during the peak hour, which is 40 feet more than the available storage length. Because the queue would exceed the available storage length that would not be exceeded under the No-Action scenario, the rail delivery scenario would result in a queuing impact at this crossing.

Table 5.3-7. Estimated 2018 Peak Hour Vehicle Queue Lengths by Scenario[a]

Study Crossing	Road Movement[b]	2018 No-Action	2018 Truck	2018 Rail	Upstream Intersection Affected by Queue from Study Crossing	Intersection Movement[c]	2018 No-Action	2018 Truck	2018 Rail
		Estimated Study Crossing Queue Length (feet)					Estimated Upstream Intersection Queue Length (feet)		
Reynolds Lead and BNSF Spur Study Crossings									
Project Area Access at 38th Avenue	NB	40	1,180	1,640	Industrial Way/ 38th Avenue	WBL	20	80	60
	SB	**40**	**80**	**60**		EBR	20	20	60
Weyerhaeuser Access at Washington Way	NB	100	180	500	Industrial Way/ Washington Way	WBL	80	100	120
						EBR	**120**	**160**	**40**
	SB	**140**	**160**	**120**		SBT	40	40	80
Weyerhaeuser NORPAC Access	NB	40	40	120	Industrial Way/ NORPAC Access	WBL	20	20	20
	SB	**20**	**20**	**20**		EBR	20	20	20
Industrial Way	NB	**400**	**400**	**460**	Industrial Way/ Weyerhaeuser	EBL	140	140	240
	SB	280	320	980		NBT	280	280	360
Oregon Way	NB	**800**	**1,180**	**1,760**	Industrial Way/ Oregon Way	NBT	260	260	2,240
						EBL	**180**	**240**	**240**
						WBR	**560**	**960**	**100**
	SB	160	160	**880**	Oregon Way/ Alabama Street	EBR	N/A	N/A	100
						WBL			100
						SBT			180
California Way	NB	80	80	220	Industrial Way/ California Way	N/A	N/A	N/A	N/A
	SB	120	140	520					
3rd Avenue	NB	**1,080**	**1,120**	**2,100**	3rd Avenue/ Industrial Way	WBR	80	80	120
						NBT	**720**	**760**	**1,740**
					Industrial Way/ California Way	SBL	120	140	140
	SB	260	260	1,040		NBR	60	60	80
						EBT	480	520	1,500
Dike Road	NB	40	40	60	None	N/A	N/A	N/A	N/A
	SB	40	40	40					

Study Crossing	Road Movement[b]	2018 No-Action	2018 Truck	2018 Rail	Upstream Intersection Affected by Queue from Study Crossing	Intersection Movement[c]	2018 No-Action	2018 Truck	2018 Rail
		Estimated Study Crossing Queue Length (feet)					Estimated Upstream Intersection Queue Length (feet)		
BNSF Main Line in Cowlitz County Study Crossings									
Taylor Crane Road (Castle Rock)	EB	20	20	20	None	N/A	N/A	N/A	N/A
	WB	20	20	20					
Cowlitz Street (Castle Rock)	EB	40	40	40	None	N/A	N/A	N/A	N/A
	WB	40	40	60					
Cowlitz Gardens Road (Kelso)	EB	20	20	20	None	N/A	N/A	N/A	N/A
	WB	20	20	20					
Mill Street (Kelso)	EB	80	80	100	None	N/A	N/A	N/A	N/A
	WB	100	100	120					
S River Road (Kelso)	EB	40	40	80	Pacific Avenue/ S River Road	SBR	N/A	N/A	40
	WB	60	60	**100**		NBL			40
Toteff Road/Port Road (Kalama)	EB	40	40	40	None	N/A	N/A	N/A	N/A
	WB	40	40	60					
W Scott Avenue (Woodland)	EB	40	40	60	None	N/A	N/A	N/A	N/A
	WB	100	100	120					
Davidson Avenue (Woodland)	EB	60	60	60	None	N/A	N/A	N/A	N/A
	WB	40	40	40					
Whalen Road (Woodland)	EB	40	40	40	None	N/A	N/A	N/A	N/A
	WB	60	60	60					

Notes:

[a] **Shaded gray** values indicate a study crossing or upstream intersection queue that would exceed the available storage for the scenario. **Shaded black** values indicate a Proposed Action queuing impact.

[b] Roadway movement approaching the rail crossing; NB = northbound; SB = southbound; EB = eastbound; WB = westbound

[c] Movement at upstream intersection affected by queue from rail crossing; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; EBL= eastbound left; EBR= eastbound right; EBT= eastbound through; WBL= westbound left; WBR= westbound right; WBT= westbound through

Cause Delay to Emergency Vehicle Response

The vehicle delay analysis in the previous subsection illustrates how the average vehicle delay for all vehicles, including emergency vehicles, would be affected during the peak construction year. Average vehicle and peak hour delay would increase for all vehicles under the rail delivery scenario because trains transporting construction materials would operate on the Reynolds Lead, BNSF Spur, and BNSF main line. Total gate downtime is estimated to be up to 12 minutes longer per day at public crossings along the Reynolds Lead and BNSF Spur, and up to 2 minutes longer per day along the BNSF main line in Cowlitz County compared to the 2018 No-Action scenario. In a 24-hour period, the Proposed Action would increase the probability of an emergency response vehicle being delayed by 1% at study crossings along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County.

The impact on emergency vehicle response would depend on the location of the origin and destination of the response incident in relation to the at-grade crossings along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County. The potential for a Proposed Action related construction train to affect emergency response would also depend on whether the dispatched emergency vehicle would need to cross the rail line and the availability of alternative routes if a Proposed Action-related construction train occupies the crossings at the time of the call.

Increase Predicted Accident Probability at Study Crossings

The FRA GradeDec.Net model was used to calculate the predicted accident probability at the study crossings in Cowlitz County. The analysis concluded that while the accident probability would increase if construction materials are delivered by rail, none of the study crossings in Cowlitz County would be above the benchmark used for the analysis (0.075 accident per year) with existing crossing safety protection; therefore, Proposed Action-related trains would not have a vehicle safety impact. The *SEPA Vehicle Transportation Technical Report* provides additional information.

Operations—Direct Impacts

Approximately 135 employees would be needed to operate the coal export terminal at full operations in 2028. Operations would occur 24 hours per day, 7 days per week. Approximately 50% of the employee-related vehicle trips would exit the project area and 30% of the employee-related vehicle trips would enter the project area during the peak hour, which would result in 41 inbound and 68 outbound trips during the peak hour.

These vehicles would access the project area via the existing private driveway opposite 38th Avenue or at a new driveway on Industrial Way approximately 0.5 mile west of the existing 38th Avenue driveway.

Vehicle transportation in the project area during construction would not have a direct impact on vehicle transportation outside the project area.

Operations—Indirect Impacts

All vehicle transportation impacts during operations would occur outside the project area and, therefore, are considered indirect impacts.

Cowlitz County

The Proposed Action would add 16 train trips per day at study crossings along the Reynolds Lead and BNSF Spur. The Proposed Action would add 8 train trips per day at study crossings along the BNSF main line in Cowlitz County (8 trains would travel from the south to Longview Junction and 8 trains would travel to the north from Longview Junction). One Proposed Action-related train could travel during the peak hour on the Reynolds Lead and BNSF Spur with current track infrastructure on the Reynolds Lead and BNSF Spur. Up to 2 Proposed Action-related trains could travel during the peak hour on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County with planned track infrastructure.

This section presents vehicle delay impacts with current and planned track infrastructure on the Reynolds Lead and BNSF Spur. Planned track improvements would increase the average train speed from:

- 8 miles per hour (mph) to 10 mph at the Weyerhaeuser access crossing opposite Washington Way
- 10 mph to 15 mph at the Weyerhaeuser NORPAC access crossing
- 10 mph to 20 mph at the Industrial Way and Oregon Way crossings
- 8 mph to 15 mph at the California Way and 3rd Avenue crossings.

Improvements would not change average train speed at the crossing opposite 38th Avenue and the Dike Road crossing.

Operation of the Proposed Action would result in the following indirect impacts.

Cause Vehicle Delays from Rail Traffic

The following describes the vehicle delay from Proposed Action-related trains.

A Proposed Action-related train would take between 8 and 10 minutes to pass at the public study crossings along the Reynolds Lead with current track infrastructure, and between 4 and 6 minutes at the public study crossings with planned track infrastructure. Proposed Action-related trains would take about 8 minutes at the Dike Road crossing along the BNSF Spur, and around 2 minutes to pass at the study crossings along the BNSF main line in Cowlitz County. Overall, the 16 Proposed Action-related trains would increase the total gate downtime over 130 minutes during an average day at the public study crossings along the Reynolds Lead and BNSF Spur, and up to 20 minutes during an average day along the BNSF main line in Cowlitz County. The following describes the 24-hour average and peak hour vehicle delay from Proposed Action-related trains.

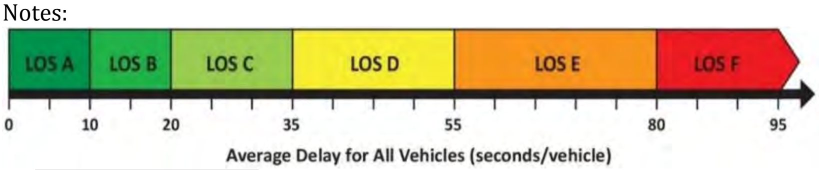
24-Hour Average Vehicle Delay

Table 5.3-8 shows the estimated 24-hour average delay per vehicle and level of service at the study crossings along the Reynolds Lead and BNSF Spur in 2028.

Table 5.3-8. Estimated 24-Hour Average Level of Service at Reynolds Lead and BNSF Lead Study Crossings in 2028 by Scenario[a]

		Proposed Action	
Study Crossing	**No-Action**	**Current Track Infrastructure**	**Planned Track Infrastructure**
Project Area Access at 38th Avenue	A	**F**	**F**
Weyerhaeuser Access at Washington Way	A	D	C
Weyerhaeuser NORPAC Access	A	C	B
Industrial Way	A	C	A
Oregon Way	A	C	A
California Way	A	D	B
3rd Avenue	A	D	B
Dike Road	A	C	C

Notes:



[a] **Bolded, shaded gray** values indicate a vehicle level of service impact (a study crossing that operates below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year).

As shown, most study crossings would operate at or above level of service D with current track infrastructure on the Reynolds Lead, and at or above level of service C with planned track infrastructure on the Reynolds Lead. The exception is the study crossing opposite 38th Avenue, which would operate at level of service F. The Proposed Action would result in a level of service impact at this crossing.

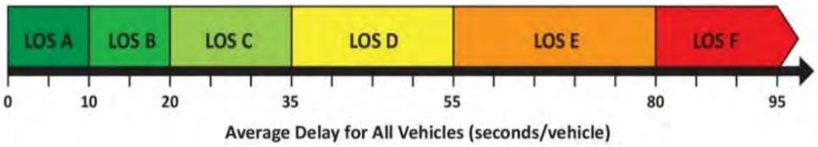
Table 5.3-9 shows the estimated 24-hour average delay per vehicle and level of service at the study crossings along the BNSF main line in Cowlitz County. All study crossings would operate at a level of service A with Proposed Action-related trains, indicating a low impact on the 24-hour average daily vehicle delay from Proposed Action-related trains. Consequently, the Proposed Action would not result in a level of service impact at the study crossings on the BNSF main line in Cowlitz County.

Table 5.3-9. Estimated 24-Hour Level of Service at BNSF Main Line Study Crossings in 2028 by Scenario

	Scenario	
Study Crossing	**2028 No-Action**	**2028 Proposed Action**
Taylor Crane Road (Castle Rock)	A	A
Cowlitz Street (Castle Rock)	A	A
Cowlitz Gardens (Kelso)	A	A
Mill Street (Kelso)	A	A
S River Road (Kelso)	A	A
Toteff Road/Port Road (Kalama)	A	A
W Scott Avenue (Woodland)	A	A

Study Crossing	Scenario	
	2028 No-Action	**2028 Proposed Action**
Davidson Avenue (Woodland)	A	A
Whalen Road (Woodland)	A	A

Notes:



[a] The Proposed Action would result in this level of service only if two Proposed Action-related trains travel during the peak hour.

Peak Hour Vehicle Delay

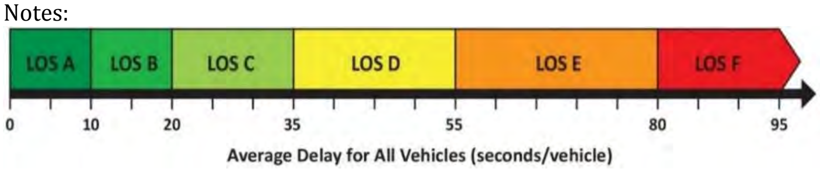
Table 5.3-10 illustrates the estimated peak hour vehicle delay at the study crossings and upstream intersections on the Reynolds Lead and BNSF Spur in 2028 by scenario. As shown, the increased rail activity associated with the Proposed Action would increase average delay per vehicle during the peak hour, with forecasted level of service dropping below D at six of the study crossings on the Reynolds Lead with current track infrastructure.

Table 5.3-10. Estimated Peak Hour Level of Service at Reynolds Lead and BNSF Spur Study Crossings and Upstream Intersections in 2028 by Scenario[a]

Study Crossing/Upstream Intersection	No-Action	Proposed Action		
		Current Track Infrastructure: 1 Peak Hour Train	**Planned Track Infrastructure: 1 Peak Hour Train**	**Planned Track Infrastructure: 2 Peak Hour Trains**
Study Crossing				
Project Area Access at 38th Avenue	B	**F**	**F**	**F**
Weyerhaeuser Access at Washington Way	A	**E**	D	**E**
Weyerhaeuser NORPAC Access	A	D	B	C
Industrial Way (SR 432)	A	**E**	B	C
Oregon Way (SR 433)	A	**E**	B	C
California Way	A	**E**	C	D
3rd Avenue	B	**F**	C	**E**
Dike Road	C	D	D	**E**
Upstream Intersections				
Industrial Way/38th Avenue	B	B	B	B
Industrial Way/Washington Way	B	B	B	B
Industrial Way/NORPAC Access	C	C	C	C
Industrial Way/Weyerhaeuser Access	C	C	C	C

		Proposed Action		
Study Crossing/Upstream Intersection	**No-Action**	**Current Track Infrastructure: 1 Peak Hour Train**	**Planned Track Infrastructure: 1 Peak Hour Train**	**Planned Track Infrastructure: 2 Peak Hour Trains**
Industrial Way/Oregon Way	D	D	D	D
Industrial Way/California Way	C	C	C	C
3rd Avenue/Industrial Way	C	C	C	C
Dike Road/Frontage Road	A	A	A	A

Notes:



[a] The Proposed Action would result in this level of service only if a Proposed Action-related train travels during the peak hour. **Bolded, shaded gray** values indicate a vehicle delay impact (a study crossing or upstream intersection that operates below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year).

Table 5.3-10 illustrates the following.

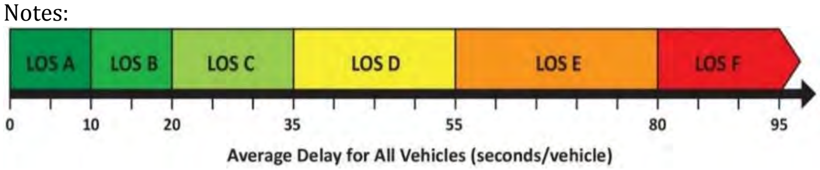
- If no track improvements are made to the Reynolds Lead to increase the average train speed from 10 mph to up to 25 mph and decrease gate downtime at the study crossings, the peak hour level of service would be below level of service D at six of the eight study crossings. The Proposed Action would result in a level of service impact at these six study crossings if a Proposed Action-related train travels during the peak hour.
- If track improvements are made to the Reynolds Lead, and one Proposed Action-related train travels during the peak hour, one study crossing (project area access at 38th Avenue) would operate below level of service D. The Proposed Action would result in a level of service impact at this study crossing if a Proposed Action-related train travels during the peak hour.
- If track improvements are made to the Reynolds Lead and 2 Proposed Action-related trains travel during the peak hour, four of the eight study crossings would operate below level of service D. The Proposed Action would result in a level of service impact at these four study crossings if two Proposed Action-related trains travel during the peak hour.

Table 5.3-11 illustrates the estimated peak hour vehicle delay at the BNSF main line study crossings in Cowlitz County in 2028 by scenario. The peak hour level of service at two study crossings (Mill Street and S River Road in Kelso) on the BNSF main line in Cowlitz County would operate below level of service D in 2028 if 2 Proposed Action-related trains travel during the peak hour. The Proposed Action would result in a level of service impact at these two study crossings if 2 Proposed Action-related trains travel during the peak hour.

Table 5.3-11. Estimated Peak Hour Level of Service at BNSF Main Line Study Crossings in 2028 by Scenario[a]

Study Crossing	No-Action	Proposed Action (2 Peak Hour Trains)
Taylor Crane Road (Castle Rock)	B	D
Cowlitz Street (Castle Rock)	C	D
Cowlitz Gardens (Kelso)	B	C
Mill Street (Kelso)	C	**E**
S River Road (Kelso)	C	**E**
Toteff Road/Port Road (Kalama)	B	C
W Scott Avenue (Woodland)	B	D
Davidson Avenue (Woodland)	B	D
Whalen Road (Woodland)	B	D

Notes:



[a] The Proposed Action would result in this level of service only if two Proposed Action-related trains travel during the peak hour. **Bolded, shaded gray** values indicate a vehicle level of service impact (a study crossing that operates below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year).

Vehicle Queuing

Increased vehicle delay from trains blocking grade crossings can have secondary impacts on nearby intersections. As vehicles begin to queue while waiting for the crossing to open, increased roadway congestion can affect upstream intersections. Table 5.3-12 illustrates the estimated 2028 peak hour queue length if a Proposed Action-related train travels during the peak hour. While the Proposed Action-related trains would increase queue lengths at study area crossings, queue lengths would already be exceeded at all of these crossings except the southbound movement at Oregon Way.

Table 5.3-12 illustrates estimated queue lengths with Proposed Action-related trains would be shorter with planned improvements to the Reynolds Lead because these improvements would allow Proposed Action-related trains to travel at higher speeds, which would decrease gate downtime at the study crossings. Four queue lengths would exceed the available storage length that would not be exceeded under the 2028 No-Action scenario and would represent a Proposed Action-related queuing impact.

- Vehicles traveling southbound on Oregon Way would queue at the Oregon Way crossing if a Proposed Action-related train travels during the peak hour. The estimated queue length (1,160 feet) would exceed available storage length (700 feet) with current track infrastructure on the Reynolds Lead. The estimated queue length would not exceed available storage length with planned track infrastructure on the Reynolds Lead.

Table 5.3-12. Estimated Vehicle Queue Lengths—2028 Operations (Peak Hour)[a]

Study Crossing Name	Road Movement[b]	2028 No-Action	2028 Current Infras.	2028 Planned Infras.	Upstream Intersection Affected by Queue from Study Crossing	Intersection Movement[c]	2028 No-Action	2028 Current Infras.	2028 Planned Infras.
		Estimated Queue Length at Study Crossing (feet)					Estimated Queue Length at Upstream Intersection (feet)		
Study Crossings along the Reynolds Lead and BNSF Spur									
Project Area Access at 38th Avenue	NB	40	1,380	1,180	Industrial Way/ 38th Avenue	WBL	20	**220**	**280**
	SB	**40**	**220**	**300**		EBR	20	80	60
Weyerhaeuser Access at Washington Way	NB	240	680	560	Industrial Way/ Washington Way	WBL	100	120	100
						EBR	**160**	**660**	**540**
	SB	**160**	**660**	**540**		SBT	40	140	90
Weyerhaeuser NORPAC Access	NB	60	180	120	Industrial Way/ NORPAC Access	WBL	20	20	20
	SB	**20**	**40**	**20**		EBR	20	20	20
Industrial Way	NB	**360**	**480**	**400**	Industrial Way/ Weyerhaeuser	EBL	160	360	160
	SB	280	1,300	540		NBT	240	360	280
Oregon Way	NB	**1,180**	**2,200**	**1,620**	Industrial Way/ Oregon Way	NBT	380	1,880	1,080
						EBL	**320**	**400**	**340**
						WBR	**940**	**1,960**	**1,380**
	SB	220	**1,160**	440	Oregon Way/ Alabama Street	EBR	N/A	260	N/A
						WBL		340	
						SBT		460	
California Way	NB	100	260	260	Industrial Way/ California Way	N/A	N/A	N/A	N/A
	SB	160	820	420					
3rd Avenue	NB	**1,300**	**3,220**	**1,380**	3rd Avenue/ Industrial Way	WBR	80	**240**	100
						NBT	**920**	**2,860**	1,020
					Industrial Way/ California Way	SBL	**160**	**200**	180
	SB	440	1,700	760		NBR	80	**140**	80
						EBT	700	2,620	780
Dike Road	NB	40	60	40	None	N/A	N/A	N/A	N/A
	SB	40	40	40					

Study Crossing Name	Road Movement[b]	2028 No-Action	2028 Current Infras.	2028 Planned Infras.	Upstream Intersection Affected by Queue from Study Crossing	Intersection Movement[c]	2028 No-Action	2028 Current Infras.	2028 Planned Infras.
		Estimated Queue Length at Study Crossing (feet)					Estimated Queue Length at Upstream Intersection (feet)		
Public At-Grade Crossings along the BNSF Main Line in Cowlitz County									
Taylor Crane Road (Castle Rock)	EB	20	20	20	None	N/A	N/A	N/A	N/A
	WB	20	20	20					
Cowlitz Street (Castle Rock)	EB	40	60	60	None	N/A	N/A	N/A	N/A
	WB	80	80	80					
Cowlitz Gardens Road (Kelso)	EB	20	40	40	None	N/A	N/A	N/A	N/A
	WB	20	40	40					
Mill Street (Kelso)	EB	100	180	180	None	N/A	N/A	N/A	N/A
	WB	160	240	240					
S River Road (Kelso)	EB	80	120	120	Pacific Avenue/S River Road	SBR	60	100	100
	WB	**120**	**180**	**180**		NBL	40	40	40
Toteff Road/Port Road (Kalama)	EB	40	60	60	None	N/A	N/A	N/A	N/A
	WB	60	80	80					
W Scott Avenue (Woodland)	EB	60	100	100	None	N/A	N/A	N/A	N/A
	WB	140	200	200					
Davidson Avenue (Woodland)	EB	100	120	120	None	N/A	N/A	N/A	N/A
	WB	60	80	80					
Whalen Road (Woodland)	EB	60	60	60	None	N/A	N/A	N/A	N/A
	WB	80	80	80					

Notes:

[a] **Shaded gray** values indicate a study crossing or upstream intersection with a queue that would exceed available storage for the scenario. **Shaded black** values indicate a Proposed Action-related impact.

[b] MVMT= Roadway movement approaching the rail crossing; NB = northbound; SB = southbound; EB = eastbound; WB = westbound

[c] MVMT= Movement at nearby intersection affected by queue from rail crossing; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; EBL = eastbound left; EBR = eastbound right; EBT = eastbound through; WBL = westbound left; WBR = westbound right; WBT = westbound through; N/A = data not available

- Vehicles making a left-turn from Industrial Way to the Applicant's leased area at 38th Avenue would queue on Industrial Way if a Proposed Action-related train travels during the peak hour. The estimated queue length (220 feet) would exceed the available storage length (180 feet) with current track infrastructure on the Reynolds Lead.
- Vehicles traveling westbound on Industrial Way to 3rd Avenue eastbound would be blocked by the queue on 3rd Avenue at the Reynolds Lead crossing if a Proposed Action-related train travels during the peak hour. The estimated queue length on Industrial Way (240 feet) would exceed the available storage length (170 feet) with current track infrastructure on the Reynolds Lead. The estimated queue length would not exceed available storage length with planned track infrastructure on the Reynolds Lead.
- Vehicles traveling northbound on California Way to Industrial Way eastbound would be blocked by the queue on 3rd Avenue at the Reynolds Lead crossing if a Proposed Action-related train travels during the peak hour. The estimated queue length on Industrial Way (140 feet) would exceed the available storage length (100 feet) with current track infrastructure on the Reynolds Lead. The estimated queue would not exceed available storage length with planned track infrastructure on the Reynolds Lead.

Cause Delay to Emergency Vehicle Response from Rail Traffic

The vehicle delay analysis in the previous subsection illustrates how the average vehicle delay for all vehicles, including emergency vehicles, would be affected during full export terminal operations in 2028. Average vehicle and peak hour delay would increase with the Proposed Action-related trains because more trains would operate at study crossings. Because vehicle delay would increase, emergency vehicle delay would also increase at grade crossings if an emergency vehicle was blocked at a grade crossing occupied by a Proposed Action-related train.

Proposed Action-related trains would increase total gate downtime over 130 minutes during an average day at the public study crossings along the Reynolds Lead and BNSF Spur, and up to 20 minutes during an average day at the study crossings along the BNSF main line in Cowlitz County.

In a 24-hour period, Proposed Action-related trains would increase the probability of emergency response vehicles being delayed by the following.

- 10% at study crossings along the Reynolds Lead and BNSF Spur with current track infrastructure
- 5% at study crossings along the Reynolds Lead and BNSF Spur with planned track infrastructure
- 1% at study crossings along the BNSF main line in Cowlitz County

The impact would depend on the location of the origin and destination of the response incident in relation to the at-grade crossings along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County. The potential for the Proposed Action-related trains to affect emergency response would also depend on whether the dispatched emergency vehicle would need to cross the rail line and the availability of alternative routes if a Proposed Action-related train occupies the crossing at the time of the call.

Increase Predicted Accident Probability at Study Crossings

The analysis concluded that while the accident probability would increase with Proposed Action-related trains (8 empty and 8 loaded trains per day), none of the study crossings on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County would be above the benchmark used for the analysis (0.075 accident per year) with existing crossing safety protection, and therefore Proposed Action-related trains would not have a vehicle safety impact at the study crossings in Cowlitz County. The *SEPA Vehicle Transportation Technical Report* provides additional information.

Statewide (Beyond Cowlitz County)

Increase Vehicle Delay on BNSF Main Line Routes beyond Cowlitz County

Table 5.3-13 shows the estimated baseline trains per day in 2028 at the statewide study crossings, and the estimated number of trains per day with Proposed Action-related trains in 2028. Figure 5.3-6 illustrates the rail routes and statewide study crossings.

As shown in Table 5.3-13, the Proposed Action would add 16 trains per day to the study crossings in Spokane, Adams, and Franklin Counties (between the Washington State-Idaho border east of Spokane and Pasco) and would increase daily rail traffic by approximately 13% and 22%, depending on location. Between Pasco and Cowlitz County (study crossings in Benton, Klickitat, and Skamania Counties), the Proposed Action would add 8 trains per day and increase daily rail traffic by approximately 14%. At the Lewis County study crossings, the Proposed Action would add 8 trains per day and increase daily rail traffic by approximately 10%, and between Auburn and Pasco (Yakima County study crossings), the Proposed Action would increase daily rail traffic by approximately 44%.

Vehicle delay at crossings would depend on the speed of the train, length of the train, the traffic volume at the crossing, and number of lanes at the crossing. The traffic volume at the crossing would vary depending on the time of day. Proposed Action-related trains would be approximately 1.3 miles long and would take the following approximate times to pass (see Table 5.3-13 for freight train speeds at study crossings).[5]

- 10 mph: 8.5 minutes
- 20 mph: 4.75 minutes
- 30 mph: 3.25 minutes
- 40 mph: 2.75 minutes
- 50 mph: 2.25 minutes
- 60 mph: 2.0 minutes

[5] Assumes gate closing 30 seconds before a Proposed Action-related train would pass through the crossing and 12 seconds after the Proposed Action-related train passes the crossing.

Table 5.3-13. 2028 Conditions at Statewide Study Crossings

#[a]	Study Crossing	Estimated Freight Train Speed[b]	2015 Estimated Trains Per Day[c]	2028 Projected Baseline Trains Per Day[c]	2028 Projected Trains Per Day with Proposed Action	2028 Increase in Trains Per Day with Proposed Action	Estimated Daily Gate Downtime from Proposed Action-Related Trains
Spokane County							
1	Idaho Road	60	70	106	122	13%	32 minutes
2	McKinzey Road	60	70	106	122	13%	32 minutes
3	Harvard Road	60	70	106	122	13%	32 minutes
4	Barker Road	60	70	106	122	13%	32 minutes
5	Flora Road	60	70	106	122	13%	32 minutes
6	Pines Road-SR 27	60	70	106	122	13%	32 minutes
7	University Road	60	70	106	122	13%	32 minutes
8	Park Road	60	70	106	122	13%	32 minutes
9	Pine Street	35	39	56	72	22%	48 minutes
10	F Street/Cheney-Spangle	35	39	56	72	22%	48 minutes
11	Cheney-Plaza Road	35	39	56	72	22%	48 minutes
Adams County							
12	Paha Packard Road	60	39	56	72	22%	16 minutes
13	Kahlotus Road	60	39	56	72	22%	16 minutes
14	1st Street	50	39	56	72	22%	36 minutes
15	Wilbur/City Road	50	39	56	72	22%	36 minutes
Franklin County							
16	Eltopia Road W	60	39	56	72	22%	16 minutes
17	Sagemoor Road	60	39	56	72	22%	16 minutes

#[a]	Study Crossing	Estimated Freight Train Speed[b]	2015 Estimated Trains Per Day[c]	2028 Projected Baseline Trains Per Day[c]	2028 Projected Trains Per Day with Proposed Action	2028 Increase in Trains Per Day with Proposed Action	Estimated Daily Gate Downtime from Proposed Action-Related Trains
Benton County							
18	East 3rd Avenue	35	34	48	56	14%	24 minutes
19	Dague Road-East 25th Avenue	60	34	48	56	14%	16 minutes
20	Perkins Road	60	34	48	56	14%	16 minutes
21	Bowles Road	60	34	48	56	14%	16 minutes
22	Cochran Road	60	34	48	56	14%	16 minutes
23	Finley Road	60	34	48	56	14%	16 minutes
24	Whitcomb Island	60	34	48	56	14%	16 minutes
Klickitat County							
25	Maple Street	45	34	48	56	14%	20 minutes
26	Walnut Street	45	34	48	56	14%	20 minutes
27	South Dock Grade Road	55	34	48	56	14%	17 minutes
Skamania County							
28	Indian Crossing	55	34	48	56	14%	17 minutes
29	Home Valley Park	55	34	48	56	14%	17 minutes
30	Cemetery Xing	N/A	34	48	56	14%	N/A
31	Russell Avenue	20	34	48	56	14%	38 minutes
32	Skamania Landing/Butler Road	60	34	48	56	14%	16 minutes
33	Walker/Skamania Landing	60	34	48	56	14%	16 minutes
34	St Cloud Road	N/A	34	48	56	14%	N/A

#[a]	Study Crossing	Estimated Freight Train Speed[b]	2015 Estimated Trains Per Day[c]	2028 Projected Baseline Trains Per Day[c]	2028 Projected Trains Per Day with Proposed Action	2028 Increase in Trains Per Day with Proposed Action	Estimated Daily Gate Downtime from Proposed Action-Related Trains
Lewis County							
35	SR 506-7th Street	50	50	73	81	10%	18 minutes
36	Walnut Street – SR 505/603	50	50	73	81	10%	18 minutes
37	E Locust Street	40	50	73	81	10%	22 minutes
38	Main Street	40	50	73	81	10%	22 minutes
39	Maple Street	40	50	73	81	10%	22 minutes
40	Big Hanaford Road	10	50	73	81	10%	68 minutes
Yakima County							
41	Jones Road East	55	7	11	19	42%	17 minutes
42	Indian Church	55	7	11	19	42%	17 minutes
43	SR241/Reservation	55	7	11	19	42%	17 minutes
44	Gulden Road	55	7	11	19	42%	17 minutes

Notes:
[a] See Figure 5.3-6 for study crossing location.
[b] Source: Washington Utilities Transportation Commission 2015.
[c] Washington State Department of Transportation 2014.
N/A = data not available

Vehicle delay would increase between the Washington State-Idaho border and Cowlitz County because the Proposed Action would add 8 or 16 trains daily (depending on location) to existing BNSF main line routes as shown in Figure 5.3-6. Proposed Action-related trains would also be longer (approximately 1.3 miles long) than the average BNSF freight train length (approximately 1.2 miles long). Vehicle delay at crossings would be higher if a Proposed Action-related train travels during a period with higher traffic volumes (such as the peak traffic hour) than a period with lower traffic volumes (such as at night).

Assuming Proposed Action-related trains travel at the same freight train speeds identified in Table 5.3-13, the five study crossings with the largest increase in daily vehicle delay compared to baseline 2028 conditions would be the following.

- Big Hanaford Road, Lewis County (8 Proposed Action-related trains daily, 10 mph)
- Pine Street, Spokane County (16 Proposed Action-related trains daily, 35 mph)
- F Street/Cheney-Spangle, Spokane County (16 Proposed Action-related trains daily, 35 mph)
- Cheney-Plaza Road, Spokane County (16 Proposed Action-related trains daily, 35 mph)
- Russel Avenue, Skamania County (8 Proposed Action-related trains daily, 20 mph)

When factoring in existing annual average daily traffic, the five study crossings with the largest increase in vehicle delay compared to the baseline 2028 conditions would be the following.

- Pines Road-SR 27, Spokane County (16 Proposed Action-related trains daily)
- Park Road, Spokane County (16 Proposed Action-related trains daily)
- Barker Road, Spokane County (16 Proposed Action-related trains daily)
- Harvard Road, Spokane County (16 Proposed Action-related trains daily)
- Flora Road, Spokane County (16 Proposed Action-related trains daily)

The combination of high annual average daily traffic and 16 Proposed Action-related trains per day would cause these study crossings to have the highest increase in vehicle delay per vehicle at study crossings.

Because the frequency of train traffic on BNSF routes would increase from Proposed Action-related trains, the probability of an increase in emergency response time at all at-grade crossings would also increase because at-grade crossings would be blocked more frequently. Table 5.3-13 illustrates the estimated gate downtime increase from Proposed Action-related trains. The vehicle delay impact would only occur if an emergency vehicle experienced a delay related to a Proposed Action-related train that would occur on average 8 or 16 times a day, depending on location. The potential for the Proposed Action-related train to affect emergency response would also depend on whether the dispatched emergency vehicle would need to cross the rail line and the availability of alternative routes if a Proposed Action-related train occupies the crossing at the time of the emergency call.

Increase Predicted Accident Probability beyond Cowlitz County

The FRA GradeDec.Net model was used to calculate the predicted accident probability at the statewide study crossings. The accident probability was estimated to be above the benchmark used for the analysis (0.075 accident per year) with existing crossing safety protection at three of the 44 statewide study crossings without Proposed Action-related trains.

Proposed Action-related trains would increase the accident probability at all at-grade crossings because 8 or 16 Proposed Action-related trains would pass at each crossing depending on location, and the Proposed Action would not change crossing protection at the study crossings. The accident probability analysis found that none of the statewide study crossings would have a predicted accident probability above the benchmark used for the analysis with Proposed Action-related trains that would be at or below the benchmark used for the analysis without Proposed Action-related trains. Therefore, Proposed Action-related trains would have not have a vehicle safety impact at the statewide study crossings. The *SEPA Vehicle Transportation Technical Report* provides additional information.

5.3.5.2 No-Action Alternative

Under the No Action Alternative, the Applicant would not construct the Proposed Action and impacts on vehicle transportation related to construction and operation of the Proposed Action would not occur. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses, including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

The following describes vehicle transportation conditions in 2018 and 2028. More detailed information is provided in the *SEPA Vehicle Transportation Technical Report*.

2018 Conditions

Vehicle transportation conditions in 2018 would be as follows.

- **24-hour average vehicle delay.** All study crossings would continue to operate at level of service A.
- **Peak hour vehicle delay.** All study crossings would operate level of service C or better (Tables 5.3-5 and 5.3-6).
- **Vehicle queuing.** Vehicle queues extending from six study crossings (all along the Reynolds Lead) would affect seven nearby intersections (Table 5.3-7). Vehicle queues at these intersections would exceed the available storage length at six approaches during the peak hour. These queues could potentially block other movements at upstream intersections and affect vehicle delay.
- **Vehicle safety.** Predicted accident probability was found to be below the benchmark used for the analysis with existing crossing safety protection at the study crossings.

2028 Conditions

The Applicant's anticipated planned growth would require approximately 2 trains per day on the Reynolds Lead and BNSF Spur by 2028 for approximately 4 trains per day. The following provides a summary of vehicle transportation conditions in 2028.

- **24-hour average vehicle delay.** All study crossings would operate at level of service A (Tables 5.3-8 and 5.3-9).
- **Peak hour vehicle delay.** Study crossings on the Reynolds Lead would operate at level of service A or B. Study crossings on the BNSF Spur and BNSF main line study crossings would operate at level of service B or C (Tables 5.3-10 and 5.3-11).
- **Vehicle queuing.** Vehicle queues extending from five study crossings (six along the Reynolds Lead and one along the BNSF main line) would affect eight nearby intersections. Vehicle queues at these intersections would exceed the available storage length at four approaches. These queues could potentially block other movements at these intersections (Table 5.3-12).
- **Vehicle safety.** Predicted accident probability was estimated to be below the benchmark used for the analysis with existing crossing safety protection at the study crossings.

5.3.6 Required Permits

No permits related to vehicle transportation would be required for the Proposed Action.

5.3.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to vehicle transportation from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

5.3.7.1 Voluntary Mitigation

The Applicant has committed to implementing the following measure to mitigate impacts on vehicle transportation.

- To mitigate the safety impacts from increased rail traffic, before beginning operations, the Applicant will fund installation of crossing gates at the Reynolds Lead crossing of Industrial Way and replace the existing active warning devices at the Reynolds Lead crossing of Industrial Way with shoulder-mounted light-emitting diode (LED) lights and gates.
- To mitigate the safety impacts from increased rail traffic, the Applicant will hold safety review meetings before beginning operations. Representatives of LVSW, City of Longview, WUTC, and other interested parties will be invited with the objectives of recommending safety improvements at the public crossings on the Reynolds Lead and determining what is necessary to create a quiet zone under federal rules.

5.3.7.2 Applicant Mitigation

The Applicant will implement the following mitigation measures to mitigate vehicle transportation impacts.

MM VT-1. Notify Local Agencies about Operations on the Reynolds Lead and BNSF Spur.

To address vehicle delay impacts at grade crossings on the Reynolds Lead and BNSF Spur, the Applicant will notify Cowlitz County, City of Longview, Cowlitz Fire District, City of Rainier (Oregon), Port of Longview, and Cowlitz-Wahkiakum Council of Governments before each identified operational stage (Stage 1a, Stage 1b, and Stage 2) that will change average daily rail traffic on the Reynolds Lead and BNSF Spur. The Applicant will prepare a memorandum to document the changes to average daily rail traffic. The memorandum will be submitted to these agencies at least 6 months before the change in average daily rail traffic.

5.3.7.3 Other Measures to Be Considered

Other measures that could be implemented to mitigate impacts on vehicle transportation that occur as a result of project-related elements outside the control of the Applicant, include the following. These measures are provided for consideration by agencies, organizations, and others for permitting or planning.

- To improve vehicle delay and safety, the Industrial Way/Oregon Way Intersection Project partners[6] should continue working to identify a preferred alternative to reduce vehicle delay and improve vehicle safety at the Industrial Way/Oregon Way intersection. Grade-separation of the intersection was recommended in the *SR 432 Highway Improvements and Rail Realignment Study* (Cowlitz-Wahkiakum Council of Governments 2014). These agencies should also continue to evaluate alternatives to reduce vehicle delay and improve vehicle safety at the other public at-grade crossings along the Reynolds Lead and BNSF Spur, including the concepts identified in the *SR 432 Highway Improvements and Rail Realignment Study*.
- Although the analysis of Proposed Action-related trains did not identify a vehicle safety impact at the California Way and Dike Road crossings, if determined to be necessary in the future, crossing gates should be considered at these two at-grade crossings to improve vehicle safety. Vehicle safety could be improved with crossing gates.

5.3.8 Unavoidable and Significant Adverse Environmental Impacts

With current track infrastructure on the Reynolds Lead and BNSF Spur, the following crossings would operate below level of service D if one Proposed Action-related train travels during the peak hour in 2028.

- Project area access opposite 38th Avenue (private crossing)
- Weyerhaeuser access opposite Washington Way (private crossing)
- Industrial Way

[6] The project partners include Cowlitz County, Cowlitz Economic Development Council, CWCOG, City of Longview, City of Kelso, and Port of Longview.

- Oregon Way
- California Way
- 3rd Avenue

With planned track improvements to the Reynolds Lead and BNSF Spur, the following crossings would operate below level of service D if two Proposed Action-related trains travel during the peak hour in 2028.

- Project area access opposite 38th Avenue (private crossing)
- Weyerhaeuser access opposite Washington Way (private crossing)
- 3rd Avenue
- Dike Road

On the BNSF main line in Cowlitz County, the following crossings would operate below level of service D if two Proposed Action-related trains travel during the peak hour in 2028.

- Mill Street
- South River Road

Increased gate downtime at these crossings from Proposed Action-related trains would increase the probability of emergency response vehicles being delayed.

While improvements for rail and road infrastructure have been proposed, it is unknown when these actions would be permitted and implemented. Therefore, the Proposed Action at full operations in 2028 could result in an unavoidable and significant adverse impact on vehicle transportation at the crossings listed above.

5.4 Vessel Transportation

The Columbia River navigation channel provides passage for deep-draft vessels, such as those related to the Proposed Action, to various ports along its shoreline. Vessel transportation in this area also includes recreational boating, passenger and ferry operations, and commercial and tribal fishing.

This section describes vessel transportation and safety in the study area. It then describes impacts on vessel transportation that could result from construction and operation of the Proposed Action and under the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

5.4.1 Regulatory Setting

Conventions, regulations, statutes, and guidelines relevant to vessel transportation are summarized in Table 5.4-1. Project vessels carry fuel oil for the purposes of engine propulsion. Therefore, this section also describes laws and regulations related to oil spill preparedness and response.

Table 5.4-1. Conventions, Regulations, Statutes, and Guidelines for Vessel Transportation

Convention, Regulation, Statute, Guideline	Description
International	
International Convention for the Safety of Life at Seas	Required safety standards for international ships for construction, navigation, life-saving, communications, and fire equipment. Also referred to as SOLAS.
International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)	International convention covering prevention of pollution of the marine environment by ships from operational or accidental causes.
International Ship and Port Facility Security Code	Security-related requirements for governments, port authorities, and shipping companies.
International Maritime Solid Bulk Cargoes Code	Procedures for bulk cargo carriers.
International Regulations for Preventing Collisions at Sea, 1972	Rules on safe navigation for vessels in international waters. Also referred to as 72 COLREGS.
Standards of Training, Certification, and Watchkeeping 1978 revised in 1995 and 2010	Standards for training, certification, and watchkeeping requirements for seafarers.
Federal	
International Navigational Rules Act of 1977 (Public Law 95-75; 91 Statute 308; 33 USC 1601-1608) (33 CFR 80-82)	Navigation rules for international waters.
Inland Navigational Rules Act of 1980 (Public Law 96-591) known as “Rules of the Road” (33 CFR 84-90)	Navigation rules for U.S. waters.
46 USC (Shipping) Chapter 33 (Inspection)	Consolidates the laws governing the inspection and certification of vessels by the U.S. Coast Guard.

Convention, Regulation, Statute, Guideline	Description
Ports and Waterways Safety Act of 1972 (33 USC 1221 et seq.)	Provides for the protection and "safe use" of a U.S. port (includes the marine environment, the navigation channel, and structures in, on, or immediately adjacent to the navigable waters) and for the protection against the degradation of the marine environment.
Maritime Transportation Security Act of 2002 (46 USC 701). Relevant regulations are 33 CFR 101 and 105.	Requirements for maritime security.
Federal Water Pollution Control Act, as amended by Section 4202 of the Oil and Pollution Act of 1990 (33 USC 1321). Relevant regulations are the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300) and 33 CFR 155.5010–5075.	40 CFR 300 establishes a national response system for oil spills and hazardous material releases. Provides a framework and establishes guidelines for area contingency planning for oil spills and hazardous material releases. 33 CFR 155.5010-5075 requires cargo (referred to as nontank vessels) vessels to prepare and submit oil or hazardous substance discharge response plans when operating on the navigable waters of the United States.
The Act to Prevent Pollution from Ships (33 USC 1901 et. seq.)	Implementing U.S. legislation for MARPOL and Annexes I and II.
Maritime Transportation Act of 2004; and the Coast Guard and Maritime Transportation Act of 2006. Amended 311(a) and (j) of the Federal Water Pollution Control Act. Relevant regulations are 33 CFR 151, 155, and 160.	Requires cargo vessel owners or operators to prepare and submit oil or hazardous substance discharge response plans.
33 CFR, 46 CFR, and 49 CFR	These regulations incorporate international laws to which the United States is signatory as well as various classification society and industry technical standards governing the inspection, control, and pollution prevention requirements for vessels.
Washington State	
Washington State Bunkering Operations (WAC 317-40) (RCW 88.46.170)	Establishes minimum standards for safe bunkering (transfer of fuel to a vessel) operations.
Washington State Oil Spill Contingency Plan Requirements (WAC 173-182) (RCW 88.46, 90.56, and 90.48)	Requires that cargo vessels 300 or more gross tons be covered by a contingency plan for the containment and cleanup of oil.
Washington State Vessel Oil Transfer Advance Notice and Containment Requirements (WAC 173-184)	Requires facility or vessel operators who transfer oil to provide the state with a 24-hour advance notice of transfer.
Washington State Cargo Vessel Boarding and Inspection (WAC 317-31)	Cargo vessels 300 or more gross tons shall submit a notice of entry at least 24 hours before the vessel enters state waters and be subject to boarding and inspection by state inspectors to ensure compliance with accepted industry standards.
Oregon State	
Oregon Administrative Rules (OAR) 856-010-0003 through 0060 and 856-030-0000 through 0045 (Statutory Authority: ORS Title 58 Chapter 776).	Oregon State Board of Maritime Pilots Rules for pilotage of vessels in Oregon state waters, including the Columbia River.

Convention, Regulation, Statute, Guideline	Description
OAR 340-141 (Statutory Authority: ORS 468.020, 468B.345–468B-390).	Oregon Department of Environmental Quality (DEQ) State Oil Spill Contingency Plan requirements for cargo vessels (self-propelled ships in commerce) 300 or more gross tons (other than a tank vessel or a passenger vessel).
Local	
There are no local laws and regulations relevant to vessel transportation.	

Notes:
SOLAS = International Convention for the Safety of Life at Seas; COLREGS = International Regulations for Preventing Collisions at Seas; MARPOL = International Convention for the Prevention of Pollution from Ships; STCW = Standards of Training, Certification, and Watchkeeping; USC = United States Code; CFR = Code of Federal Regulations; WAC = Washington Administrative Code; OAR = Oregon Administrative Rule; ORS = Oregon Revised Statute

5.4.2 Study Area

The study area for direct impacts is the area surrounding the proposed docks (Docks 2 and 3) where vessel loading would occur. The study area for indirect impacts includes the waterways that would be used by, or could be affected by, vessels calling at the project area. It includes the waters out to 3 nautical miles seaward of the mouth of the Columbia River, the Columbia River Bar, the Columbia River upstream to Vancouver, Washington,[1] and the Willamette River upstream to the Port of Portland.

5.4.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on vessel transportation associated with the construction and operation of the Proposed Action and No-Action Alternative.

5.4.3.1 Information Sources

The following sources of information were used to define the existing conditions relevant to vessel transportation and identify the potential impacts of the Proposed Action and No-Action Alternative on vessel transportation in the study area.

Information for the vessel traffic analysis was obtained from stakeholder interviews and the following sources of information.

- Detailed vessel traffic data from the Columbia River Bar Pilots (Bar Pilots) included in information provided by the Applicant (URS Corporation 2014) was validated during a meeting with the Bar Pilots. That report and other data obtained from the pilots are the basis for historical vessel traffic type and volumes. Washington State Department of Ecology (Ecology) Vessel Entries and Transits (VEAT) data were used for comparison with the Bar Pilot data.
- The Columbia River Pilots (River Pilots) representatives provided information on vessel traffic management within the Columbia River and vessel docking issues for the existing dock (Dock 1) at the project area.

[1] The Port of Vancouver is the furthest upriver port receiving large commercial vessels.

- Merchants Exchange of Portland, Oregon (PDXMEX), provided Automatic Identification System (AIS) data and a synopsis of its operations.
- Port of Portland provided information on the LOADMAX channel reporting and forecasting system.
- *Coast Pilot 7 (Pacific Coast: California, Oregon, Washington, Hawaii, and Pacific Islands)* (National Oceanic and Atmospheric Administration 2014) and the *Lower Columbia Region Harbor Safety Plan* (Lower Columbia Region Harbor Safety Committee 2013) provided information on the vessel transportation characteristics of the study area.
- The following data were used as part of the risk analysis.
    - AIS data to establish baseline (2014) vessel types, sizes, routes, and transit frequencies between the Columbia River mouth and Longview.
    - Historical data on vessel incidents and severity, based on the U.S. Coast Guard (USCG) Marine Information for Safety and Law Enforcement (MISLE) database for 2001 to 2014.
    - Data on reported oil spills within the Columbia and Willamette Rivers from the following three databases for the period between January 1, 2004, and December 31, 2014[2]: USCG MISLE database, Ecology's Environmental Report Tracking System (ERTS) database, which records all incidents reported to the state, and Ecology's Spills Program Incident Information (SPIIS) database, which records spills reported to the state.
- Information also was collected during visits to the project area on October 14, 2014.

5.4.3.2 Impact Analysis

The following methods were used to identify the potential impacts of the Proposed Action and No-Action Alternative on vessel transportation.

For the purposes of this analysis, construction impacts were based on peak construction period and operations impacts were based on maximum coal export terminal throughput capacity (up to 44 million metric tons per year). The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on vessel transportation.

- The vessel transportation route, navigational considerations, historical and current vessel traffic patterns, and the systems in place to monitor and control vessel traffic along that route were described based on information gathered through the sources described in Section 5.4.3.1, *Information Sources*.
- Construction-related impacts were qualitatively assessed based on the relative increase in activity in and around the project area and the potential to disturb ongoing vessel transportation.
- Operations-related impacts at the project area (direct impacts) were qualitatively evaluated in terms of the increased potential for vessel-related incidents to occur.

[2] When the information from these three datasets were combined all duplicate entries were removed and only incidents with actual reported spills of petroleum or petroleum products were considered in the development of the baseline oil spill frequency for the study area.

- Operations-related impacts during vessel transit (indirect impacts) were evaluated both qualitatively and quantitatively to determine the potential for increased risks. Historical vessel incident data were evaluated to characterize the nature and magnitude of vessel incidents that have occurred on the Columbia River to the project area. This information was used to provide context for interpreting operational impacts.
- The potential for vessel incidents (i.e., allisions[3] at the project area, collisions, groundings, and fire/explosions by Proposed Action-related vessels during transit) was modeled for existing conditions, the Proposed Action, and No-Action Alternative. The potential for allisions during transit was qualitatively assessed.
  - The incident frequencies were estimated using the Marine Accident Risk Calculation System (MARCS) model and were limited to the area evaluated in the study (DNV GL 2016).
  - The number of trips for non-Proposed Action-related vessels were derived from 2014 AIS data for all vessel types. An increase of 1% per year was applied to the 2014 AIS data through 2028 for the No-Action Alternative. The number of vessels under the Proposed Action was added to this total to determine the incremental increase in the likelihood of the modeled incidents occurring.
- To provide context for understanding the relative consequences of a collision, grounding or allision incident, a survey of USCG Marine Information for Safety and Law Enforcement (MISLE) database was conducted for years 2001 to 2014. This data coverage period was chosen because it covers over 99% of all reported collision, grounding, and allision incidents in the dataset. Data surveys were conducted for the national dataset and for the study area separately to test for differences in the distribution of incident severity between the two.
- Increased risks of bunker oil spills were addressed quantitatively and qualitatively.
  - The potential for a bunker oil spill to occur as the result of an incident was modeled using the Naval Architecture Package (NAPA model) (DNV GL 2016). Using Monte Carlo simulations, in accordance with International Maritime Organization Resolution MEPC.110(49)[4] – Probabilistic Methodology for Calculating Oil Outflow, the model estimates oil outflow volumes based on the number of damaged cargo tanks and interaction with tidal influences. Monte Carlo simulations were run for 50,000 damage cases to estimate the potential variability in impact and in oil outflow volumes.
  - The potential for releases to occur during bunkering was qualitatively assessed based on the relative increase in vessel traffic.
- Vessel activity in general also has the potential to result in impacts on other resources. Therefore, the relative increase in vessel activity to and from the project area was also described and qualitatively assessed to provide the basis for related analysis in other sections of this EIS.

5.4.4 Existing Conditions

This section addresses the existing conditions related to vessel transportation and safety in the study area, including the natural and built environment, types and volumes of vessel traffic, vessel

[3] An allision occurs when a vessel strikes a fixed structure, such as a dock or a vessel at berth.

[4] The Marine Environment Protection Committee (MEPC) is a subsidiary body of the International Maritime Organization Council.

traffic management, vessel incident frequency and severity, and incident management and response systems.

5.4.4.1 Natural and Built Environment

This section describes the marine environment and facilities and other physical features relevant to marine navigation in the study area. Figure 5.4-1 illustrates the location of the features discussed in this section.

Marine Environment

Conditions of the marine environment in the study area that can affect vessel transportation include winds, longshore and tidal currents, river flows, swells and waves, and extreme weather (National Oceanic and Atmospheric Administration 2014). These elements are described below.

Conditions in the Pacific Ocean near the mouth of the Columbia River can vary greatly depending on the time of year. Prevailing winds and seasonal patterns have the greatest effect on offshore conditions. Longshore currents that generally flow to the north in winter and to the south in summer also affect vessel navigation, although not as much as tidal current and river flows near the river system. Offshore swells can vary more than several feet with the current flow and can result in breaking waves.

Average winter temperatures range from 35 to 49 degrees Fahrenheit (°F) near the mouth of the river and from 32 to 39°F near the upstream extent of the study area; while average summer temperatures are below 70 and 80°F, respectively. Snowfall is not common in the study area.

Although winds are strongest in late fall and winter, they seldom reach gale force along the Columbia River. The strongest winds are usually out of the south or southwest. Wind flow is generally from the east through southeast in winter, and wind speeds reach 17 knots or more about 5 to 10% of the time. Spring and summer typically have northwest and west wind patterns that often clash with river outflows. The volume of water flowing from the Columbia River and the force of impact with ocean conditions can combine to create daunting sea conditions. Nevertheless, summer winds generally remain light and have a cooling effect keeping average daytime temperatures nearly 10 degrees lower at Astoria than at Portland.

Fog is a hazard during late summer and fall with visibilities below 0.5 mile on 4 to 8 days per month on average.

River current always flows out, but with wide variations in flow rate and volume. The outflow from the Columbia River is a combination of tidal currents with river discharge. At times, currents reach a velocity of over 5 knots on the ebb; on the flood they seldom exceed a velocity of 4 knots.

Columbia River Bar

The Columbia River Bar is seaward of the mouth of the Columbia River (Figure 5.4-1). The bar is about 3 miles wide and 6 miles long. The bar is where the energy of the river's current dissipates into the Pacific Ocean, often as large standing waves (1 meter/3.28 feet or more) (Jordan pers. comm. B). The waves result from the bottom contours of the bar area as well as the mixing of fresh and saltwater and environmental conditions.

Figure 5.4-1. Ports, Anchorages, and other Features in the Study Area

Note: Letters correspond to anchorages described in Table 5.4-3.

Tide, current, swell, and wind—direction and velocity—all affect the bar conditions. Current velocity typically ranges from 4 to 7 knots westward into the predominantly westerly winds and ocean swells, creating significant disturbances of the water column and waves. There are two full tidal current ebb and flood cycles each day, and conditions at the bar can change drastically in a very short time period with the tidal flow. Worst-case conditions typically occur when onshore winds and tidal ebb combine with the river flow; when this happens, the effects can change unpredictably in a very short time as the tidal flow cycles (National Oceanic and Atmospheric Administration 2014).

Columbia River

The tidal range at the mouth of the Columbia River is approximately 5.6 feet with mean higher high water measured at 7.5 feet in 2013 (National Oceanic and Atmospheric Administration 2014). At Portland and Vancouver the tidal range is approximately 2.3 feet with mean higher high water measured at 8.7 feet in 2013 (NOAA tides and water levels station 9440083). The Columbia River experiences a mixed semidiurnal tide cycle. This means that there are two high and two low high tides of different size every lunar day. Moreover, the river flow combines with the tides to influence tidal heights. For example, during the spring when the river flow peaks, tidal height is increased by additional water flowing through the river. This phenomena is referred to as freshet (National Oceanic and Atmospheric Administration 2009).

Annual freshets have little effect on the tide range at the mouth of the Columbia River; however, at Portland and Vancouver they average about 12 feet with the highest known level of 33 feet at Portland. Typically tidal influence reaches as far as the Portland/Vancouver area. However, tidal effects can be felt to as far as 140 miles upriver under low-flow conditions (National Oceanic and Atmospheric Administration 2015).

The average annual flow for the Columbia River at Beaver Army Terminal near Quincy, Oregon,[5] is approximately 236,600 cubic feet per second (cfs).[6] The river's annual discharge rate fluctuates with precipitation and ranges from 63,600 cfs in a low water year to 864,000 cfs in a high water year (U.S. Geological Survey 2014). The flow is driven primarily by the outflow from the dams on the upper portion of the river, which varies with both snowmelt and rainfall.

Navigation Channel

The Oregon–Washington border follows the Columbia River (Figure 5.4-1). The navigation channel in the study area includes two U.S. Army Corps of Engineers (Corps) projects: the Columbia and Lower Willamette River Project and the Mouth of the Columbia River Project. The navigation channel is described by the three following areas.

- **Mouth of the Columbia River.** The portion of the channel at the mouth of the Columbia River, referred to as the Columbia River Bar, is 6 miles long, extending 3 nautical miles[7] into the Pacific Ocean from the mouth of the river to 3 miles upriver. This segment of the channel varies from 2,000 feet wide and 55 feet deep to 640 feet wide and 48 feet deep. Waters in this area are

[5] Approximately 12 river miles downriver of the project area.
[6] 1 cfs = 448.8 gallons per minute.
[7] Offshore distances are recorded in terms of nautical miles and inshore distances and river distances are given in terms of statute miles.

considered treacherous and large vessels require a licensed pilot.[8] The Corps maintains three jetties at the mouth of the Columbia River (Figure 5.4-1) to keep the channel at the mouth of the river clear.

- **Columbia River.** From the upriver extent of the bar (river mile 3) to Vancouver (river mile 106.5), the channel is generally maintained to a depth 43 feet and a width of 600 feet (U.S. Army Corps of Engineers 2015).[9]
- **Willamette River.** Along the lower 11.6 miles of the Willamette River, the channel has a depth of 40 feet.

Traffic in the channel moves in a two-way pattern: one lane inbound and one lane outbound. Although some areas of the navigation channel are dredged into rock, the channel sides consist primarily of loose, unconsolidated sediments. However, there may be areas of submerged objects or rocky bottom.

Ports

Table 5.4-2 lists the ports in the study area with berthing for large vessels along with their locations and facilities. Figure 5.4-1 shows the locations of these ports.

Table 5.4-2. Port Facilities in the Study Area

Port	Location	Facilities
Port of Astoria, OR	RM 12	Three deep-draft berths; additional berths for small commercial fishing vessels and research vessels; two marinas and a boatyard; two anchorages
Port of St. Helens, Port Westward Industrial Facility, near Clatskanie, OR	RM 53	Port Westward Industrial Facility. One dock and one deep-water berth
Port of Longview, WA	RM 65	Eight marine terminals containing a total of eight berths
Port of Kalama, WA	RM 75	Seven marine terminals: two grain elevators, one general cargo dock, one barge dock, one liquid bulk facility, one lumber barge berth, and one deep-draft wharf
Port of Portland, OR	RM 100	Four marine terminals containing a total of 18 berths
Port of Vancouver, WA	RM 106.5	Four marine terminals containing a total of 13 berths

Notes:
RM = river mile

Anchorages and Turning Basins

This section describes anchorages and turning basins in the study area.

[8] Oregon Administrative Rule 856-010-0060 exempts the following vessels from compulsory pilotage on the Columbia River Bar: (a) Foreign fishing vessels not more than 100 feet or 250 gross tons international; (b) Recreational vessels not more than 100 feet long.

[9] Near Vancouver, depth varies between 35 and 43 feet and width varies between 400 and 500 feet.

Vessels anchor within the Columbia River system for a variety of reasons, planned (e.g., to take on fuel, to wait for a berth) or unplanned (e.g., mechanical repairs, to wait for better weather conditions). In anticipation of this need, USCG has designated 11 locations for vessels to anchor. Each location has specific characteristics with which vessel masters, crews, and pilots must be familiar. Designated anchorages, as identified by USCG and described in 33 CFR 110.228 (Columbia River, Oregon and Washington), are listed in Table 5.4-3 and depicted in Figure 5.4-1. Table 5.4-3 identifies the locations of the anchorages, the number and maximum size of vessels that can be accommodated, and whether stern buoys are provided to help prevent vessels from swinging while at anchorage.

Table 5.4-3. Anchorages in the Study Area

ID[a]	Anchorage Name	River Miles	Range of Depth(s) (feet)	Maximum Vessel Size	Vessel Capacity	Stern Buoy?[b]
A	Astoria North[c]	14–17.8	24–45+	Panamax	6	No
B	Astoria South	15–18.2	20–45+	Handymax	4	No
C	Longview	64–66	29–40+	Handymax	5	No
D	Cottonwood Island	66.7–71.2	19–40+	Handymax	13	No
E	Prescott	72.1–72.5	52–65+	Panamax	1	Yes (1)
F	Kalama	73.2–76.2	26–40+	Panamax	7	No
G	Woodland[d]	83.6–84.3	8–40+	<600 feet LOA	3	No
H	Henrici Bar[d]	91.6–93.9	22–33+	<600 feet LOA	8	No
I	Lower Vancouver	96.2–101.0	Minimum of 50	<600 feet LOA	14	No
J	Kelly Point	101.6–102.0	25–40+	Panamax	1	No
K	Upper Vancouver	102.6–105.2	35–50+	Panamax or larger	7	Yes (2)

Notes:
[a] Identification letter corresponds to letters in Figure 5.4-1.
[b] Number in parentheses reflects the number of stern buoys maintained at the anchorage.
[c] This anchorage is generally reserved for large and deeply laden vessels as determined by Columbia River Pilots.
[d] Remote and not currently in use.
Source: Lower Columbia Region Harbor Safety Committee 2013 and U.S. Army Corps of Engineers 2015
LOA = length overall

The Corps' regulations establish the operational rules for the anchorages, including a requirement that vessels desiring to anchor must contact the pilot office that manages the anchorage to request a position assignment. The Bar Pilots manage Astoria North and Astoria South anchorages. The River Pilots manage the anchorages upriver from Astoria. The rules also specify that no vessel may occupy a designated anchorage for more than 30 consecutive days without permission from the USCG Captain of the Port.

The Lower Vancouver and Upper Vancouver anchorages are the only anchorage areas maintained by the Corps as part of the Columbia River navigation channel. The other designated anchorages are at sites identified as naturally deep locations, although shoaling does occur to some extent and dredging is occasionally necessary.

Although the anchorages downstream of the project area (Astoria North and South) can accommodate deep-draft vessels, use by vessels with drafts of more than 28 feet at Astoria North and more than 26 feet at Astoria South are not recommended due to the probability of dragging anchor. However, a deep anchorage position at Astoria North, referred to as “The Hole,” is normally kept vacant for deep-draft vessels in unusual situations or emergencies or for short-term anchoring (Lower Columbia Region Harbor Safety Committee 2013). Bunkering[10] operations are normally permitted in all anchorages.

Four turning basins are located in the study area (Figure 5.4-1). Turning basins are generally wider areas along a channel dredged to the same depth as the channel where vessel masters and pilots have maneuvering room to turn vessels for the purposes of pointing the bow of the vessel in the direction of transit. Only the Longview turning basin, which is located at river mile 66.5 and encompasses the proposed berths at the project area, can accommodate Panamax-sized vessels.

Bridges

Two bridges cross the navigation channel at and downstream of the Longview area (Figure 5.4-1).

- Lewis and Clark Bridge crosses the Columbia River between Longview, Washington, and Rainier, Oregon. It has a vertical clearance of 187 feet and a horizontal clearance of 1,120 feet. This bridge is upstream from the project area, and Proposed Action-related vessels would not pass through this bridge under normal operations.
- Astoria-Megler Bridge crosses the Columbia River between Astoria, Oregon, just inland of the Port of Astoria, and Point Ellice, near Megler, Washington. It has a vertical clearance of 205 feet and a horizontal clearance of 1,070 feet.

Ferries

One ferry, the Wahkiakum County Ferry, crosses the navigation channel on the Columbia River between Puget Island, Washington and Westport, Oregon, at river mile 37.4 (Figure 5.4-1). It is the only ferry crossing downstream of the project area.

5.4.4.2 Vessel Traffic

Vessels transiting the study area include commercial cargo, fishing, and passenger vessels; recreational vessels; and service vessels (including tugs, pilot boats, and USCG vessels), as well as a small number of other vessels such as military ships, research vessels, and industrial construction vessels. The cargo vessels and large passenger vessels (cruise ships) are generally restricted to the navigation channel and maintain a predictable two-way traffic pattern (one lane inbound and one lane outbound). For the purposes of this EIS, cargo vessels (ships and barges) and cruise ships are referred to as *large commercial vessels*. The other vessels are generally not restricted to movement in the navigation channel. For the most part, these vessels are more agile and less predictable in their movements. Data sources and availability regarding these two broad categories of vessels

[10] The transfer of fuel onto a vessel.

differ. For these reasons, the following discussion of vessel traffic has been separated into two sections: Large Commercial Vessels and Other Vessels.

Large Commercial Vessels

This section focuses on large commercial vessels calling at ports in the study area. Cargo vessels comprise over 99% of large commercial vessels[11] and include ships and barges carrying various cargo including dry bulk, automobiles, containers, bulk liquids, and other general cargo. Large commercial vessels comprise most deep-draft vessel traffic in the study area.[12]

The following sections describe types of large commercial vessels, types and amounts of cargo transported, and traffic volumes in the study area.

Vessel Types

The types of large commercial vessels in the study area are listed below by three broad categories: cargo ships, barges, and passenger cruise ships.

- Cargo ships
    - Dry bulk carriers carrying forest products and steel, ore, grain, potash, and other dry bulk cargoes
    - Container ships carrying containerized cargo
    - General cargo ships carrying steel, machinery, and other general cargo that is not containerized or bulk.
    - Tankers carrying bulk liquids
    - Automobile carriers
- Barges[13]
    - Tank barges (including articulated tug barges [ATBs][14]) carrying bulk liquids
    - Other cargo barges carrying dry bulk, containerized and other cargo
- Passenger cruise ships

Table 5.4-4 presents typical specifications for these vessels and example images.

[11] Cruise ships comprise less than 1% of large commercial vessel traffic in the study area. *Historical Traffic Volumes* provides a detailed discussion of vessel traffic by vessel type over a recent 11-year period.

[12] A small number of deep-draft military ships and research vessels also transit the study area.

[13] A barge has no onboard propulsion; it is towed or pushed by one or more tugs.

[14] An articulated tug barge, or ATB, is a tank barge that is propelled and maneuvered by a high-powered tug positioned in a notch in its stern.

Table 5.4-4. Types of Large Commercial Vessels in the Study Area

Vessel Category	Vessel Types	Typical Vessel Specifications	Example Photos
Cargo ships	Dry bulk cargo ships (bulkers), container ships, general cargo ships, automobile carriers	**Dry bulk, container, and general cargo ships:** DWT: 50,000–80,000, Length: 650–965 feet Beam: 100- 106 feet Draft: 33–39.5 feet	 Bulk cargo ship (bulk carrier)
		Automobile Carriers: DWT: 18,638 Length 650 feet Bean: 105 feet Draft: 27 feet	 Automobile Carrier
		Container ships: DWT: 57,088 Length: 260 feet Beam: 33 feet Draft: 12.5 feet	 Container Ship

Vessel Category	Vessel Types	Typical Vessel Specifications	Example Photos
		Tankers DWT: 65,000–80,000 Length: 965 feet Beam: 106 feet Draft: 41 feet	 Tanker
Barges	Cargo barges including tank barges, dry cargo barges and container barges	Length: 132–286 feet Beam: 40–55 feet Draft: 8–17 feet DWT: N/A (Gross tons: 559–2,700)	 Dry cargo barge
Passenger cruise ships		Length: 560–965 feet Beam: 78–125 feet Draft: 18–29 feet DWT: 2,700–13,290	 Cruise ship

Notes:
Photo sources: MarineTraffic.com except for tanker, worldmaritimenews.com; and dry cargo barge, Tidewater.com.
DWT = deadweight tons; ATB = articulated tug barge

The vessels discussed in this section come in various sizes, as reflected by the ranges (e.g., width, draft) shown in Table 5.4-4. Cargo ships are categorized[15] by their capacity and dimensions. The vessel classes that can be accommodated in the study area are listed in Table 5.4-5 with their typical dimensions and cargo capacities.

Table 5.4-5. Vessel Classes in Use on the Columbia River Navigation Channel

Vessel Class	Deadweight (tons)	Length (feet)	Beam (feet)	Design Draft (feet)
Handymax	10,000–49,999	490–655	75–105	36–39
Panamax	50,000–79,999	965	106	39.5
Post-Panamax[a]	Over 80,000	965 or greater	106 or greater	39.5 or greater

Notes:
[a] The Post-Panamax class, also referred to as New Panamax, is a new vessel class that reflects the expanded Panama Canal dimensions.
Source: INTERCARGO 2015

Cargo Types and Tonnages

Table 5.4-6 presents the types and amounts of cargo transported along the Columbia River. The amounts and percentages in the table reflect average annual gross tonnage for the period 2004 to 2014, based on Bar Pilots' data (Jordan pers. comm. A). The primary growth areas in recent years have been in the dry bulk and automobile traffic.

Table 5.4-6. Cargo Types and Corresponding Average Annual Gross Tonnage (2004–2014)

Cargo Type	Gross Tonnage	Percentage[a] of Total Cargo Moved
Dry bulk	44,551,063	47.3
Automobiles	20,986,525	22.3
Containers	11,187,455	11.9
General cargo	7,447,913	7.9
Bulk liquid	4,127,333	4.4
Other[b]	5,912,903	6.3
	94,213,193[c]	100

Notes:
[a] Percentages refer to gross tonnage to better represent the approximate quantities of various commodities moved along the Columbia River.
[b] Miscellaneous gross tonnage accounting for vessel movements from one berth to another, passenger vessels, tugs, and empty barge movements.
[c] Numbers do not sum due to rounding.
Source: Bar Pilots data (Jordan pers. comm. A).

[15] These category names often reflect the canal through which the vessels are designed to travel.

Tug Assistance

Cargo and cruise ships require tugs (generally a minimum of two) to provide assistance during docking and undocking, because these vessels lack adequate maneuverability at slower speeds. These vessels also may rely on tugs in emergency situations to assist, escort, and in some cases, provide fire suppression. Tug escorts on the Columbia River are generally engaged only in unusual conditions (e.g., electronic equipment issue that would prevent safe navigation or inoperable vessel propulsion system at normal power levels) that can be mitigated by the tug escort. Most likely an unusual condition that requires a tug escort would be in effect for all portions of the transit (from crossing the bar to the final destination).

Shaver Transportation Company, Foss Maritime, and Olympic Tug and Barge, all based in Portland, provide tugs suitable for assisting large commercial vessels in the study area. Nine of Shaver's 13 study area tugs would be appropriate to assist vessels calling at the project site (Rich pers. comm.). Six of Foss's study area tugs (Hendriks pers. comm.) and 13 of Olympic's study area tugs would be suitable for assisting Panamax and Handymax ships (Bonnin pers. comm.) at the project site.

Tugs also are used to tow and push barges between destinations in the study area for bunkering, fuel transport, and hauling cargo. The following companies provide barge towing in the study area: Bernert Barge Lines, Brusco, and Tidewater.

Vessel Speed and Travel Times

The vessels discussed in this section are primarily restricted to the navigation channel, in which traffic moves in two lanes: one lane inbound and one lane outbound. Their speeds generally range between 9 and 15 knots in the study area, with the slower speeds in that range occurring while passing port areas; still slower speeds of between 6 and 9 knots occur while passing through anchorages (DNV GL 2016).

Travel time across the bar, between the offshore Pilot Station and Tongue Point, takes approximately 2 hours in either direction. River transits depend on the study area terminal origination or destination. As an example, the travel time from Tongue Point to Longview is approximately 5 hours inbound (generally vessels in ballast[16]) and about 6 hours outbound (generally loaded vessels). Outbound transits generally take longer than inbound transits for two reasons: The majority of outbound vessels are loaded and, therefore, travel at reduced speeds and outbound transits are scheduled during high-tide conditions to maximize under-keel clearance[17] and thus usually are running against the force of a flood (incoming) tide.

Existing and Historical Vessel Traffic

This section describes existing (2014) vessel activity and distribution in the study area and existing and historical traffic volumes over the past 11 years in the context of historical peak volumes prior to this period.

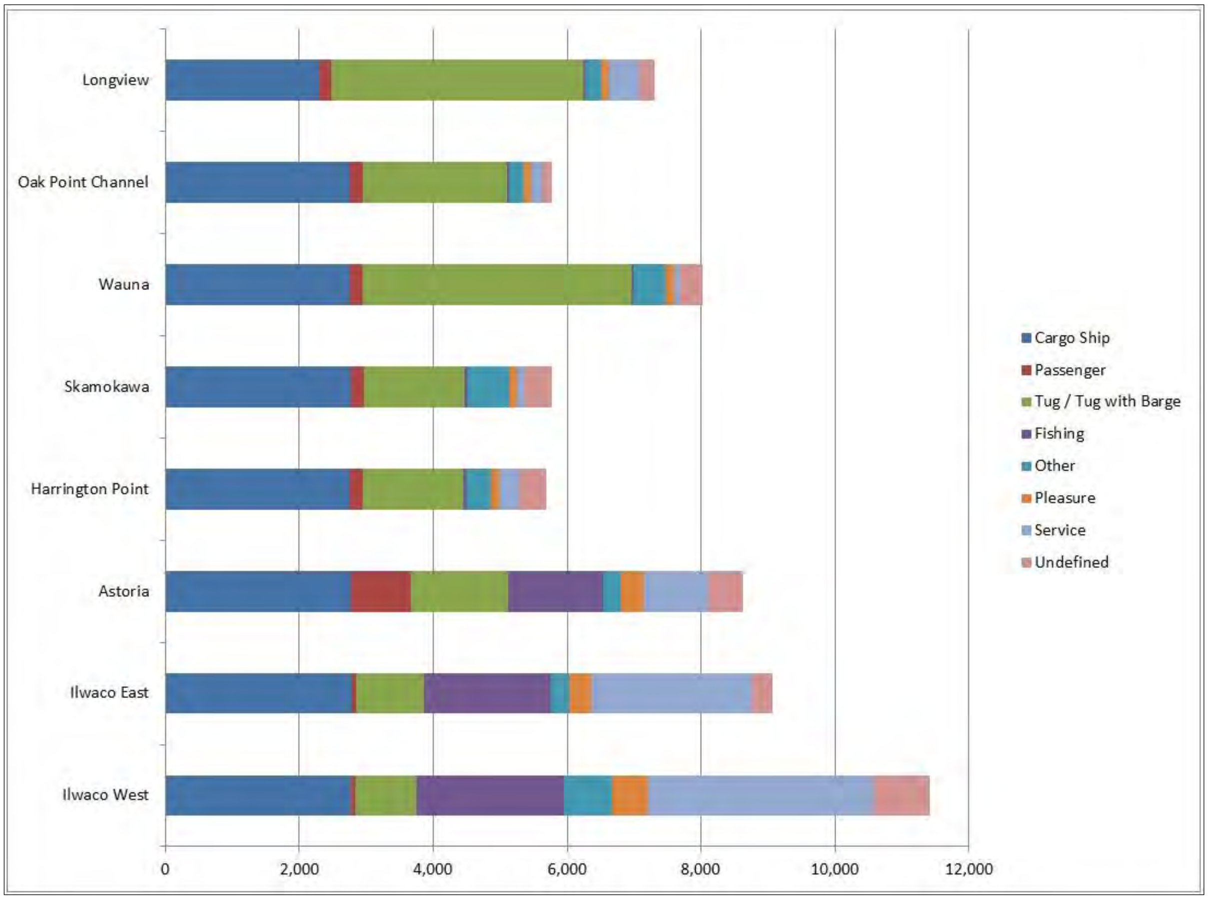
[16] Vessels *in ballast* are not loaded with cargo, but have had their tanks loaded with water to increase vessel stability; these vessels have less of a draft than when loaded.

[17] *Under-keel clearance* is the amount of space between the hull of the vessel and the bottom of the channel.

Existing Vessel Traffic and Distribution

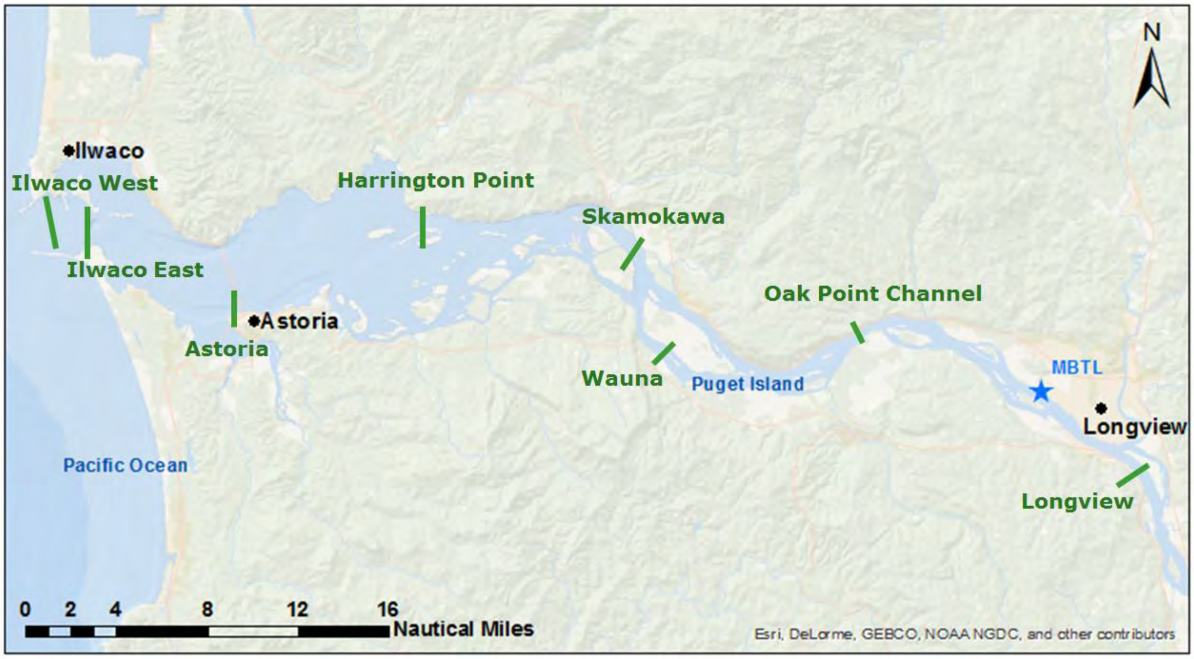
Figure 5.4-2 depicts activity by vessel type at eight locations (Figure 5.4-3) on the lower Columbia River based on 2014 AIS data (DNV GL 2016). The categories shown in Figure 5.4-2 that apply to large commercial vessels are Cargo Ships, Passenger (cruise ships and other large commercial passenger vessels), and, Tug/Tug with Barge.[18] As shown in the figure, vessel activity is greatest near the mouth of the Columbia River. Much of this increased activity at these locations (Ilwaco West, Ilwaco East, and Astoria) is related to service and fishing vessel activity. Cargo ship activity is fairly consistent between the project area and the mouth of Columbia River.

Figure 5.4-2. Number of Transits per Location by Vessel Type (2014 AIS Data)



[18] Because barges do not have AIS receivers, barge numbers are captured as part of the tug data. The tug numbers include tugs traveling independently and tugs towing or pushing barges. Only the latter are considered large commercial vessels. The number of tug and barge units (cargo barges), including ATBs, entering and exiting the river are best represented by transits recorded for the Ilwaco locations; the increased tug activity in the upriver portions of the study area, especially near Longview and Wauna, likely represents tugs traveling independently to provide docking services and tugs shifting cargo barges between ports.

Figure 5.4-3. Vessel Data Location Points



Existing Port Activity

Characterizing existing port activity is another way to understand large commercial vessel activity. Types and uses of vessels calling at ports in the study area (Figure 5.4-1) are described below.

- Port of Astoria primarily receives cruise ships, loggers and other cargo vessels, and other types of vessels (e.g., USCG, pollution control, commercial fishing, and recreational vessels). The port reports approximately 230 vessel calls [19] at the Waterfront and Tongue Point berths in 2015 (McGrath pers. comm.).
- Port of St. Helens, Port Westward Industrial Facility receives tankers and tank barges.
- Port of Longview receives cargo ships and barges transporting various types of general and bulk cargo, including steel, lumber, logs, grain, minerals, alumina, fertilizers, pulp, paper, wind energy components, and heavy-lift cargo. The port reported 222 vessel calls in 2015 with a 5-year average of 205 vessel calls per year (Hendriksen pers. comm.).
- Port of Kalama receives cargo ships and barges primarily transporting grain, but also liquid bulk chemicals and general cargo. The Port reported 205 vessel calls in 2014 (Port of Kalama 2015).
- Port of Portland receives cargo ships (mostly Handymax and Panamax) and barges, cruise ships, and other vessel types (e.g., other commercial passenger vessels, dredges, pollution control vessels, USCG). The cargo vessels transport all types of cargo. The port reported 513 and 352 vessel calls in 2014 and 2015, respectively (Myer pers. comm.).
- Port of Vancouver receives cargo ships (Handymax and Panamax) and barges transporting grain, scrap, steel, automobiles, petroleum products, other dry and liquid bulk cargo, and other

[19] A call represents a visit to a port terminal. A vessel call typically results in two vessel transits: one inbound and one outbound.

products. The port also receives commercial passenger vessels (not cruise ships) and dredges. The port reported 450 vessel calls per year in 2014 and 2015 (Uglum pers. comm.).

Historical Traffic Volumes

This section describes historical commercial vessel traffic volumes in the study area. Table 5.4-7 shows annual transits[20] of large commercial vessels[21] in the study area over an 11-year period (2004 to 2014), based on Bar Pilots records of bar crossings (i.e., vessels entries to and exits from the Columbia River).

As shown in Table 5.4-7, traffic volumes were similar in 2004 and 2014, but have fluctuated within that time period. For comparison, the historical peak vessel traffic year recorded by the Bar Pilots is 1979 with 4,752 transits[22] (Jordan pers. comm. A). Approximately the same level occurred in 1988. In every other year from 1979 to 2000 the number of vessel transits was greater than or very close to 4,000. Since 2001, vessel transits have remained below these levels.

Table 5.4-7. Large Commercial Vessel[a] Transits[b] in the Study Area (2004–2014)

Year	Transits
2004	3,554
2005	3,436
2006	3,618
2007	3,858
2008	3,782
2009	2,926
2010	3,366
2011	3,162
2012	3,178
2013	3,448
2014	3,638

Notes:
[a] A small number (approximately 2% annually) of noncommercial vessels (e.g., military ships and research vessels) are reflected in these data.
[b] Transits recorded in the Bar Pilots data are generally equivalent to bar crossings, (i.e., entries to and exits from the river system); however, a small percentage (approximately 1% annually) reflect in-river vessel movements (e.g., for bunkering or anchorage).
Source: Bar Pilots records (Jordan pers. comm. A)

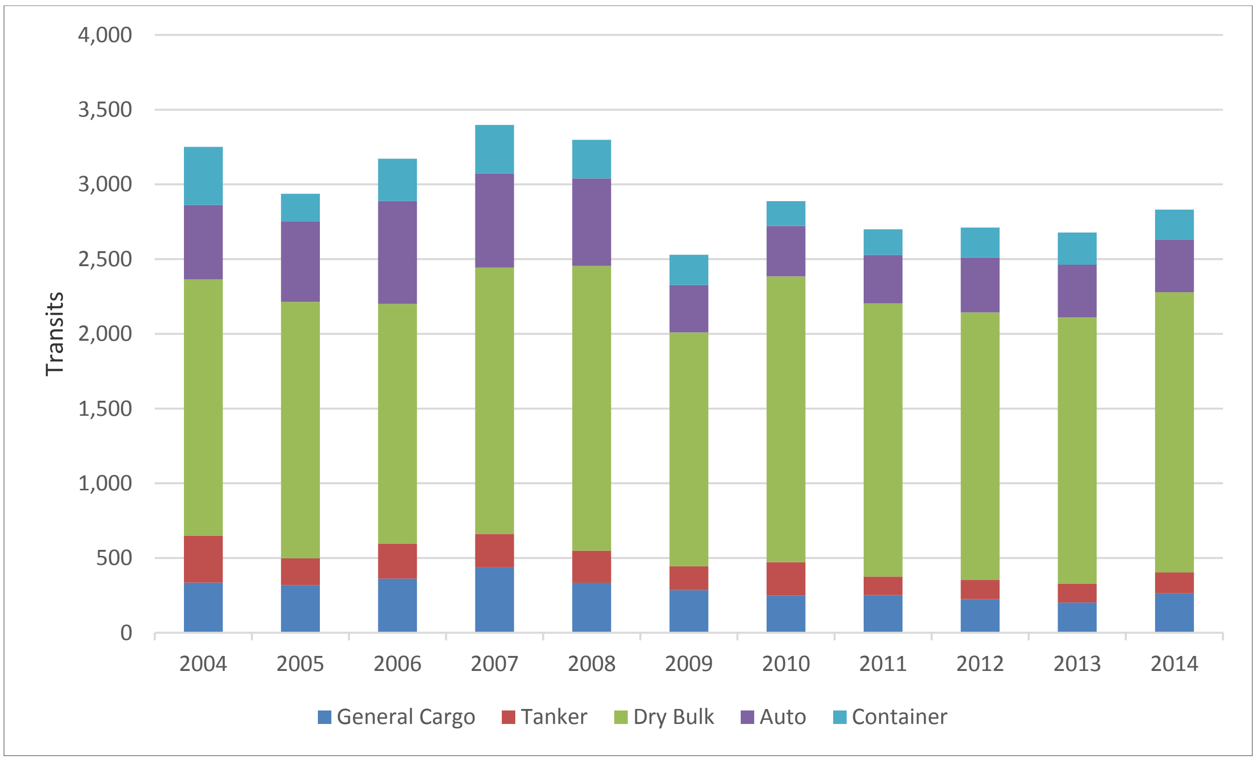
Although vessel traffic volumes have been considerably lower since 2004 compared to earlier peaks, vessel sizes and total cargo tonnages have increased. The overall decrease in vessel traffic levels can be attributed to general economic conditions. The deepening of the Columbia River channel from 40 to 43 feet has allowed larger vessels with greater drafts to call at river ports, and vessels that

[20] Bar Pilots record bar crossings or transits (i.e., entries to and exits from the river system); however, these data include a small percentage (approximately 1% annually) of in-river vessel movements (e.g., for bunkering or anchorage).
[21] The Bar Pilot data reflect a small number (approximately 2% annually) of non-commercial vessels (e.g., military ships and research vessels).
[22] The peak traffic year for the Columbia River reflected in the VEAT data is 1999 with 2,269 vessels calls or 4,538 transits (Washington State Department of Ecology 2014).

previously had to be light-loaded can now be loaded to deeper drafts. This has resulted in the need for fewer, but larger, vessels to move a given volume of cargo; this is especially the case for the dry bulk cargo vessels that make up a high percentage of the river traffic (Krug and Myer pers. comm.; Amos pers. comm.; Jordan pers. comm. B). The changing nature of vessel design and the likely partial impact on vessel volumes within the study area is illustrative of the multiple factors that can impact vessel numbers over time.

Of the vessel transits recorded by the Bar Pilots (2004 through 2014), cargo ships constitute the largest percentage of vessel traffic in the study area (around 90% on average); while barges represent 3 to 10% and cruise ships less than 1%, on average. Approximately 3%, consists of a mixture of other vessel types.[23] These cargo ships can be broken down further into specific vessel types, based on the Bar Pilots records. Figure 5.4-4 shows transits by vessel type within the cargo ship category. Dry cargo ship transits represent over half (between 50 and 60%) of the cargo ship traffic annually. The remainder (in descending order of magnitude) were automobile carriers, general cargo ships, container ships, and tankers.

Figure 5.4-4. Percentage of Annual Cargo Ships by Vessel/Cargo Type (2004–2014)



[23] Vessels categorized as *other* include vessels recorded in Bar Pilots data as miscellaneous (occasional military vessel, research vessels, industrial/marine construction, dredges), bunkers, shipyard, and shifts.

Vessel Traffic Management

Management of vessel traffic in the study area is primarily a real-time activity involving the pilots, vessel masters, and PDXMEX.[24] Large commercial vessel traffic moves along the navigation channel in a two-way pattern: one lane inbound and one lane outbound. This simplistic layout constitutes the foundation of the traffic management system. Oversight and active participation in the traffic management involves coordination of all river stakeholders, including USCG, Corps, Ecology, Oregon Department of Environmental Quality (DEQ), pilots, shipping agents, terminal operators, tug operators, and other associations and services. Large commercial vessels traveling in the study area must adhere to international and inland rules (72 COLREGS and Rules of the Road, respectively), described in Section 5.4.1, *Regulatory Setting*. These rules are intended to facilitate safe maritime travel.

The 64th Washington State Legislature passed House Bill 1449 focused on current regulatory programs covering the over-land and over-water transportation of oil. One of the bill provisions (Section 11) required (contingent on funding) that Ecology complete an evaluation and assessment of vessel traffic management and vessel traffic safety within and near the mouth of the Columbia River. The bill stipulated a date for submittal to the legislature of December 15, 2017, with a final evaluation to be completed by June 30, 2018. The evaluation and assessment must include (but is not limited to) an assessment and evaluation of the following.

- (a) The need for tug escorts for oil tankers, articulated tug barges, and other towed waterborne vessels or barges;
- (b) Best achievable protection; and
- (c) Required tug capabilities to ensure safe escort of vessels within and near the mouth of the Columbia River

Pretransit Planning

Large commercial vessels are required to provide an advance Notice of Arrival[25] to USCG at least 96 hours before arrival at the bar in most cases, or upon departure from the last port of call for shorter voyages. This information is provided electronically and shared almost instantaneously with PDXMEX and the Bar Pilots and River Pilots.

Upon receipt of the Notice of Arrival a coordination process is initiated between the pilots and the shipping agent representing the vessel interests. The Bar Pilots and River Pilots work closely together and with PDXMEX during the pretransit scheduling. The pilots use information provided in the Notice of Arrival as well as weather conditions, pilot availability, tidal and river conditions, and anchorage and berth availability to determine scheduling.

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[24] The Merchants Exchange of Portland (PDXMEX) is an information and communication center for ports and stakeholders along the Columbia River. It provides a monitoring system that allows users to locate vessels in the study area and operates a dispatch center that assists in coordinating with River and Bar Pilot dispatch centers to ensure proper vessel traffic management. PDXMEX is also a central point of contact for vessel agents, who provide necessary shore-side services for vessels.

[25] In addition to serving as an arrival notification the Notice of Arrival includes vital information about the vessel, voyage information (e.g., specifics about the last five ports visited, name and telephone number of a 24-hour point of contact), cargo information, information about each crewmember and other people onboard, operational condition of equipment, and documentation specifics.

For inbound vessels, tracking and coordination begins when the vessel is approximately 2 to 3 hours away from the pilot boarding station. Decisions on vessels crossing the bar movements are made by the Bar Pilots alone, although considerations affecting the Columbia River Pilots could result in delaying a vessel's transit.

The Bar Pilots coordinate closely with USCG on navigation conditions and safety. While only the USCG Captain of the Port (COTP) can close the bar to vessel traffic, the Bar Pilots can suspend traffic movements when the overall circumstances dictate. In assessing navigation conditions, the pilots consider if vessel crossing is safe, if the pilot can get on and off the vessel safely, and if the pilot boat or helicopter can return to base safely.

The Bar Pilots give the River Pilots a "window of opportunity" for getting an outbound vessel over the bar. The River Pilots then develop their transit plans to match that window. Transit planning for draft-constrained vessels varies with river flows. For example, during the low-water season, the pilots can only count on having sufficient water under keel during one of the daily high tides. Outbound transit plans are developed at least 8 hours and as much as 24 hours in advance. Vessels may be permitted to sail with the maximum freshwater draft of 43 feet if the river level, tide, and conditions permit (Columbia River Pilots 2016). Pilots operating draft-constrained vessels in the study area have to adjust the time of their transit to allow for at least 2 feet of under-keel clearance on the river plus expected squat[26] (Columbia River Pilots 2016).

The decision to sail outbound is more critical than the decision to bring a vessel in. For outbound traffic, once the vessel starts downriver there is no place to stop or turn around unless the vessel is in extremis and requests to anchor; inbound vessels can stop before approaching the bar. Nevertheless, there is a point at which a vessel approaching the bar from sea or from the river is fully committed to the crossing. This is why pretransit planning is key to safe passage across the bar in either direction.

As discussed previously in the *Tug Assistance* section, tug escorts are generally only engaged on the Columbia River in unusual conditions that can be mitigated by the tug escort. Tug escorts in the study area are rare (Gill pers. comm.).

Pilotage

The vessels discussed in this section are required to use a licensed pilot in the study area. The Bar Pilots and River Pilots are highly trained mariners who are experts in vessel navigation and the characteristics of their respective portions of the waterway. They are responsible for safely maneuvering large commercial vessels in the study area with support of the vessel master's knowledge of their own vessel and how it maneuvers.

The Bar Pilots board inbound vessels outside the bar, at a predetermined site suitable for safe boarding, and are responsible for piloting the vessel to Tongue Point, near Astoria. At Tongue Point, the Bar Pilots disembark and the River Pilots board. The River Pilots guide the vessel to the terminal until it is safely moored. For departing vessels, the process is reversed.

[26] *Vessel squat* is the tendency of a vessel to draw more water astern (behind or toward the rear of the vessel) when it is moving through a water body. The streamlines of return flow are sped up under the ship, causing a drop in pressure and of the ship, effectively, increasing draft.

Vessel size is a significant factor in transit planning. The River Pilots typically place just one pilot on each vessel, but in some circumstances, including vessels with a beam greater than 140 feet, two pilots are assigned.

As a standard practice, River Pilots avoid meeting and overtaking situations between large commercial vessels in the following areas of the river: Miller Sands (river miles 22 to 25), Skamokawa/Abernathy (river miles 28 to 34), Bugby Hole (river miles 39 to 40), Bunker Hill (river miles 55.5 to 56.5), and Longview Bridge (river miles 65 to 67). The Bar Pilots ensure that large commercial vessels do not pass each other on the bar.

If, at any time during the transit, it becomes necessary to anchor a commercial vessel for an unexpected reason, the USCG COTP is contacted and directs the vessel anchoring in consultation with the pilot and vessel master. The Lower Columbia Region Harbor Safety Plan Anchorage Guidelines provide details about the anchorages and potential hazards that could affect anchorage.

The River Pilots work with the tug companies providing tug services in the study area to ensure that appropriate tugs are available upon request. Tugs are assigned, primarily for docking assistance, based on the minimum bollard pull required for a particular vessel type or operation. Pilots requesting tug support also take into account other tug features such as type of propulsion, deck machinery, or number of propellers.

Pilotage Tools

Pilots use a variety of tools to manage traffic on the river. They rely mostly on Transview 32 (TV32), LOADMAX, AIS towers, and other aids for navigation to monitor real-time vessel traffic and data on current weather and tidal conditions. They carry Portable Pilot Units in conjunction with installed navigation equipment on vessels to access these tools. These tools are described below.

TV32[27] is a real-time, vessel traffic information and management system that portrays vessel movements and interactions on the river along with water depth, current flow information and updated bathymetry charts. It combines the following systems to provide extremely high spatial resolution accuracy: AIS,[28] NOAA Nautical and Electronic Navigational Charts (ENC) Electronic Chart Display and Information System (ECDIS), NOAA Physical Oceanographic Real-Time System (PORTS[29]), and differential global positioning system (DGPS). TV32 allows pilots to accurately determine vessel meeting points to facilitate informed decision making regarding navigation, anchorage, and traffic coordination.

[27] TV32 is considered to be a vital part of the Columbia River Vessel Traffic Information System (VTIS) consisting of the pilots, the PDXMEX, and the other electronic tools discussed in this section. A VTIS generally requires users to deliberately access information as opposed to a vessel traffic service, as in Puget Sound, which is centrally managed and manned to continuously receive and disseminate navigation safety information to vessel operators on the waterway.

[28] AIS is required on large commercial vessels, vessels over 65 feet, and passenger vessels (33 CFR 64.01 and 164.46). AIS technology ensures that basic identification and movement information for these vessels is available to government agencies, cooperative public/private associations, port managers, and pilots with the most basic computer equipment and an internet (or wireless) connection.

[29] PORTS measures surface current speeds, water depth, and wind direction and speed. Data are transmitted and displayed on the TV32 interface every 6 minutes.

While operating, every pilot has access to the Corps' survey data that includes channel depths, the 43-foot contour, and cross-sections along with NOAA PORTS and LOADMAX data, as well as the vessel's own navigation system information displays. Using this information, pilots can predict vessel meeting points and display those locations when two ships are as much as 70 miles apart. The pilots can then adjust vessel speeds to ensure that the meetings take place in suitable locations and avoid the few places on the river where meeting situations must be avoided. The River Pilots also monitor shoaling developments and assess how those might affect transit plans. LOADMAX is a system of seven computer-connected PORTS gages along the Columbia River that measure real-time water levels. It produces daily email forecasts of river stage and velocity at 1-hour intervals, with a forecast horizon of 10 days. Pilots routinely use these data to time river transits.

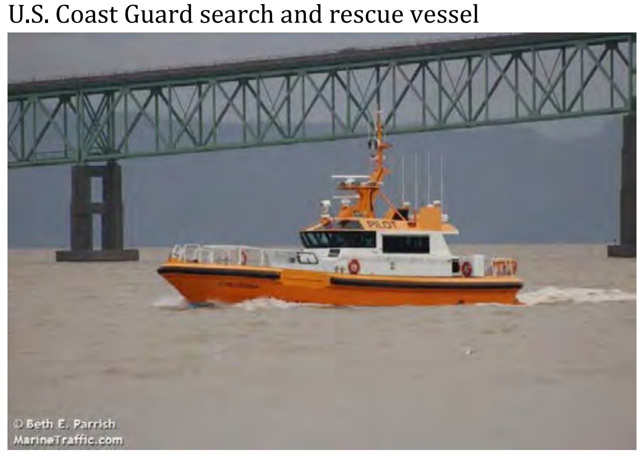
The River Pilots have specifically credited AIS towers and virtual aids as important to their navigation. Pilots have two relay towers that allow them to see the entire length of the route and monitor traffic using the waterway. Aids to navigation allow vessels to identify and locate other vessels and increase situational awareness of hazards and route features that are not otherwise physically marked (or would require extra time and resources to mark). USCG is responsible for maintaining the aids to navigation systems on the Columbia River. The aids include a series of fixed and floating aids, which are visual (e.g., buoys, beacons, lights), aural (e.g., bells, fog signals), electronic or any combination.

Other Vessels

Other vessels include commercial fishing, recreational, smaller commercial passenger, and service vessels. These vessels are generally much smaller than the vessels discussed in the previous section and have different activity and transit patterns. Most can move about the river without being restricted to the navigation channel. Table 5.4-8 presents typical specifications for these vessels and example images.

Table 5.4-8. Other Vessel Types in the Study Area

Vessel Type	Typical Specifications	Example Image
Fishing vessels	Length: 20–180 feet Beam: 8–45 feet Draft: 3–15 feet	 Fishing (gillnetter) vessel
Other commercial passenger vessels: car ferries, inland passenger ships, passenger ferries	**Car ferry:** Length: 109.2 feet Breadth: 47.5 feet Draft: 6 feet **Other commercial passenger vessel:** Gross Tons: < 100 Length: 80–150 feet Beam: 30–40 feet Draft: 6–12 feet	 Car ferry “Oscar B”  River cruise vessel

Vessel Type	Typical Specifications	Example Image
Recreational vessels, including pleasure boats, yachts, sailing vessels	Length: 20–150 feet Beam: 8–40 feet Draft: 3–15 feet	 Pleasure craft
Service vessels Military (USCG), law enforcement, pilot vessels, Aids to Navigation vessels	U.S. Coast Guard vessels range in length from 22 feet to over 300 feet. **Vessel shown:** Length: 47 feet Beam: 14 feet	 U.S. Coast Guard search and rescue vessel
	Pilot vessel (shown): Length: 72 feet Beam: 20 feet Pollution control vessels: Length: 20–40 feet Beam: 6–20 feet	 Pilot vessel COLUMBIA

Vessel Type	Typical Specifications	Example Image
Tugs	Length: 50–150 feet Beam: 26–35 feet Draft: 9–16 feet	 General tug
Dredge vessels	**Vessel shown:** Length: 200 feet Beam: 58 feet Draft: 16 feet	 Dredge vessel YAQUINA

Notes:
Photo sources: MarineTraffic.com, except fishing (gillnetter) vessel, WDFW Image Gallery: car ferry "Oscar B," Daily Astorian; search and rescue vessel, News Lincoln County.

Commercial Fishing

Columbia River

The Columbia River is divided into six commercial fishery management zones; of these, Zones 1 through 3, and a portion of Zone 4 occur in the study area (NOAA Fisheries 2016). The commercial fisheries in these zones are managed by the states of Oregon and Washington.

Zones 1, 2, and 3 support important commercial shad, anchovy, herring, smelt, and salmon fisheries. Commercial fishers deploy gillnets, tangle-nets, or seines depending on species, season, and zone. Anchovies and herring may be taken for commercial purposes at any time in the Columbia River seaward of the Astoria-Megler Bridge (Figure 5.4-1). Commercial salmon seasons and authorized fishing gear are shown in Table 5.4-9. Shad typically can be taken for commercial purposes from the study area zones during commercial salmon seasons with the same fishing gear authorized for the taking of salmon. The retention of green sturgeon and white sturgeon was prohibited in the Columbia River downstream of Bonneville Dam beginning in 2006 and 2014, respectively.

Table 5.4-9. Major Columbia River Commercial Salmon Fishery Seasons in the Study Area

Season[a]	Primary Species	Areas	Authorized Method/Gear
Winter (February–March)	Spring Chinook	Select Area Fisheries[b]	Gillnets and tangle-nets
Spring (April–June)	Spring Chinook	Select Area Fisheries[b] and Columbia River mainstem[c]	Gillnets and tangle-nets
Summer (June–July)[c]	Sockeye and Summer Chinook	Columbia mainstem and Select Area Fisheries[b]	Gillnets
Early Fall (August–mid-September)	Summer and Fall Chinook	Columbia River mainstem and Select Area Fisheries[b]	Gillnets
Late Fall (mid-September–mid-November)	Fall Chinook and Coho	Columbia River mainstem and Select Area Fisheries[b]	Gillnets, tangle nets, and experimental seines

Notes:
[a] Dates and areas subject to stock abundance and management decisions.
[b] Select Area Fisheries include Youngs Bay, Blind Slough/Knappa Slough, Tongue Point/South Channel, and Deep River.
[c] Columbia River mainstem areas include Zones 1 (Columbia River mouth) to 5 (Beacon Rock at RM 142).
Source: Washington Department of Fish and Wildlife and Oregon Department of Fish and Wildlife 2015a (winter, spring and summer) and 2015b (fall fisheries).

Approximately 2,046,747 pounds of shad and salmon (Chinook, coho, pink, and sockeye) were harvested (160,821 landings) on the Columbia River in 2015; the late-fall salmon season accounted for approximately 85% of this total harvest, making the late-fall salmon season the busiest time of year for commercial fishing on the lower Columbia River (Oregon Department of Fish and Wildlife 2015b).

Coastal, Nearshore, and Ocean Commercial Fishing

Several coastal, nearshore, and offshore open-ocean fisheries, including groundfish, halibut, salmon, albacore, pacific whiting, sardines, and shellfish (primarily Dungeness crab and pink shrimp) are present within or adjacent to the study area. Activities range from harvesting to delivery to shore-based processors, depending on the fishery. The mouth of the Columbia River is the busiest part of the study area for commercial fishing vessel traffic, though numbers of operating vessels fluctuate by season and license by fishery.

Tribal Fishing

The treaties of 1855 between the United States and individual tribal governments reserved tribal rights to fish, hunt, and gather traditional foods and medicines throughout ceded lands identified within the treaties. The Columbia River and its tributaries support a variety of tribal resources, including six species of salmon and Pacific lamprey, which have been a reliable and important source of food and trade items to tribes of the Columbia River Compact. The Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of Warm Springs, and Nez Perce Tribe are the tribes in the Columbia River Basin that have reserved rights to anadromous fish in treaties with the United States (Columbia River Inter-Tribal Fish Commission 2016). Zone 6, upstream of the study area from just downstream of Bonneville Dam to McNary Dam, is managed as an exclusive treaty commercial fishing zone. Tribal fishing resources are described in more detail in Chapter 3, Section 3.5, *Tribal Resources*.

Recreational Fishing and Boating

The Columbia and Willamette Rivers are popular areas for recreational boating (motorized and nonmotorized), fishing, and other recreational activities (Port of Portland 2010). Over 30 water access and boat launch sites along the Columbia and Willamette Rivers within the study area provide public and private river access for recreational boating and fishing.

The Columbia River is the most boated waterbody in the State of Oregon with 524,091 boat use days, followed by the Willamette River with 281,176 boat use days. Hayden Island, which is located on the Columbia River, between Vancouver, Washington, and Portland, Oregon, serves as a key location for recreational boaters traveling to different sections of the Columbia and Willamette Rivers. Marinas in the vicinity report that recreational boating is highest during summer months and that 100% of 3,600 boat slips on Hayden Island are leased between April and October (Port of Portland 2010). The Columbia River Water Trail is a designated area for canoes and kayaks that travels through the study area to the mouth of the river.

The Columbia and Willamette Rivers support numerous aquatic species including salmon, steelhead, small mouth bass, shad, and sturgeon fisheries. Greenling, rockfish, lingcod and perch are caught from the jetties, and flounder are common on sandy flats. Recreational fishing seasons vary by target species, but fishing occurs year-round for many species. Recreational catch and release fishing for green and white sturgeon is currently allowed year-round (Oregon Department of Fish and Wildlife 2015c). Warm-water game fish species season is also year-round in the study area (Oregon Department of Fish and Wildlife 2015c). The spring Chinook and steelhead fishery for the Columbia River may be open from January to March depending on fishery management decisions, and Chinook and coho salmon fishing season runs from August to December.

The spring Chinook fishery in the Hayden Island area of the Columbia River is extremely popular and fishing participation rates have increased over recent years. During the spring Chinook season, between 135,000 and 145,000 angler days are documented on this section of the Columbia River between March 1 and June 1 (Port of Portland 2010). Also, the area between the mouth of the river and Tongue Point, which includes Youngs Bay, is a popular area for recreational fishing year-round, (Oregon Department of Fish and Wildlife 2016). This area is popular especially during the fall Chinook and coho salmon season, which generally peaks in the last 2 weeks of August (Washington Department of Fish and Wildlife 2016).

Dungeness crabs are caught in the estuary and in nearshore and offshore areas beyond the mouth of the river, and razor clams are harvested along the ocean beaches north and south of the mouth of the river.

Commercial Passenger Vessels (Non-Cruise Ships)

Commercial passenger (non-cruise ship) vessels transit from one port to another within the Columbia River; they include a range of vessels up to 100 gross tons carrying from six to over 150 passengers. Examples of these vessels include the Portland Spirit and Columbia Gorge Sternwheeler, which provide dinner cruises and day trips, respectively, and the Waikiakum County ferry, the only ferry on the lower Columbia River, which shuttles passengers and up to 12 cars at a time between Puget Island, Washington and Westport, Oregon.

Service Vessels

Service vessels, including military, law enforcement, search and rescue, pilot, pollution control, and tugs operate throughout the study area and could be found anywhere on the lower Columbia River at any time. The vessel types and activities are summarized below.

- USCG vessels in the study area consist of vessels stationed primarily at the Port of Astoria, Cape Disappointment, and Portland, Oregon. These vessels are used for search and rescue, maritime law enforcement, boating safety, Aids to Navigation, and homeland security.
- Oregon State Police and Washington State Police also operate vessels on the Columbia River to coordinate the enforcement of commercial fishery and sport angling regulations, and for special investigations. County governments along the Columbia River also staff full-time deputies assigned to patrol the waters of the Columbia River and conduct boat inspections. These local law enforcement vessels can be found operating within their respective jurisdictions of the Columbia River and its adjacent waterways.
- Pilot vessels are used to transport Bar and River Pilots to large vessels for pilotage duties described above in *Large Commercial Vessels, Vessel Traffic Management*. The Bar Pilots use one of two Pilot boats, the Astoria or the Columbia, both 72-feet long, for offshore transfers.[30] For transfers within the Columbia River, the River Pilots and the Bar Pilots use the Connor Foss, a 63-foot-by-17-foot aluminum vessel designed specifically for pilot transfers. The Bar Pilots make approximately 3,600 vessel crossings of the bar each year with vessels ranging from 100-foot tugs to 1,100-foot cargo ships. River Pilots pilot vessels upriver from Astoria including along 13 miles of the Willamette River from its confluence with the Columbia to the seawall in downtown Portland (Columbia River Pilots 2014).
- Three marine spill response vessels are staged in the study area at the Port of Astoria.
- Tugs operating in the study area include those towing or pushing barges from or to destinations beyond the study area and those from tug companies located along the Columbia River. The latter tug companies provide cargo barge movement services between ports along the river; move bunkers (fuel oil barges) to vessels requiring fuel; and provide docking, escort, and other assistance, as described above under *Large Commercial Vessels, Tug Assistance*.
- Dredges are used to maintain the navigation channel by removing excess sand, silt, and mud that naturally settles to the bottom and on the sides of the channel over time. Dredging operations are advertised to vessel operators transiting in the Columbia River and are conducted in such a manner as to generally not impede vessel traffic.

Recreational and Commercial Fishing Vessel Traffic Management

The USCG is the primary federal maritime law enforcement agency on the Columbia River. Oregon State Police and Oregon county law enforcement (Clatsop County Sheriff Marine Patrol) also patrol on the Columbia River (Oregon.gov 2016). Vessels in these state and local law enforcement units are used to regulate recreational and fishing vessel traffic on the river in accordance with state and local laws.

[30] Embarking and disembarking of Columbia River Bar Pilots offshore can be by boat or helicopter. It is the individual pilot's choice whether to use the boat or helicopter for transfers offshore, with the helicopter being used about 70% of the time (Rodino pers. comm.:52).

The USCG boards commercial fishing vessels at sea to ensure compliance with safety equipment requirements required by the Commercial Fishing Industry Vessel Safety Act of 1988. The USCG auxiliary conducts dockside inspections of commercial fishing vessels to supplement the at sea boardings and educate fishermen on safety equipment and training requirements (Kemerer and Castrogiovanni 2008). USCG vessels participate with state and local law enforcement in joint operations on a periodic basis to manage vessel traffic and maintain recreational boater safety (U.S. Coast Guard 2016). For example, during the months of August and September each year, the Coast Guard Auxiliary, in conjunction with USCG Station Cape Disappointment, Clatsop County Sheriff's Office, and Oregon State Police, engage in a Recreational Boating Safety surge operation to educate and inform boaters participating in Columbia River recreational salmon season. USCG also hosts Operation Make Way, a yearly joint recreational boater education and enforcement campaign, to educate recreational boat users about the need to give way and stay clear of large commercial vessels operating within the Columbia and Willamette navigation channels. The program aligns with state's and counties' recreational boating safety missions.

5.4.4.3 Ship Casualty Survey

The information presented in this section is based on data obtained from the USCG MISLE database and covers all available data from 2001 through 2014. The data are collected for 26 vessel incident types and are not predictive of cargo vessel casualties. Three primary incident types—collision, allision, and a combination of grounding/set adrift—are representative of the navigational incidents that could occur and compare best to the results of the incident modeling (Table 5.4-10).

Table 5.4-10. Incident Severity by Incident Type for Study Area (Total Incidents, 2001–2014)

Incident Type	Total Loss (% of Total)	Damaged (% of Total)	Undamaged (% of Total)	Total
Allision	3 (5%)	24 (43%)	29 (52%)	56
Collision	1 (5%)	9 (47%)	9 (47%)	19
Grounding /Adrift	1 (1%)	16 (21%)	59 (78%)	76
Total[a]	**5 (3%)**	**49 (32%)**	**97 (64%)**	**151**

Notes:
[a] Total may not sum due to rounding.
Source: DNV GL 2016

The database notes the severity of each incident and describes potential vessel damage. Table 5.4-11 presents the outcome distribution in three categories—total loss,[31] damaged, and undamaged—for marine incidents that took place between the Columbia River mouth and the Port of Portland.

The results of these data surveys are very similar to those from nationwide incidents in that approximately two-thirds of incidents resulted in no damage, one-third in some damage, and slightly less than 3% in total loss.

[31] For the purposes of this analysis, *actual total loss*, *total constructive loss: salvaged*, and *total constructive loss: unsalvaged* were combined into a single *total loss* category.

Table 5.4-11. Outcome Distribution for All Incidents in the Study Area by Vessel Type (2001–2014)

Vessel Type	Total Loss (%)	Damaged (%)	Undamaged (%)	Total (%)
Bulk Carrier	0%	2%	16%	18%
General Dry Cargo Ship	0%	1%	3%	4%
Ro-Ro Cargo Ship	0%	1%	1%	2%
Tank Ship	0%	0%	2%	2%
Barge	0%	2%	7%	9%
Passenger Ship	1%	8%	7%	15%
Towing Vessel	0%	7%	13%	20%
Fishing Vessel	2%	5%	13%	21%
Recreational	1%	3%	0%	3%
Military ship	0%	1%	0%	1%
Unspecified	0%	1%	3%	4%
Miscellaneous	0%	1%	0%	1%
Total[a]	**3%**	**32%**	**64%**	**100%**

Notes:
[a] Total may not sum due to rounding.
Source: DNV GL 2016

Table 5.4-10 shows that groundings were the most common type of incident, followed by allisions, then collisions. Although collisions represented less than 13% of total incidents during the survey period, they resulted in the highest severity outcomes, followed closely by allisions; groundings resulted in significantly less severe outcomes (78% of grounding resulted in no vessel damage). Table 5.4-11 presents the distribution of incident severity for all incidents by vessel type. The table shows that the higher severity events more typically involved smaller craft (e.g., fishing or recreational vessels).

5.4.4.4 Marine Oil Spill Survey

Vessel-related oil spills that occurred in the study area from 2004 to 2014 are presented in Table 5.4-12 by spill volume and incident type, based on MISLE, SPIIS, and ERTS data. Spill volumes per incident ranged from 0.1 gallon to 1,603 gallons. An average 15.6 oil spills per year occurred during the study period; of these, 84% had a volume of less than 10 gallons. As reflected in Table 5.4-12, most of the spills were not related to a vessel incident. Spills greater than 100 gallons occurred at a frequency of 0.4 per year or once every 2.2 years. The average size of these spills was approximately 630 gallons.

The vessel-related spill survey was largely confined to the specified time period (2004 to 2014) because this was the period of best overlap among all the datasets and because it provides a representation of present risk.

Table 5.4-12. Oil Spill Incident Count and Frequency—Lower Columbia River (2004–2014)

Incident Type	Oil Spill Incident Count by Spill Volume: <1 gal gallon	1–10 gallons	10–100 gallons	>100 gallons	Total	Oil Spills per Year
Allision	1	-	-	-	1	0.1
Capsize	1	-	-	-	1	0.1
Damage to the environment[a]	123	57	28	6	214	15.3
Grounding	-	-	1	-	1	0.1
Sinking	-	2	-	-	2	0.1
Total	**125**	**59**	**29**	**6**	**219**	**15.6**
Spills per year	**8.9**	**4.2**	**2.1**	**0.4**	**15.6**	

Notes:
[a] This category includes all other incident types and undetermined events including but not limited to those causing an oil sheen, which requires reporting under state law.

Larger-scale incidents involving the release of oil have occurred in previous years; however, these events predate legislation targeted at and largely successful in reducing the likelihood of oil spills from vessels or diminishing the impact of a spill should it occur, namely, the enforcement in U.S. waters of the International Convention for the Prevention of Pollution from Ships (MARPOL) and the Oil Pollution Act of 1990. The latter brought about more stringent planning and spill-prevention activities than the previous U.S. legislation (the FWPCA as amended by the Clean Water Act), improved preparedness and response capability (public and private), and established a double hull requirement for tank vessels.

5.4.4.5 Incident Management and Response Systems

The National Contingency Plan, codified in 40 CFR 300, establishes federal on-scene coordinators for oil spills and hazardous material releases within the inland zone and coastal environments. The plan is the foundation document for state, regional, and local planning for pollution response and provides organizational focus for the related emergency situations that can lead to oil spills, such as vessel groundings, collisions, allisions, and fires.[32]

USCG is the federal on-scene coordinator in the study area. In Washington State, Ecology is the designated state on-scene coordinator for spill response. The Washington Emergency Management Division functions in this role for natural disasters, and Washington State Patrol or state fire marshal for fires. The Washington State Emergency Response system is designed to provide coordinated state agency response, in cooperation with federal agencies for effective cleanup of oil or hazardous substance spills. Within Oregon, DEQ is the lead agency for oil or hazardous material spills, the Oregon Office of Emergency Management coordinates support from other state agencies, and the state fire marshal provides hazardous materials/fire incident response coordination and support when a situation exceeds local response capabilities.

The Northwest Area Contingency Plan is the regional planning framework for oil and hazardous substance spill response in the states of Washington, Idaho, and Oregon. Representatives from the

[32] Washington and Oregon legislative/regulatory requirements for state oil spill contingency plans applicable to vessels calling under the Proposed Action are listed in Table 5.4-1.

federal and state agencies listed above and local governments plan for spill response emergencies and implement response actions according to the plan when an incident occurs.

The plan includes but is not limited to the following elements.

- A description of the area covered by the plan, including the areas of special economic or environmental importance that might be damaged by a spill.
- Roles and responsibilities of an owner or operator and of federal, state, and local agencies in spill response and in mitigating or preventing a substantial threat of a discharge.
- A link to an online list of equipment available to respond to oil spills.
- Site-specific geographic response plans.

Geographic response plans, part of Northwest Area Contingency Plan, are tailored for specific shorelines and waterways. The main objectives of these plans are to identify sensitive resources at risk from oil spills and to direct initial response actions to sensitive resources.

In addition to the national and regional plans, the Lower Columbia Region Harbor Safety Committee maintains the Harbor Safety Plan, which includes incident management guidelines; emergency communications; notification requirements in case of an oil spill; steps to take in case of a vessel grounding, vessel collision, bridge allision, and mechanical or equipment failures.

All of these plans help coordinate response efforts by the responsible party (vessel owner/operator) and federal and state agencies.

Owners/operators of large commercial vessels are required to prepare and submit oil spill response plans under federal (33 CFR 155.5010-155.5075) and state requirements (WAC 173-182 and OAR 340-141) to ensure that resources, including equipment, are in place for a spill of the vessel's fuel oil and of any oil carried as secondary cargo. Moreover, vessel owners/operators are required to retain an oil spill removal organization and a spill management team; this is often accomplished by contracting with cooperative organizations that specialize in oil spill response, such as the Marine Spill Response Organization and National Response Corporation.

Additionally, vessels owners/operators can obtain oil spill response and contingency planning coverage under the Maritime Fire Safety Association (MFSA) response plan, an umbrella plan for enrolled vessels entering the Columbia River.

The incident response system in the study area for vessels covered by the MFSA response plan is described below for oil spills, fires, and collisions and groundings.

- **Oil spill.** If an oil spill occurs in the study area, USCG, Ecology, and DEQ—the federal and state on-scene coordinators—and the responsible party (RP) represent the Unified Command. The Unified Command coordinates responses, mitigation, and cleanup efforts for spills on the lower Columbia River to protect public health and safety, response personnel, and the environment. (Maritime Fire and Safety Association 2013)
- **Shipboard fire.** Under the Federal Fire Prevention and Control Act of 1974, fire prevention remains a local and state responsibility (Northwest Area Committee 2015). The local fire jurisdiction is the first responder to a shipboard fire. If the incident is beyond the local

jurisdiction's capacity, mutual aid resources[33] are requested through the MFSA Fire Protection Agencies Advisory Council (FPAAC). The FPAAC mutual aid network extends to 13 fire agencies along the lower Columbia/Willamette Rivers. If local and mutual aid resources are exhausted, the local fire chief requests assistance from the state emergency management office. With appropriate approvals, the state fire chief (Oregon) or state fire marshal mobilization coordinator (Washington) takes control over response (Office of State Fire Marshal 2015; Office of the State Fire Marshal, Washington State Patrol 2015). The USCG COTP acts as the federal on-scene coordinator, if a shipboard fire occurs outside a fire agency's jurisdiction but within the Sector Columbia River COTP zone, or if a vessel fire is treated as a search-and-rescue case (Northwest Area Committee 2015).

- **Collision and grounding incident response.** For collision and grounding incidents, the vessel operator immediately secures watertight closures and contacts the USCG COTP, Ecology, and DEQ. The USCG COTP may establish a communications schedule, request periodic vessel updates, and issue a safety marine information broadcast. In response to a collision, USCG response personnel and state investigators assess and supervise the incident and may form a Unified Command. Unified Command instructs responsible parties on separating joined vessels and moving vessels to anchorage. The USCG COTP works with the vessel operator and Unified Command to initiate pollution response, as necessary. In most cases, a surveyor is required to inspect damage and verify repairs. In response to a grounding, the objective is to refloat and minimize damage to the vessel and environment. The responsible party may be required to activate the response plan to minimize any pollution threat, at the discretion of the Unified Command.

5.4.5 Impacts

This section describes the potential direct and indirect impacts related to vessel transportation that would result from construction and operation of the Proposed Action and the No-Action Alternative.

5.4.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area as a result of construction and operation of the Proposed Action. The Proposed Action would load an average of 70 vessels per month or 840 vessels per year, which would equate to 1,680 vessel transits in the Columbia River. Proposed Action-related cargo vessels would be required by federal and state law to meet vessel standards and plan requirements. These include structural, fire-fighting and personnel requirements as well as oil spill contingency and response plans as previously described.

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

[33] Local and state firefighting organizations enter into reciprocal agreements to provide mutual aid when a single jurisdiction's resources are overwhelmed.

In-water dock construction (pile-driving, dredging, and general construction of above-water elements) would occur over a 6-month to 1-year period (Grette Associates, LLC 2014). For this work, barges would be located near Docks 2 and 3. The barges would be positioned outside of the navigation channel, so as to not impede vessels traveling within the channel. They would also be placed outside of the area used by vessels accessing Dock 1, so they would not affect these activities. Additional information on dredging and pile driving is included in Chapter 4, Section 4.5, *Water Quality*.

Construction—Indirect Impacts

Construction of the Proposed Action would result in the following indirect impacts. Construction-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

As described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*, the Applicant has identified three construction-material-delivery scenarios: delivery by truck, rail, or barge. If material is delivered by barge, it is assumed that approximately 1,130 barge trips would be required over the construction period. Approximately two-thirds of the barge trips would occur during the peak construction year, assumed to be 2018. Approximately 750 barge trips in the study area would be required during the peak construction year to deliver construction materials. Because the project area does not have an existing barge dock, the material would be off-loaded at an existing dock elsewhere on the Columbia River and transported to the project area by truck.

Barges are shallower in draft and could transit the Columbia River navigation channel during periods of low water to avoid interference with larger vessel traffic. Coordination would take place with the River Pilots prior to and during transit activity. Moreover, the barges would be transiting a portion of the navigation channel during construction in the vicinity of the project area and not the entire study area. Therefore, impacts on vessel traffic in the study area as a result of construction-related barge traffic would be low because barge traffic would avoid interference with larger vessels and would only traverse a portion of the lower Columbia River.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*. The Proposed Action would load 70 vessels per month or 840 vessels per year, which would equate to 1,680 vessel transits in the Columbia River.

Loading coal onto vessels for export is the only activity proposed for the new docks, Docks 2 and 3. Vessel loading would be performed using an electric-powered shiploader. Each dock would have one shiploader. Each shiploader would have an average capacity of 6,500 metric tons per hour. At maximum throughput, an average of 70 vessels per month (an average of over two per day) would be loaded at Docks 2 and 3. The berths for Docks 2 and 3 are expected to be occupied by Proposed Action-related vessels 365 days per year.

River Pilots would pilot the incoming and outgoing vessels (from Astoria inland and vice versa) and direct docking and undocking maneuvers. At least two tugs would be used to assist with docking and undocking maneuvers for each arriving and departing Proposed Action-related vessel. Therefore, at least two tugs would be active in the vicinity of the docks four times per day on average. The pilot would determine the appropriate size and horsepower of the tugs depending on factors such as the size of the vessel, the weather conditions, and the currents at the time of maneuvers.

Docks 2 and 3 would be designed to accommodate dry bulk cargo ships up to 830 feet long and 130 feet wide, which would accommodate standard Panamax vessels and the somewhat smaller Handymax vessels. The berths at Docks 2 and 3 would be 43 feet deep, which is the depth at which the Columbia River navigation channel is maintained (U.S. Army Corps of Engineers 2015).

The expected fleet mix is 80% Panamax and 20% Handymax vessels. Table 5.4-13 contains the size and dimensions of these types of vessels assumed for the risk analysis.

Table 5.4-13. Vessel Sizes and Dimensions for Panamax and Handymax Vessels Assumed in the Risk Analysis

Vessel Class[a]	Deadweight (tons)	Length Overall (feet)	Beam (feet)	Draft (feet)
Handymax	46,101	600	106	36.1
Panamax	68,541	738	106	43.6

Notes:
[a] These specifications chosen to represent the size and dimensions for Panamax and Handymax vessels are representative of an "average-sized" Panamax vessel and an average-sized Handymax vessel.
Source: DNV GL 2016: I-4.

Operations impacts related to the Proposed Action are based on the following assumptions.

- The River Pilots indicate (Gill pers. comm.) that they anticipate turning the ships at the project area in loaded condition (i.e., in preparation for departure, as opposed to turning downstream upon arrival).[34] Thus, inbound ships would approach Docks 2 and 3 in ballast (headed upstream), maneuver out of the navigation channel toward the dock, and align parallel to the dock, docking with the assistance of tugs.
- Pilots estimate that operations at the project area (Docks 2 and 3) would require the two assisting tugs to have bollard pull ratings of at least 30 tons operating ahead and at least 22.5 tons operating astern. Those tugs would be in the 3,000-to-4,000-horsepower range (Gill pers. comm.). Pilots would determine tug assistance needs.
- A typical departure of a loaded vessel off the dock (with the assistance of the tugs) would involve moving the bow out into the channel, while keeping the stern near the dock to give the pilot accurate positioning of the vessel during the turn, and allowing the current to rotate the bow until the vessel points downriver and can begin moving downriver. The width of the channel at this point is approximately 1,200 feet, which provides a turning area approximately 1.6 times the length of the vessel.
- Currently, maneuvering a vessel to the existing berth (Dock 1) upstream of the proposed docks can be challenging due to the strong current outflow from the bank (Amos pers. comm.). Pilots expect that conditions for the proposed docks (Docks 2 and 3) would require similar operations as Dock 1 (Gill pers. comm.). Pilots would be aware of this issue and would consider it during planning and operations.

[34] Currents in the river at the project area are typically directed downriver or ebbing due to the river flow overriding the tidal currents. It is expected to be more efficient and safer to dock the ship heading into the current using the forward power of the engines which is stronger than the vessel's backing power. When the loaded vessel leaves the dock with the bow pointing upriver, the currents assist the vessel turning in the channel by pushing the bow around and downriver. Pilots are responsible for vessel movements and will determine the appropriate actions for vessel arrivals and departures.

Should an incident occur during operations, it would most likely be attributable to increased risk of a vessel fire at the dock, an increased risk of an oil spill while at the dock, or an increased risk of a vessel allision while at the dock. Each of these situations is discussed below.

Increase the Risk of a Vessel Fire while at the Dock

Coal in any form, is a combustible material, making it susceptible to a variety of ignition scenarios. Coal fires during transfer and loading operations are typically caused by one of two sources of ignition: the coal itself (self-ignition) and the conveyor belt used in the transport of coal (e.g., over-heating due to damaged bearings, roller, belt slip). Safety requirements prohibit open flames near coal loading operations.

A fire in the vessel's machinery spaces or accommodation areas is a potential emergency scenario. Vessel design standards, fire equipment requirements, and crew training would be required to prevent or to facilitate rapid response to a vessel emergency while at the dock. All of these standards and requirements are implemented in accordance with the International Convention for the Safety of Life at Seas (SOLAS) in foreign and domestic cargo vessels (and codified in U.S. regulations) and enforced by USCG.

A bulk carrier such as the Proposed Action-related vessels would have the following fire prevention and response features.

- Structural fire protection, including certain bulkheads constructed to prevent the passage of flame and smoke for one hour. Other bulkheads must be constructed of incombustible materials. Current regulations require that risk of fire hazards be eliminated as much as possible in other construction features of the vessel (46 CFR 92).
- Structural insulation around compartments containing the emergency source of power (such as the ship's service generators). Other approved materials capable of preventing an excessive temperature rise in the space may also be used to eliminate the spread of a fire that originates in this type of compartment (46 CFR 92).
- Fire pumps, hydrants, hoses, and nozzles for the purposes of onboard firefighting. In addition, certain spaces must have approved hand-portable fire extinguishers and semiportable fire extinguishing systems (46 CFR 95).
- Officers and crewmembers with a basic level of training that includes fire prevention and firefighting (U.S. Coast Guard 2014).

Within the hold of a vessel, coal can be susceptible to ignition due primarily to self-heating and/or the creation and subsequent ignition of certain gases, including methane and hydrogen. Fire detection systems including carbon monoxide detection and infrared scanning would be in place to monitor and minimize the potential for onboard coal fires. Additionally, manual scanning by workers would enhance built-in mechanical-detection systems. Automated fire-suppression systems that are activated in the early stages of fire development are critical to reducing the potential for flame spread. These typically include water sprinklers combined with a fire extinguishing agent such as wetting agents or foam. Therefore, an onboard emergency is unlikely to affect resources other than the vessel itself.

Increase the Risk of an Oil Spill while at the Dock

An operational oil spill at the dock would most likely occur during bunkering (i.e., a ship receiving fuel while at the dock). The Applicant has committed to not allowing vessel bunkering at Docks 2 or 3; therefore, there would be no risk of an oil spill at a dock associated with oil transfers under the Proposed Action. Under proposed Mitigation Measure MM VS-2, the Applicant will notify Cowlitz County and Ecology if bunkering is proposed at Docks 2 and 3 in the future, so Cowlitz County and Ecology can determine if additional environmental review is required. Oil spill risks that might occur during transit are addressed under *Operations—Indirect Impacts*.

Increase the Risk of a Vessel Allision at the Dock

An allision occurs when a vessel strikes a fixed structure, such as a Proposed Action-related vessel striking the proposed docks at the project area or another vessel striking a Proposed Action-related vessel at berth.

Pilots sometimes experience difficulties getting a ship to the berth at the existing Dock 1, located just upstream of proposed Docks 2 and 3. Information about maneuvering challenges at Docks 2 and 3 cannot be collected and evaluated until the docks are built and vessel maneuvers take place at the project area. Nevertheless, the pilots' experience at nearby Dock 1 in the Applicant's leased area introduces a certain level of uncertainty associated with the aggregate influence of currents and river flow at Docks 2 and 3. A potential outcome when there are strong currents in the vicinity of the dock during vessel maneuvers is an allision. An allision may also occur if there were a loss of steering or loss of propulsion during transit or maneuvering at the dock. Despite the uncertainty associated with vessel maneuvers at the dock, the likelihood of a vessel allision is lessened due to the presence of tug power while docking and undocking.

Risk of allision could also involve another vessel striking a Proposed Action-related vessel while the Proposed Action-related vessel was at berth. As noted in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, several ports are located upstream of the project area and other vessels traveling to and from those locations would pass the project area. Based on incident modeling (DNV GL 2016), the likelihood of an allision under the Proposed Action is once in 39 years. However, as noted in Section 5.4.4.3, *Ship Casualty Survey*, most allisions do not result in substantial consequences, such as a total vessel loss. From 2001 and 2014, 5% of allisions resulted in substantial consequences, such as total vessel loss, and all of these events involved fishing vessels only.[35]

Operations—Indirect Impacts

All large commercial vessel traffic bound for Longview or ports further upriver, including the Port of Portland and Port of Vancouver, pass the project area. Transiting Proposed Action-related vessels could affect or be affected by other vessel movements in the study area. Moreover, increased vessel traffic could result in changes in wake patterns, increased propeller wake, and increased underwater noise, and vessel emissions that could affect other environmental resources. These impacts are addressed in Chapter 4, Section 4.5, *Water Quality*, and Sections 5.5, *Noise and Vibration,*

[35] The data also show that between 2001 and 2014, 4% of the allisions resulting in some damage were bulk carrier allisions.

and 5.6, *Air Quality*. Impacts on the vessel transportation system and related environmental resources along the Columbia River navigation channel due to vessel operations are considered to be indirect impacts.

The factors that influence the potential for incidents during vessel transport are complex but are driven largely by changes in the pattern of vessel traffic particularly those vessels limited to the navigation channel. Table 5.4-14 compares large commercial vessel traffic under existing conditions (based on 2014 AIS data), the No-Action Alternative (2028), and with the Proposed Action (2028).

Table 5.4-14. Existing and Projected Large Commercial Vessel Traffic in the Lower Columbia River

Condition	Vessel Transits[a] per Year
Existing Conditions (2014)	3,862
No-Action Alternative (2028)	4,440
Proposed Action (2028)	6,120

Notes:

[a] Transit numbers differ slightly from those presented in Table 5.4-7 in the discussion of historical vessel traffic volumes (Section 5.4.4.2, *Vessel Traffic*). The 2004–2014 historical volumes presented in that table are based on Bar Pilot data, whereas the transits presented here, which were the basis for the DNV GL (2016) risk assessment, are based on AIS data. The variance is a result of different recording methods and vessel type designations of the data sources.

Source: Based on 2014 AIS data for Cargo/Carrier, Tanker, Tug, and Passenger vessel types; a projected growth rate of 1% was applied to the 2014 transits to obtain the 2028 vessel transits under the No-Action Alternative; and proposed vessel transits (1,680) were added to the no-action transits to obtain transits with the Proposed Action.

For the purposes of incident modeling, the baseline traffic year of 2014 was selected to represent relatively recent traffic conditions on the river.

The vessel incidents evaluated in the modeling include allision, collision, grounding (powered or drift), and fire/explosion, because they are most likely to result in substantial consequences if they occur (Section 5.4.4.3, *Ship Casualty Survey*). Incident modeling considered the interaction between Proposed Action-related vessels and other large commercial vessels using the channel, as well as smaller vessels (e.g., recreational boats or commercial fishing vessels) not limited to the channel. The potential increase in these risks are discussed below.

Increase the Risk of a Vessel Allision (with a Fixed Object) during Transit

For vessels outbound from the project area, no fixed structures or waterfront facilities are close to the edge of the channel until the Port Westward dock at river mile 53 (Figure 5.4-1) and after that a small barge terminal dock at river mile 36. Thereafter, there are no facilities or structures until reaching the Port of Astoria, and those structures are well clear of the channel.

The Astoria-Megler Bridge is the next structure encountered, and once past that, the remaining structures are the jetties at the entrance of the river.[36] Due to the minimal impediments to vessel

[36] Since they are piloted, large commercial vessels have an advantage over fishing and recreational vessels because pilots are specifically trained to keep a large commercial vessel from alliding with a known object in the navigation route, including a bridge. There was an allision at the Astoria-Megler Bridge that involved a piloted vessel approximately 30 years ago. Since this incident, Bar Pilots have implemented risk reduction measures to reduce the probability of allisions at the bridge; they avoid meeting other piloted vessels at the bridge, observe weather and river current conditions, and review weather forecasts before transiting under the bridge (DNV GL 2016).

traffic within the navigation channel, the likelihood of a Proposed Action-related vessel alliding with a fixed structure while in transit is low and was not quantitatively evaluated in the risk assessment (DNV GL 2016). As shown in Table 5.4-10, 56 vessel allisions occurred in the study area from 2001 to 2014 (compared to an average of over 3,000 large commercial vessel transits annually during this time). Of these, just over half (52%) resulted in no damage, 43% resulted in some level of damage, and 5% resulted in total loss.[37] Therefore, although there would be an increase in risks compared to existing conditions, the overall risk of a Proposed Action-related vessel resulting in an allision to or from the project area would be low.

Increase the Risk of Other Incidents during Transit

Increased risks associated with the Proposed Action also include the potential for more collisions, groundings, or fires/explosions. While a collision may seem like a more likely incident scenario in the two-lane channel, the vessel casualty data (Table 5.4-10) and incident modeling results (Table 5.4-15) show that groundings, specifically powered groundings, are more likely under all traffic scenarios.

As presented in Table 5.4-15, the Proposed Action would increase the potential for incidents compared to both existing condition (2014) and the No-Action Alternative (2028). The predicted increase in incidents is primarily because of the increase in the number of vessels transiting the lower Columbia River. It should be noted that the consequences of a modeled incident can vary greatly from no damage to total loss and that the increase in likelihood alone is not representative of the magnitude of the potential consequences. In other words, not all of these incidents are likely to result in notable damages. For example, of the 151 reported incidents that occurred in the study area from 2001 through 2014 (Table 5.4-10), 64% resulted in no damage, 32% resulted in damage, and 3% resulted in total loss.

Table 5.4-15. Predicted Incident Frequencies per Year in the Study Area

	Incident Frequency				
Scenario	**Predicted Collision**	**Predicted Powered Grounding**	**Predicted Drift Grounding**	**Predicted Fire/ Explosion**	**Total**
Existing Conditions (2014)	1.94	11.8	2.8	0.0032	16.6
No Action (2028) Conditions	2.53	13.6	3.3	0.0037	19.4
Proposed Action (2028) Conditions	3.06	15.2	3.9	0.0043	22.2

Notes:
Source: DNV GL 2016

Additionally, the incident frequencies predicted for existing conditions are from a single year (2014). While this year accounts for higher vessel traffic compared to the previous few years, it does not account for the wide historical variation in vessel traffic. Further, because the Proposed Action would ramp up over time, comparing the addition of 840 vessels to existing conditions is a conservative approach. Therefore, it is important to also consider how the No-Action Alternative would compare to existing conditions and how the Proposed Action would compare

[37] All total losses resulting from allision were to fishing vessels.

to the No-Action Alternative. As shown in Table 5.4-15, a relative increase in the likelihood of all incident types would occur over time unrelated to the Proposed Action.

Collisions

In general, the River Pilots and Bar Pilots avoid overtaking situations where one vessel passes another from behind. Thus, the most likely collision scenario is an inbound vessel meeting an outbound vessel. The River Pilots have identified specific points on the river where conditions are not suitable for vessels to pass each other, and they carefully manage transits to avoid two vessels meeting in those locations and instead manage the vessel transits so if they do need to pass each other, it is at a safe area. Avoidance of these areas was taken into consideration in calculating incident frequencies (i.e., estimating the likelihood of a collision due to the Proposed Action) in the incident modeling.

The most likely collision scenarios are bow-to-bow and side-to-side contact involving two large commercial vessels transiting the navigation channel. Bow-to-side is a possibility, but the channel width and the sizes of the vessels would likely make it more of a glancing impact rather than a straight ahead "T" impact.

Bow-to-bow contact is generally viewed as the easiest type of collision to avoid because the target area is small and either vessel can act independently to avoid it. Also, a vessel's bow is its strongest structural point and bow-to-bow collisions would not be expected to result in cargo hold damage or fuel oil release. In addition, the hydrodynamic interaction between ships meeting causes the bows to be pushed away from each other as they approach.

Side-to-side or a glancing bow-to-side collision could result in damage to the hull, but the likelihood of catastrophic damage is relatively low. For dry cargo vessels—including bulk carriers—it is unlikely any coal cargo would be released into the water in the event of an angle of impact less than 22.5 degrees (DNV GL 2016). For tank vessels—including ATBs carrying oil in bulk—the risk of an oil spill cannot be ruled out; however, modern tank vessel design standards, including double hull construction of tankers, significantly reduce that potential.

As noted in Section 5.4.4.2, *Vessel Traffic*, *Other Vessels*, the Columbia and Willamette Rivers provide important fisheries for commercial, tribal, and recreational purposes. Although these smaller vessels are not restricted to the navigation channel, they often cross the river to access various locations in the study area. Particularly during periods of high fishing activity, there would be an increased chance for a vessel incident to occur. However, in general, because these smaller vessels are not restricted to the channel and must by law yield to oncoming large commercial vessels, the potential for a collision between a smaller vessel and a Proposed Action-related vessel would be low. Although it is not possible to predict the types of vessels that might be involved in a future incident, the incident modeling does show a very small increase in the potential for collisions involving fishing (0.04 incident per year) and recreational (0.01 incident per year).

Groundings

The River Pilots noted that there are few areas where waterway conditions create a substantial chance for a grounding to occur. They also noted that the nature of the river channel is such that there is a bank cushion effect that helps to keep vessels away from the channel edges[38] (Amos pers. comm.). The vessel drafts assumed in the analysis and presented in Table 5.4-13 are representative of fully loaded vessels; the actual draft of any given transiting vessel would depend on the amount of cargo or ballast water onboard. Actual draft information is provided to pilots prior to transiting the Columbia River. As described in Section 5.4.4.2, *Vessel Traffic*, *Large Commercial Vessels*, *Vessel Traffic Management*, pilots have final decisions for vessel movements and determine if the planned operation can be successfully completed. The Columbia River Pilots' Vessel Movement Guidelines (Columbia River Pilots 2016) state "vessels may be permitted to sail with the maximum freshwater draft of 43 feet if the river level, tide, and conditions permit." As stated in Section 4.4.2.2, *Vessel Traffic*, *Vessel Traffic Management*, pilots operating draft-constrained vessels in the study area have to adjust the time of their transit to allow for at least 2 feet of under-keel clearance on the river plus expected squat to reduce the risk of groundings.

Fires, Explosions, and Other Emergencies

Equipment failure affecting power or steering while the vessel is underway could lead to loss of control of a vessel. A fire in the vessel's machinery spaces or accommodation areas is also a potential emergency scenario. For any of these situations the vessel master would do what is necessary to protect the safety of the crew first and avoid damage to the vessel second. A prudent action would be to remove the vessel from the navigation channel to a "safe haven," a location where appropriate actions can be taken by the vessel crew without compounding the emergency by involving another vessel or structure. Safe haven opportunities on the river are minimal. Marine terminals at the port areas and designated anchorages are the only places where vessels can stop to manage an emergency. Two anchorages at Astoria can accommodate five deep-draft vessels, at most, depending on their sizes. There are no other anchorage areas until reaching Longview (past the project area). Once a loaded vessel gets underway inbound to or outbound from the Longview area, it is committed to completing the planned transit.[39]

Nothing prevents a vessel's master from anchoring anywhere in the river under emergency conditions; however, there is no way to predict how successful such an action might be in stopping the vessel. Anchoring effectiveness is dependent on factors such as the nature and condition of the waterway bottom, water depth, and vessel speed at the time of the anchoring. Risks include the potential for the anchor to damage the vessel if the water is not sufficiently deep. The vessel's location in or near the channel could also hamper or endanger other vessels depending on its location at the time. Dropping an anchor or anchors in an attempt to stop a vessel would be done only if other control measures failed. Opportunities for these emergency measures would be discussed as part of the pretransit planning between the master and the pilot.

In an emergency, a vessel could anchor in the channel at some locations; however, that presents significant risks for the vessel regarding the narrow channel and most likely would block

[38] When the vessel is near to the bank, the water is forced between the narrowing gap between the vessel's bow and the bank. This water tends to create a "cushion" that pushes the vessel away from the bank.

[39] A number of potential sites for additional anchorages are being discussed by the waterway stakeholders; however, they generally are shallow water sites. Reportedly, the discussions include the possibility of the Corps maintaining those areas as part of the navigation channel. Provision of additional stern buoys is also being considered.

virtually all other traffic. The likelihood of a vessel emergency causing a collision is low. Safe haven limitations (described above) mean that vessel transit would not begin until everyone involved is satisfied that the vessel is fully capable of completing the transit.

Although a vessel emergency increases the likelihood of indirect impacts on the Columbia River waterway, the likelihood of such an emergency occurring is very small. As shown in Table 5.4-15, the likelihood of fires and explosions is substantially lower than any other type of incident considered in the risk assessment. If such an emergency were to occur, the presence of a qualified vessel master and the pilot, in addition to crew training, vessel design, and equipment would help minimize the harmful impact on human safety and environment.

Increase the Risk of a Bunker Oil Spill during Transit or at Anchorages

An oil spill involving diesel or heavy fuel oil could occur as the result of an incident during transit or during bunkering transfers at locations other than the proposed docks. If an incident occurred that resulted in an impact, there is a possibility that a fuel tank could be damaged and fuel spilled. Oil spills could also occur during bunkering at anchorages within the study area. In general, the risks of spills would increase under the Proposed Action due to an increase in the number of vessels calling at the project area and the resultant increase to overall vessel traffic in the study area. To provide additional information about the relative likelihood of various sized oil spills, the risk assessment also quantitatively evaluated the incremental increase in risks of a spill (in the event of a collision or grounding) due to the Proposed Action.

Tables 5.4-16 and 5.4-17 present the likelihood (in terms of return periods[40]) of representative spill sizes that could occur as the result of the modeled increased risk of collisions or groundings, respectively.

Table 5.4-16. Example Bunker Oil Spill Volumes and Frequencies due to Collisions Related to the Proposed Action (2028 and 2038)

Return Period (years)[a]		
2028	**2038**	**Oil Spill Volume (gallons)**
341	224	20,900 or less
581	381	59,300 or less
676	444	107,400 or less
3,748	2,461	166,500 or less

Notes:
[a] Frequency of collisions in 2038 is higher compared to 2028 due to an increase in the overall vessel traffic in the study area.
Source: DNV GL 2016

[40] Estimated period of time between occurrences of an event.

Table 5.4-17. Example Bunker Oil Spill Volumes and Frequencies due to Groundings Related to the Proposed Action (2028 and 2038)

Return Period (years)[a]	Oil Spill Volume (gallons)
140	5,700 or less
182	10,700 or less
403	39,700 or less
4,299	45,800 or less

Notes:
[a] Grounding frequencies do not vary from 2028 to 2038 since the number of project vessels remains at 840 in both years.
Source: DNV GL 2016

As shown in the tables, the likelihood of bunker oil spills from a vessel incident is relatively low with the most likely scenarios occurring in the range of once every 224 years for collisions (2038 traffic levels) and once every 140 years for groundings (2028 or 2038 traffic levels). As noted in Section 5.4.4.4, *Marine Oils Spill Survey*, spills that have historically occurred in the study area are much smaller than the quantities indicated in Tables 5.4-16 and 5.4-17 and have ranged from 0.1 gallon to 1,603 gallons.[41] The average number of oil spills within this same timeframe (2004 to 2014) is 15.6 spills per year with 84% having a volume of less than 10 gallons. Spills of more than 100 gallons have occurred at a frequency of 0.4 per year or once every 2.2 years. The average size of these relatively larger spills is approximately 630 gallons.

The reason that the potential spill sizes modeled for the Proposed Action are larger is because the spill scenarios presented above are associated with large-scale vessel incidents: collisions or groundings. For such an incident to result in a release of bunker oil, the energy involved in the initial incident must be great enough to puncture the vessel's tanks. Increases in the types of oil spills of a scale more similar to those that have occurred over the last 10 years or so would also be expected under the Proposed Action to be somewhat commensurate with the relative increase in vessel traffic. Expansion of the casualty survey to a longer (beyond 11 years) timeframe, would include more unlikely events of a larger scale more in line with those addressed by the incident modeling.

An amendment to the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex that went into force in 2007, included a new regulation 12A on oil fuel tank protection. That regulation applies to any ship that has an aggregate oil fuel capacity of 785 cubic yards (3,774 barrels [158,508 gallons] of oil equivalent) or more and was contracted for on or after August 1, 2007; or had a keel laying date on or after February 1, 2008; or was delivered on or after August 1, 2010. The regulation limits an individual fuel tank to a maximum capacity limit of 3,270 cubic yards (15,725 barrels) and also includes requirements for the protected location of the fuel tanks and performance standards for accidental oil fuel outflow. It requires consideration of general safety aspects, including maintenance and inspection needs, when approving the vessel's design and construction. These improvements have helped to reduce the extent of releases in the event of a vessel incident.

[41] Data presented in Section 5.4.4.4, *Marine Oil Spill Survey*, include all reported vessel-related spills from 2004 to 2014, not just those caused by vessel incidents such as groundings and collisions.

Increased vessel traffic associated with the Proposed Action also has the potential to result in increased risk of oil spills during bunkering activities. Causes of oil spills during bunkering transfers include overflow of the tank, parting of the hose due to mooring fault, operator error in connecting the hose, failure of the hose or pipework, and failure of bunker tanks (HSE 2012). Experience from insurance claims (Gard 2002) is that most bunker spills result from an overflow of the bunker tank due to carelessness or negligence, either on the part of those supplying the bunkers, or those on board the vessel receiving them. The main safeguards against the occurrence of bunker spills are use of bunkering best practices, including attentive tank-level monitoring and valve alignment, use of bunkering procedures and checklists, and supervision of the bunkering operation by a qualified person.[42] Standard/ABS (2012) lists the main features of such procedures.

The consequences of a spill of heavy fuel oil into the marine environment are in general considered to be more severe than for other fuels, although this may depend on the sensitivity of the local environment to acute toxicity (DNV 2011). Undoubtedly, spills of heavy fuel oil will be more persistent, taking longer to weather naturally and being more difficult to clean up. The average cleanup costs per metric ton of oil spilled have been estimated as more than seven times higher for heavy fuel oil[43] than for diesel (Etkin 2000).

There were nine oil spills during refueling of large cargo vessels that occurred in the study area from 2004 to 2014. Spills of oil cargoes are better documented than spills from bunkering. Therefore, previous risk analyses have assumed the frequency of spills during bunkering is the same as during transfer of liquid cargoes: 1.8 by 10^{-4} (one spill every 5,555 years) per bunkering operation for spills exceeding 1 metric ton (7.3 barrels or 308 gallons). The frequency of smaller spills is likely to be much greater. This implies that the annual likelihood depends on the number of bunkering operations. If the ship bunkers 10 times per year, the likelihood of a spill of 1 metric ton or more would be 1.8 by 10^{-3} per year, or approximately 1 chance in 500 per year. Although it is not possible to predict the number of vessels that may bunker or where they would bunker, the risks of a spill during transfer would slightly increase due to the increase in vessel trips under the Proposed Action.

Increase Vessel Activity

Increased vessel traffic associated with the Proposed Action would also have the potential to result in other impacts from increased activity, vessel wakes, propeller wash, underwater noise and vibration, and vessel emissions. The potential impacts on cultural resources, water quality, and fish are addressed in Chapter 3, Section 3.4, *Cultural Resources*, and Chapter 4, Sections 4.2, *Surface Water and Floodplains*, 4.5, *Water Quality*, 4.6, *Vegetation*, 4.7, *Fish*, and 4.8, *Wildlife*, respectively. The magnitude of these vessel-related impacts would depend on a variety of interrelated factors, including but not limited to, distance of the channel from the shoreline, depth of the intervening riverbed, placement and size of dredged materials, the presence of particularly sensitive species, the speed and size of the vessels, the prevailing river and tidal

[42] *Bunkering Best Practices: A Reference Manual for Safe Bunkering Operations in Washington State* (Washington State Department of Ecology 2014) and Bunkering Guidelines in *Lower Columbia Region Harbor Safety Plan* (January 2013). These references provide extensive guidelines related to winds, sea states, mooring equipment, tug availability, and regulatory requirements to provide for safe, spill-free bunkering operations.

[43] Heavy fuel oil is used in marine main diesel engines. It is a residue from crude oil refining and because of its properties, heavy fuel oil is required be stored and used at a high temperature.

currents, and otherwise naturally occurring wave action. Many of these factors are regulated by the federal government, including dredging activities, the placement of dredged spoils, and vessel traffic management in the study area. In general, the increase in deep-draft vessels associated with the Proposed Action would result in the increased potential for vessel-related impacts to occur.

5.4.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses including an expanded bulk product terminal. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement. No new docks would be built under the No-Action Alternative.

The No-Action Alternative would increase vessel traffic by approximately 20 vessel calls (40 trips) per year. In addition, vessel traffic in the study area in general would continue to increase over time with further industrial development along the river. As assumed for the incident modeling, large commercial vessel traffic would increase to approximately 2,200 vessel calls (4,400 transits) per year by 2028. Therefore, there would be an increase in the number of incidents likely to occur compared to existing conditions unrelated to the Proposed Action.

Management of vessel traffic on the lower Columbia River will be an ongoing concern for federal (USCG and Corps) and state (Ecology and DEQ) agencies, local coastal jurisdictions, the Bar Pilots and River Pilots, maritime associations (such as PDXMEX and MFSA), and private interests. With or without the Proposed Action, vessel traffic volume is expected to be variable along the lower Columbia River due to economic and market fluctuations, changes in port infrastructure, and vessel design modifications. The Columbia River VTIS and the Lower Columbia Region Harbor Safety Committee are both part of a system that functions to adapt the processes currently in place in the Columbia River to changes in the nature and the volume of vessel traffic.[44] These systems are in place and would continue to operate under the No-Action Alternative and help reduce the impacts related to the anticipated increases in vessel traffic in the lower Columbia River.

5.4.6 Required Permits

No permits related to vessel transportation would be required for the Proposed Action.

5.4.7 Proposed Mitigation Measures

This section describes the mitigation measures that would reduce impacts related to vessel transportation from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and

[44] The Lower Columbia Region Harbor Safety Committee consists of federal, state, and local government representatives, port employees, vessel and facility operators, vessel agents, spill response cooperatives, and any other stakeholders that meet on a regular basis to exchange information, plan for contingencies, and review current operating procedures in light of any recent incidents. The *Lower Columbia Region Harbor Safety Plan* includes regularly revised guidelines on current traffic management practices and procedures for port users and is available via the Harbor Safety Committee's website (http://www.lcrhsc.org/).

compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

5.4.7.1 Applicant Mitigation

The Applicant will implement the following mitigation measures.

MM VS-1. **Attend Lower Columbia River Harbor Safety Committee Meeting**. The Applicant will attend at least one Lower Columbia River Harbor Safety Committee meeting per year before beginning operations and every year during operations. The Applicant will provide notification of attendance to Cowlitz County.

MM VS-2. Notify if Bunkering at Docks Occurs. The risk of an oil spill at Docks 2 and 3 would primarily be during bunkering (refueling) operations. The Applicant has committed to no bunkering at Docks 2 and 3. If this changes and bunkering is proposed at Docks 2 and 3, the Applicant will notify Cowlitz County and Ecology who will determine if additional environmental review is required before bunkering operations are conducted.

5.4.7.2 Other Measures to be Considered

It is recommend that the Applicant participate in regular Lower Columbia River Harbor Safety Committee meetings.

5.4.8 Unavoidable and Significant Adverse Environmental Impacts

Compliance with laws and implementation of the mitigation measures would reduce impacts related to vessel transportation. If a Proposed Action-related vessel incident such as a collision or allision occurred, the impacts could be significant, depending on the nature and location of the incident, the weather conditions at the time, and whether any oil is discharged. Although the likelihood of a serious Proposed Action-related vessel incident occurring is very low, there are no mitigation measures that could completely eliminate the possibility of an incident or the resulting impacts.

5.5 Noise and Vibration

Sound is a fundamental component of daily life. When sounds are perceived as desired, beneficial, or otherwise pleasing, they are typically considered as having a positive effect on daily life. When sounds are perceived as unpleasant, unwanted, or disturbingly loud, they are considered noise. Noise may interfere with a broad range of human activities such as communication or sleep. Noise disturbance varies depending on the conditions and on the particular land uses and activities near the sound source and the sensitivity of those land uses.

Vibration is motion described in terms of displacement, velocity, or acceleration. People are usually sensitive to perceptible vibration. An increase in noise or vibration can affect the peacefulness, serenity, and sacredness of residential, commercial, recreational, and cultural locations.

This section describes noise and vibration in the study area. It then describes noise and vibration impacts that could result from construction and operation of the Proposed Action and No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action and any remaining unavoidable and significant adverse impacts.

5.5.1 Regulatory Setting

Laws and regulations relevant to noise and vibration are summarized in Table 5.5-1.

Table 5.5-1. Regulations, Statutes, and Guidelines for Noise and Vibration

Regulation, Statute, Guideline	Description
Federal	
Noise Control Act of 1972 (42 USC 4910)	Protects the health and welfare of U.S. citizens from the growing risk of noise pollution, primarily from transportation vehicles, machinery, and other commerce products. Increases coordination between federal researchers and noise-control activities; establishes noise emission standards; and presents noise emission and reduction information to the public.
Federal Transit Administration Transit Noise and Vibration Impact Assessment (FTA-VA-90-1003-06, May 2006)	Provides procedures and guidance for analyzing the level of noise and vibration, assessing the resulting impacts, and determining possible mitigation for most federally funded transit projects.
Federal Railroad Administration High-Speed Ground Transportation Noise and Vibration Impact Assessment (October 2012)	Provides guidance and methods for the assessment of potential noise and vibration impacts resulting from proposed high-speed ground transportation projects (Federal Railroad Administration 2012).
U.S. Environmental Protection Agency Railroad Noise Emission Standards (40 CFR 201)	Established final noise emission standards for surface carriers engaged in interstate commerce by railroad. This rulemaking is pursuant to Section 17 of the Noise Control Act of 1972 (U.S. Environmental Protection Agency 2014).
FRA Railroad Noise Emission Compliance Regulations (49 CFR 210)	These regulations indicate the minimum compliance regulations necessary to enforce EPA's Railroad Noise Emission Standards.

Regulation, Statute, Guideline	Description
FRA Final Rule on the Use of Locomotive Horns at Highway-Rail Grade Crossings (49 CFR 222 and 229)	Requires the sounding of locomotive horns at public highway rail grade crossings. Considers the allowance of Quiet Zones when the increased risk is mitigated with supplementary grade crossing safety measures.
State	
Maximum Environmental Noise Levels (WAC 173-60)	Establishes maximum environmental noise levels. However, noise from surface carriers engaged in interstate commerce by railroad is exempt from these regulations.
Local	
Cowlitz County Code (CCC 10.25) (Nuisance Noises)	Regulates excessive intermittent noise that interferes with the use, value, and enjoyment of property and which pose a hazard to the public health, safety, and welfare.

Notes:
USC = United States Code; FRA = Federal Railroad Administration; FTA = Federal Transit Administration; CFR = Code of Federal Regulations; EPA = U.S. Environmental Protection Agency

5.5.2 Study Area

The study area for noise and vibration direct impacts is within 1 mile of the project area. The study area for noise and vibration indirect impacts is the area within 1 mile from the centerline on the Reynolds Lead and BNSF Spur between Longview Junction and the project area. Figure 5.5-1 illustrates the combined study area. An assessment of potential noise indirect impacts is also included for the rail routes in Washington State for Proposed Action-related trains and Proposed Action-related vessel traffic along the Columbia River between the project area and 3 nautical miles offshore.

5.5.3 Methods

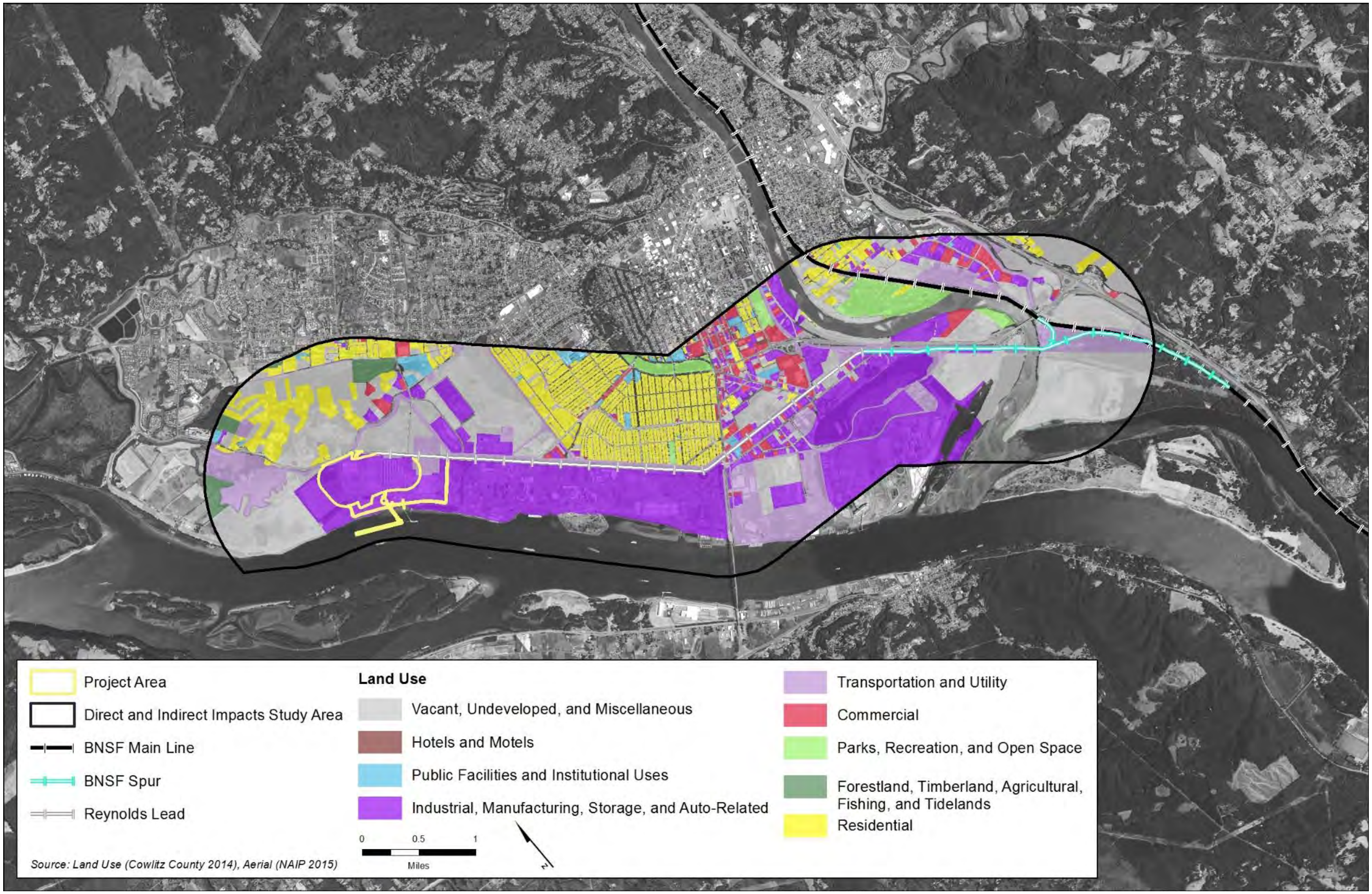
This section describes the sources of information and methods used to evaluate the potential noise and vibration impacts associated with the construction and operation of the Proposed Action and No-Action Alternative. Methods for field surveys conducted in the study area are also provided.

5.5.3.1 Information Sources

The following sources of information were used to evaluate noise and vibration impacts.

- Information provided by the Applicant, including project design features and a list of typical construction and operation equipment.
- Lists of typical construction and operation equipment from reference projects and typical corresponding noise and vibration levels.
- Existing and future-year rail traffic estimates for the Reynolds Lead and BNSF Spur provided by the Longview Switching Company (LVSW) and the Applicant.
- Data on locomotive and train noise levels.
- Ambient noise monitoring data collected during field surveys in the study area.

Figure 5.5-1. Noise and Vibration Study Area



5.5.3.2 Field Surveys

Field surveys were performed from October 28 through November 10, 2014, and from January 11 through 16, 2015, to measure existing outdoor sound levels (ambient noise levels) at representative noise-sensitive receptors. Noise-sensitive receptors include residential and institutional land uses such as schools and churches (Figure 5.5-2). The surveys focused on locations in the study areas where noise-sensitive receptors could be exposed to noise from Proposed Action-related activities. Short-term (10-minute) and long-term (24-hour) sound-level meters were set up for measurements at selected noise-sensitive receptors as shown in Figure 5.5-3.

Four sound-level meters were installed on October 27, 2014, then relocated on November 2, 2014, providing at least 6 full days of data collected at each of the eight long-term ambient noise survey locations shown in Figure 5.5-3. The meters were mounted on utility poles with the microphone approximately 10 feet above the ground surface. Short-term measurements were conducted during the same period as the long-term survey. The microphone of the short-term equipment was located 5 feet above ground surface and the noise level was measured and recorded for a period of 10 minutes at each short-term survey location. Figure 5.5-3 illustrates the short-term ambient noise survey locations.

The *SEPA Noise and Vibration Technical Report* (ICF and Wilson Ihrig 2017) provides additional information on the methods used to obtain existing ambient noise levels.

5.5.3.3 Methods for Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on noise and vibration.

Construction

The Applicant has identified three construction scenarios.

- **Truck.** If material is delivered by truck, it is assumed approximately 88,000 truck trips would be required over the construction period. Approximately 56,000 truck trips would be needed during the peak construction year.
- **Rail.** If material is delivered by rail, it is assumed approximately 700 train trips would be required over the construction period. Approximately two-thirds of the rail trips would occur during the peak construction year.
- **Barge.** If material is delivered by barge, it is assumed approximately 1,130 barge trips would be required over the construction period. Approximately two-thirds of the barge trips would occur during the peak construction year. Because the project area does not have an existing barge dock, the material would be off-loaded at an existing dock elsewhere on the Columbia River.

The methods for analyzing noise and vibration impacts related to construction are described in this subsection. The *SEPA Noise and Vibration Technical Report* provides additional information on the methods to analyze potential impacts.

Figure 5.5-2. Noise-Sensitive Land Uses in the Study Area

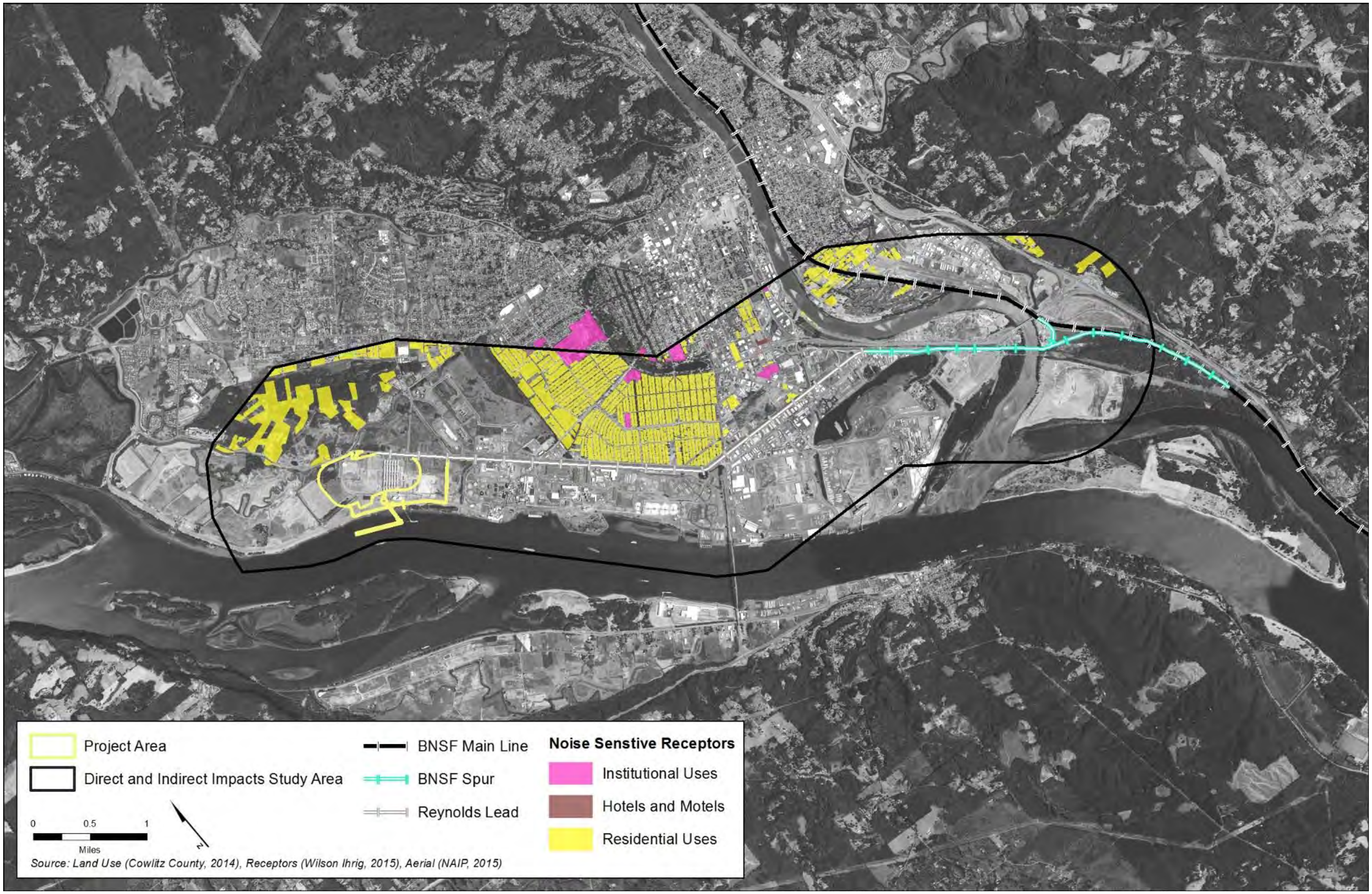


Figure 5.5-3. Ambient Sound Pressure Level Survey Locations

Noise

Construction of the proposed coal export terminal would occur primarily during daytime hours. Daytime construction of the terminal would be exempt from Washington State permissible noise level regulations (Washington Administrative Code [WAC] 173-60-040). To provide context to construction noise levels, construction noise in the project area was evaluated per guidelines established by the Federal Transit Administration (FTA) (2006) and Federal Railroad Administration (FRA) (2012). Construction noise, including pile driving, which is typically the most dominant source of noise complaints during construction, was estimated at the noise-sensitive receptors in the study area using detailed information about the anticipated roster of construction equipment to be used and based on information provided by the Applicant. For purposes of this analysis, and because the exact locations of construction equipment and processes are either unknown at this time or could vary during the course of construction, noise was treated as originating from the acoustic center of the geographic locations. An assessment of potential indirect noise impacts from Proposed Action-related construction trains and vehicle traffic was also performed.

Vibration

Pile driving would be the dominant source of ground vibration during construction. Vibration during pile driving was calculated using the methods from *Transit Noise and Vibration Impact Assessment* (Federal Transit Administration 2006). Human annoyance can occur at much lower vibration levels than vibration levels that may cause cosmetic damage to structures. Therefore, this lower “annoyance” threshold was used to assess vibration impacts.

Operations

The methods for analyzing noise and vibration impacts related to operations are described in this subsection.

Direct Impacts

The following describes the methods to evaluate potential noise and vibration impacts in the project area.

Noise

The Computer-Aided Noise Abatement Noise Prediction Model (Cadna/A®, Version 4.4.145) was used to estimate the propagation of sound from coal export terminal operations in the project area. The model predicted noise levels at noise-sensitive receptors in the study area and generated noise contours (lines of equal noise levels) for comparison to the Washington State regulatory noise criteria.[1] The *SEPA Noise and Vibration Technical Report* provides the list of sound sources that were included in the model and the parameters and assumptions for each noise source, equipment sound levels, and other assumptions. The equipment analyzed included transfer towers, conveyor belts, conveyor drives, a tandem rotary dumper, shiploaders, stacker/reclaimers, surge bins, and the rail loop. The model parameters and assumptions considered buildings and structures, coal storage

[1] Cadna/A® considers natural and human-made topographical barrier effects, including terrain features and structures such as major buildings, storage tanks, and large equipment.

piles, surface acoustical absorption, foliage, temperatures and relative humidity and cladding for exterior surfaces.

Vibration

There would be no substantial sources of ground vibration within the project area during operations, except trains moving on the rail loop in the project area. Using data and methods provided in *Transit Noise and Vibration Impact Assessment* (Federal Transit Administration 2006), it was determined that a vibration impact from train operations is unlikely at distances greater than 40 feet from a railroad track for infrequent events (less than 30 trains per day). The closest vibration-sensitive receptor (a residence) is approximately 275 feet from the outer track of the rail loop. Therefore, an estimate of vibration generated during coal export terminal operations was not necessary.

Indirect Impacts

The following describes the methods to evaluate potential noise and vibration impacts from Proposed Action-related rail and vessel traffic.

Rail Traffic Noise

As described in Section 5.1, *Rail Transportation*, LVSW plans to upgrade the Reynolds Lead and part of the BNSF Spur as a separate action should it be warranted by increased rail traffic resulting from existing and future customers. This analysis assessed rail noise with current and planned track infrastructure.

A noise model was used to predict noise levels generated by rail traffic along the Reynolds Lead and BNSF Spur for existing conditions, the No-Action Alternative in 2018, the No-Action Alternative in 2028, and the Proposed Action in 2028. Section 5.1, *Rail Transportation*, describes rail traffic volumes on the Reynolds Lead and BNSF Spur that were assumed for these scenarios. The model assumed continuously welded rail, consistent with the existing rail on the Reynolds Lead and BNSF Spur.

The analysis considered two types of rail noise.

- *Wayside noise*, which refers to the combined effect of locomotive noise and car/wheel noise.
- *Horn noise*, which refers to the sound of locomotive warning horns sounded at public at-grade road/rail crossings. In addition, LVSW operating rules require train engineers to sound locomotive horns at private at-grade crossings on the Reynolds Lead. Because horn sounding is intentionally loud to warn motorists of oncoming trains, the horn noise footprint is often larger than the wayside noise footprint.

There are five public at-grade crossings and three active private crossings along the Reynolds Lead and BNSF Spur.

- Dike Road
- 3rd Avenue
- California Way
- Oregon Way

- Industrial Way
- Weyerhaeuser entrance west of Douglas Street (private crossing)
- Weyerhaeuser entrance at Washington Way (private crossing)
- 38th Avenue entrance to the Applicant's existing bulk product terminal (private crossing)

The noise model included the FRA provision that horns be sounded not less than 15 seconds or more than 20 seconds before the locomotive reaches an at-grade crossing. To be conservative, the analysis assumed locomotive horn sounding would begin 20 seconds before the locomotive reaches an at-grade crossing. The noise levels were predicted for trains running both with and without sounding horns at crossings.

Noise from surface carriers engaged in interstate commerce by railroad is exempt from Washington State maximum permissible noise level regulations (WAC 173-60-040). Therefore, there are no criteria or guidelines for assessing noise impacts specifically from freight trains, and it was determined that high-speed rail and transit project impact guidelines represented the most appropriate measure.

FRA-adopted noise assessment methods developed by FTA were used to calculate potential noise impacts from operations of the Proposed Action. These methods are documented in the *Transit Noise and Vibration Impact Assessment* (FTA/FRA guidance) (Federal Transit Administration 2006). FRA generally relies on this guidance for analysis of potential noise impacts from conventional rail vehicles traveling at speeds below 90 miles per hour.

To supplement FTA/FRA guidance, freight rail source levels from the FRA *High Speed Ground Transportation Noise and Vibration Assessment* were used to characterize noise from freight rail vehicles (Federal Railroad Administration 2012). These guidelines determine noise impacts based on increases in ambient noise level (day-night sound level [L_{dn}][2] or peak hour equivalent sound level [L_{eq}],[3] depending on the type of receptor) after a project is completed. The amount of increase that is acceptable depends on the existing ambient noise level.

FTA/FRA guidance noise impact criteria are based on the land use category receiving the noise. The FTA/FRA guidance identifies three land use categories for assessing potential noise impacts.[4]

- **Category 1.** Tracts of land where quiet is an essential element of their intended purpose, such as outdoor amphitheaters, concert pavilions, and national historic landmarks with significant outdoor use.
- **Category 2.** Residences and buildings where people normally sleep, including homes, hospitals, and hotels.
- **Category 3.** Institutional land uses (schools, places of worship, libraries) that are typically available during daytime and evening hours. Other uses in this category can include medical

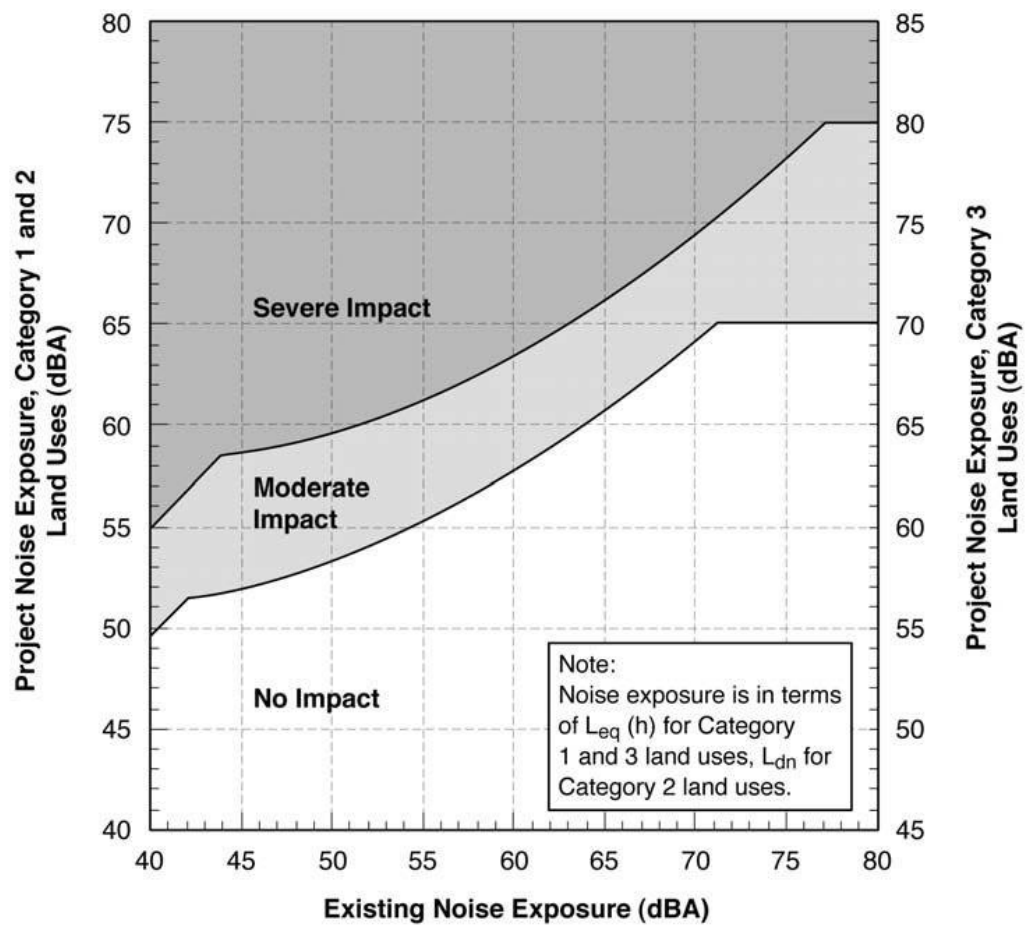
[2] The day-night sound level (Ldn) is essentially a 24-hour average noise level (in A-weighted decibels [dBA]) with a 10-decibel upward adjustment of noise levels occurring at night. This adjustment is made to account for most peoples' increased sensitivity to noise at night.
[3] The $L_{eq(h)}$ is a noise metric representing a constant sound level containing the same sound energy as the actual fluctuating sound over an hour. As such, the L_{eq} can be considered an energy-average sound level.
[4] Noise exposure values are reported as hourly equivalent sound level ($L_{eq[h]}$) for Category 1 and 3 land uses, and L_{dn} for residential land uses (Category 2).

offices, conference rooms, recording studios, concert halls, cemeteries, monuments, museums, historical sites, parks, and recreational facilities.

The FTA/FRA guidance defines three noise impact category levels (Figure 5.5-4).

- **No impact.** The change in the noise level would result in an insignificant increase in the number of instances where people are highly annoyed by new noise.
- **Moderate impact**. The change in the noise level would be noticeable to most people but may not be enough to cause strong adverse community reactions.
- **Severe impact.** A significant percentage of people would be highly annoyed by the noise.

Figure 5.5-4. Noise Impact Criteria



Source: Federal Transit Administration 2006.

The level of impact is determined by the existing level of noise exposure and the change in noise exposure that would result, using a sliding scale according to the land uses affected. As the existing level of noise exposure increases, the additional noise exposure needed to cause a moderate or severe impact decreases. The contribution of Proposed Action-related trains relative to the existing noise levels would differ according to the level of existing noise exposure (Figure 5.5-4). This sliding scale recognizes that people who are already exposed to high levels of noise in the ambient environment are expected to tolerate smaller increases in noise in their community relative to locations with lower existing ambient levels. The increases between the Proposed Action in 2028 and the No Action 2028 levels were compared to the FTA/FRA guidance to determine the level of noise impact.

The assessment of the potential noise impact from Proposed Action-related rail traffic on BNSF Railway Company (BNSF) main line routes in Washington State was based on a potential increase in L_{dn}, and employed an approach similar to that in the FTA/FRA guidance (Federal Transit Administration 2006). The analysis assumed that the distribution of the number of trains between daytime and nighttime would not change.

Rail Traffic Vibration

Using generalized ground surface vibration curves (Federal Transit Administration 2006) and correcting for speed, a vibration impact from Proposed Action-related train operations would be unlikely at distances greater than 60 feet from a railroad track for infrequent events (less than 30 passbys per day). The closest vibration-sensitive receptor (a residence) is approximately 180 feet away from the Reynolds Lead, and there are no vibration-sensitive receptors adjacent to the BNSF Spur. Therefore, no analysis was conducted to estimate vibration from rail operations.

Vessel Traffic Noise

The general assumptions used to assess impacts from stationary and moving vessels on the Columbia River are presented in Table 5.5-2.

Table 5.5-2. Assumptions Related to Noise from Stationary and Moving Vessels

Equipment	Noise level
Stationary vessels (moored ship)	65 dBA at a distance of 62 feet
Vessels under way	45 dBA at a distance of 400 feet
Foghorns	60 dBA at a distance of 1,800 feet

Notes:
See the *SEPA Noise and Vibration Technical Report* for detailed information on the sources of these noise level assumptions.
dBA = A-weighted decibel

Vessel Traffic Vibration

No analysis was conducted to estimate vibration generated during vessel operations. Proposed Action-related vessels would be similar to those already traveling on the Columbia River. There have been no documented cases of perceptible vibration on shore generated by ship traffic on the river.

5.5.4 Existing Conditions

This section describes the existing noise conditions in the study area.

Figure 5.5-1 illustrates the land uses in the study area. Figure 5.5-2 illustrates the noise-sensitive receptors in the study area, including residential land uses. The closest noise-sensitive receptors to the project area, Reynolds Lead, and BNSF Spur are residential land uses. These land uses are generally located north of the Reynolds Lead and Industrial Way (State Route [SR] 432) between Oregon Way and Washington Way (a distance of approximately 1.5 miles along the Reynolds Lead), with some residential land uses near the California Way and 3rd Avenue crossings of the Reynolds Lead. Residential land uses are also located across Mt. Solo Road (SR 432) from the project area.

As described in Section 5.5.3, *Methods,* long- and short-term surveys were conducted to determine existing conditions in the study area. Primary noise sources during the surveys varied by location, but were generally observed to include train traffic; vehicle road traffic; noise from existing industrial facilities, mills, and plants; residential activities; and noise from port activities. Table 5.5-3 provides a summary of the primary noise sources at the long-term ambient noise survey locations illustrated in Figure 5.5-3.

Table 5.5-3. Primary Noise Sources at Long-Term Ambient Noise Survey Locations

Long-Term Ambient Noise Survey Location	Noise Sources
602 California Way	California Way and Industrial Way vehicle traffic Trains on the Reynolds Lead Horizon Metals recycling center on California Way
111 15th Avenue	Industrial Way vehicle traffic Trains on the Reynolds Lead
221 Beech Street	Local vehicle traffic Industrial Way vehicle traffic Weyerhaeuser mill Trains on the Reynolds Lead
875 34th Avenue	Local vehicle traffic and residential activity PNW Metal Recycling at Mint Farm Industrial Park
3600 Memorial Park	Local vehicle traffic PNW Metal Recycling at Mint Farm Industrial Park
420 Rutherglen Drive	Distant industrial operations at Mint Farm Industrial Park Weyerhaeuser mill Port of Longview
4723 Mt. Solo Road	Vehicle traffic on Mt. Solo Road
1719 Dorothy Avenue	Local vehicle traffic and residential activity PNW Metal Recycling at Mint Farm Industrial Park

Notes:
See the *SEPA Noise and Vibration Technical Report* for additional information on the noise field surveys.

Figure 5.5-5 illustrates existing noise level contours for all noise sources including train horns. The existing ambient noise levels formed the baseline against which the effects of the Proposed Action and No-Action Alternative were measured.

Figure 5.5-5a. Existing Rail Noise Contours, BNSF Spur to Reynolds Lead

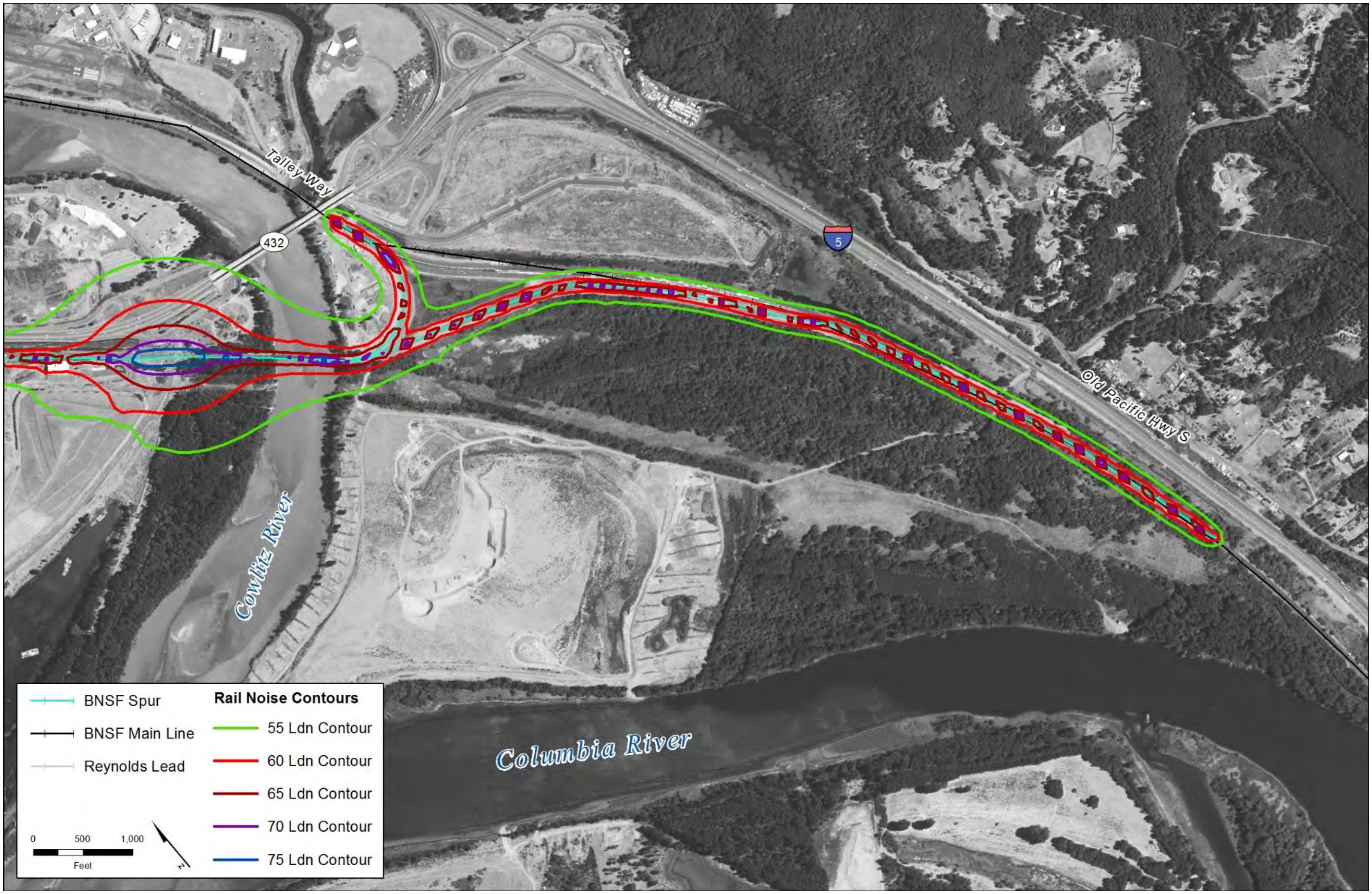


Figure 5.5-5b. Existing Rail Noise Contours, Beginning of Reynolds Lead

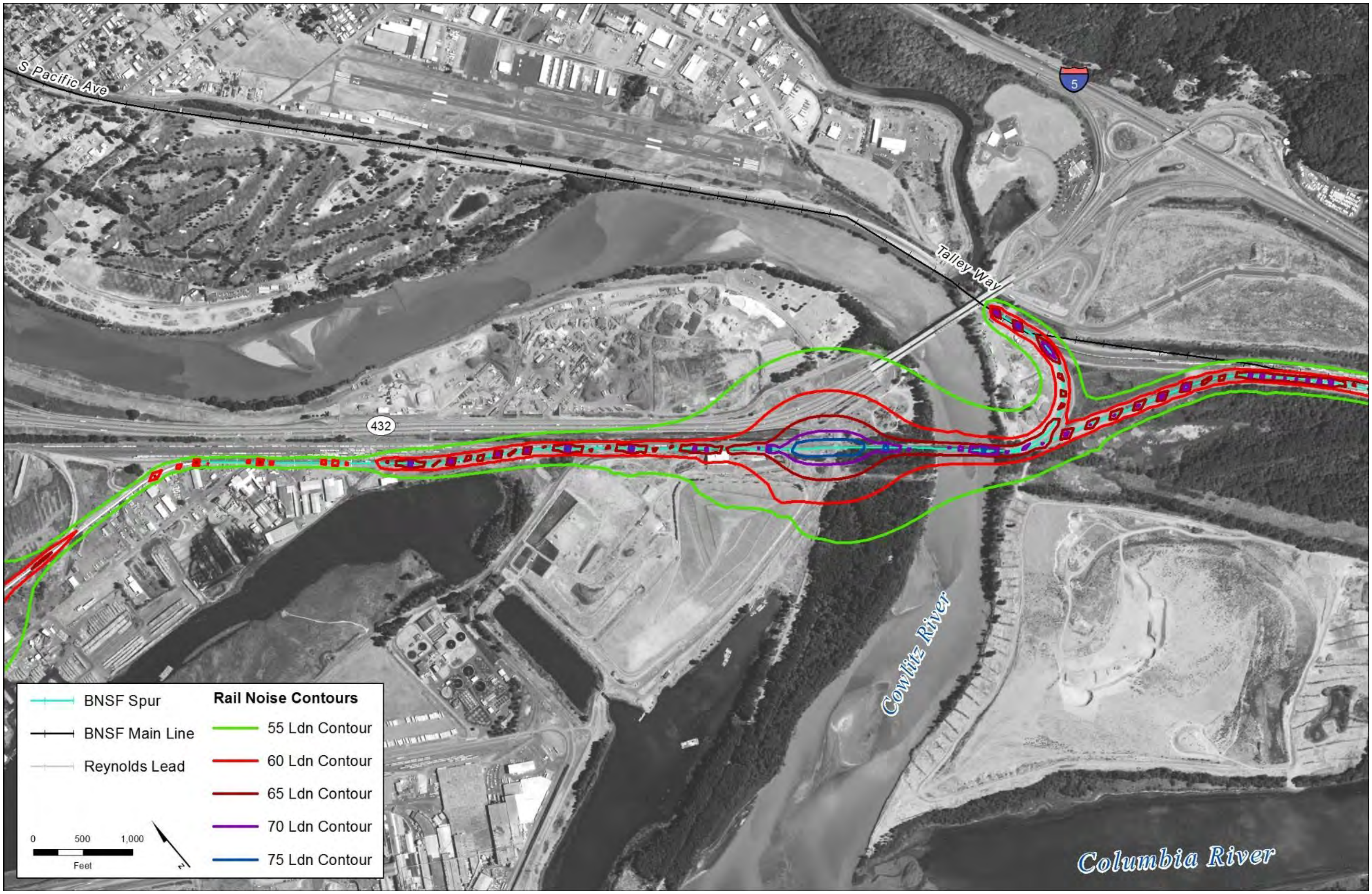
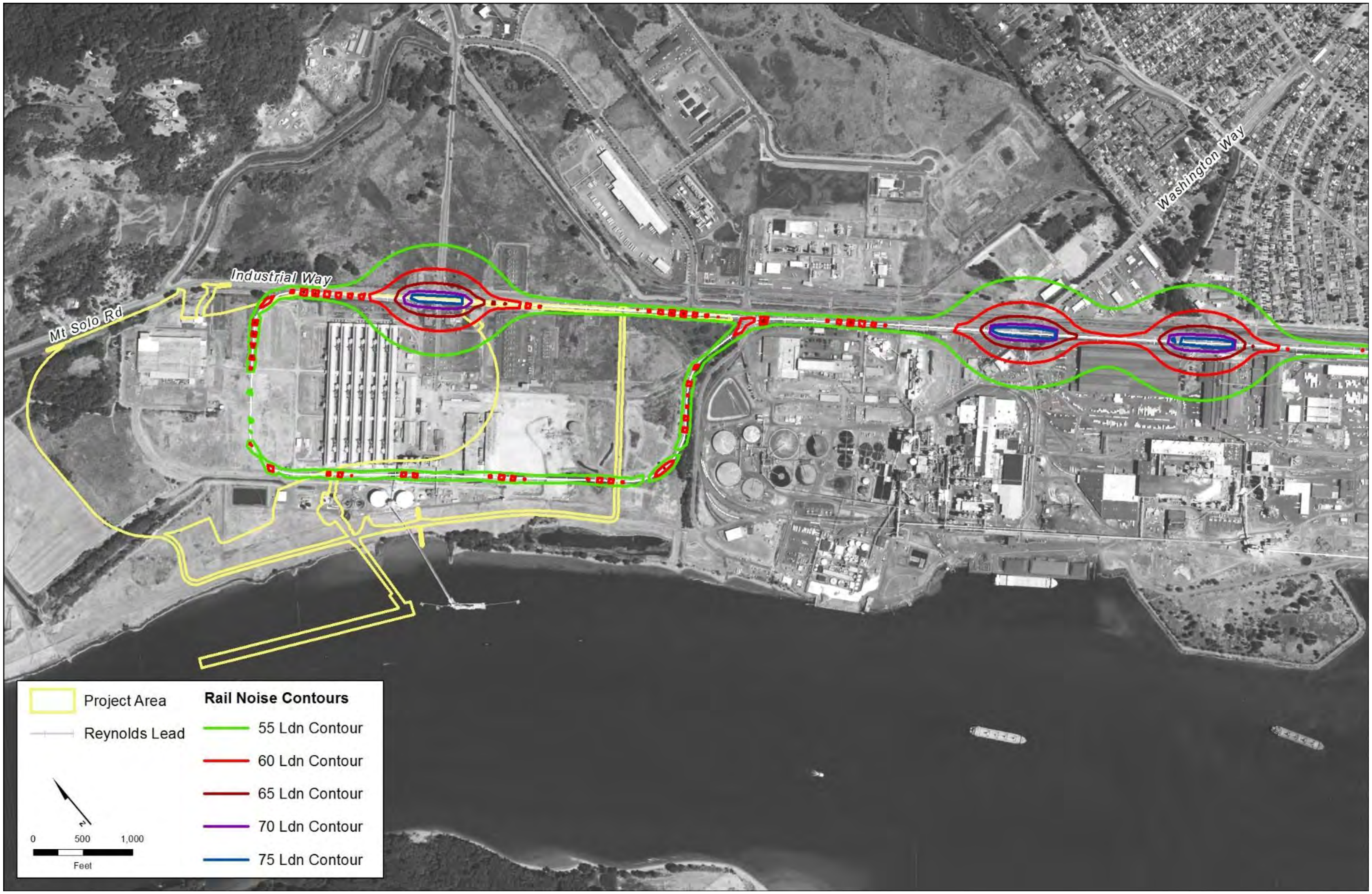


Figure 5.5-5c. Existing Rail Noise Contours, Mid-Reynolds Lead

Figure 5.5-5d. Existing Rail Noise Contours, End of Reynolds Lead



5.5.5 Impacts

This section describes the potential direct and indirect impacts related to noise and vibration that would result from construction and operation of the Proposed Action and the No-Action Alternative.

5.5.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area as a result of construction and operation of the Proposed Action.

Construction—Direct Impacts

Construction-related activities associated with the Proposed Action could result in direct impacts as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, pile driving, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Emit Noise during Construction

The maximum noise level at the closest noise-sensitive receptor (the residence at 104 Bradford Place) during construction is predicted to be 83 A-weighted decibels (dBA), which would occur during pile driving. While not a regulatory noise standard for construction noise, to provide context, this noise level would exceed the FTA/FRA noise level criteria of 80 dBA for construction noise when pile activities occur within approximately 1,500 feet of this residence.

Emit Vibration during Construction

The maximum predicted vibration levels at the closest vibration-sensitive receptor (the residence at 104 Bradford Place) would be 72 velocity decibels during pile driving. While not a regulatory standard for vibration during construction, to provide context, this vibration level would not exceed FTA/FRA criteria for maximum allowable vibration from construction at residences. Therefore, while construction of the Proposed Action would emit vibration from pile driving, the vibration would be not be substantive enough to have an adverse impact at the nearest residence.

Construction—Indirect Impacts

Construction of the Proposed Action would result in the following indirect impacts. Construction-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

Emit Noise from Construction-Related Vehicle Traffic

Vehicles traveling to and from the project area, mainly on Industrial Way, represent a potential source of noise impacts during construction. A maximum of approximately 330 truck trips per day for the truck and barge construction material delivery scenarios would be required during the peak year of construction. The increase in truck traffic represents an increase of 3.3% in average daily traffic for all vehicles on Industrial Way. This increase in vehicular traffic would not result in a substantial change to the existing noise levels and would be temporary (during the peak year of construction). Therefore, Proposed Action-related construction traffic would not result in an adverse noise impact.

Emit Noise from Construction-Related Rail Traffic

As described in Section 5.1, *Rail Transportation*, the Proposed Action would add an average of 1.3 train trips during the peak construction year if construction materials are delivered by rail. Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, describes the construction scenarios. This level of rail activity would not cause noise levels to increase more than 3 L_{dn} (dBA). Proposed Action-related rail traffic would not result in noise level increases that would exceed applicable criteria for a noise impact as illustrated in Figure 5.5-4.

Operations—Direct Impacts

Operation of the Proposed Action would result in the following direct impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

Noise

Operation of the Proposed Action would result in the following noise direct impacts.

Exceed Washington State Noise Level Standards

Figure 5.5-6 shows the predicted noise contours for operation of the Proposed Action. Noise from coal export terminal operations is projected to exceed the Washington State noise standard at one residence (104 Bradford Place). The residence where the exceedance would occur is within the 50-dBA contour, which is the applicable Washington State limit for nighttime noise levels in a residential area when the noise is from an industrial source. The predicted noise level at the residence is 55 dBA. This predicted noise level is comparable to the current nighttime noise level at this location. Other residences are located outside the noise level limit contours or would be shielded by topography.

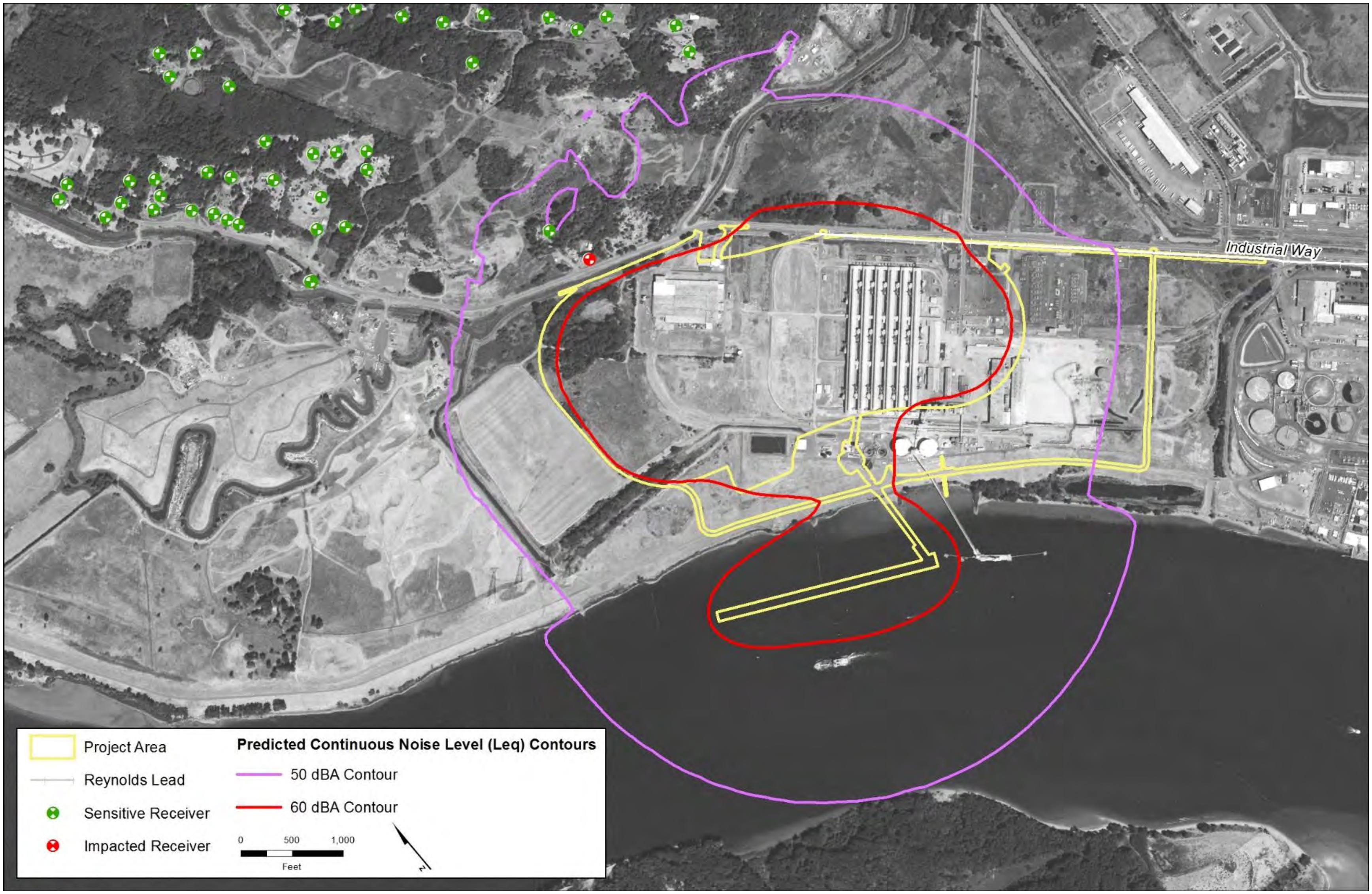
Vibration

As described in Section 5.5.3, *Methods*, no vibration impacts associated with operation of the Proposed Action are anticipated. No substantial sources of ground vibration would occur at the project area during operations, and the closest vibration-sensitive receptor (a residence) is too far away to be affected by vibration from trains on the rail loop in the project area.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

Figure 5.5-6. Predicted Continuous Noise Level (L_{eq}) Contours during Operations



Emit Noise from Operations-Related Vehicle Traffic

Vehicles traveling to and from the project area, mainly on Industrial Way, represent a potential source of noise impacts during operations. As illustrated in Section 5.3, *Vehicle Transportation*, the annual average daily traffic on Industrial Way would increase approximately 5.7% under the Proposed Action.

In general, a doubling of average daily traffic would be required to increase the L_{dn} from vehicular traffic by 3 dBA at the noise-sensitive receptors. In general, changes in a noise level of less than 3 dBA—as would be expected from the increase in traffic under the Proposed Action—would not be noticed by the human ear. Therefore, no noise-related indirect impacts from operations would be expected.

Emit Noise from Rail Traffic on the Reynolds Lead and BNSF Spur

At full coal export terminal operations, the Proposed Action would add 16 trains daily on the Reynolds Lead and BNSF Spur (8 loaded and 8 empty trains). Operation of the Proposed Action would increase rail traffic-related noise along the Reynolds Lead and BNSF Spur primarily as a result of sounding train horns for public safety.

Figure 5.5-7 illustrates plots of the estimated equal noise levels (L_{dn}) with Proposed Action-related rail traffic in 2028. The noise level contours include the noise from train horns sounded for public safety. Train engineers are required by FRA rules to sound locomotive horns at least 15 seconds, and not more than 20 seconds, in advance of public at-grade crossings. In addition, LVSW operating rules require train engineers to sound locomotive horns at private at-grade crossings. These sounding of horns would occur with or without track improvements on the Reynolds Lead and BNSF Spur that would allow higher train speed through the grade crossings.

Potential noise impacts were based on levels of potential impact (moderate impact or severe impact) defined in FTA/FRA guidance, which compares the existing level of noise exposure to the change in noise exposure with Proposed Action-related trains. Figure 5.5-8 illustrates the residential land uses predicted to be exposed to moderate or severe noise impacts. Table 5.5-4 summarizes the predicted number of affected noise-sensitive receptors exposed to moderate and severe impacts.[5]

[5] The number of single residential units that could be affected at each multifamily residence was estimated using online satellite and street photography.

Figure 5.5-7a. Noise Contours with Proposed Action-Related Trains, BNSF Spur to Reynolds Lead

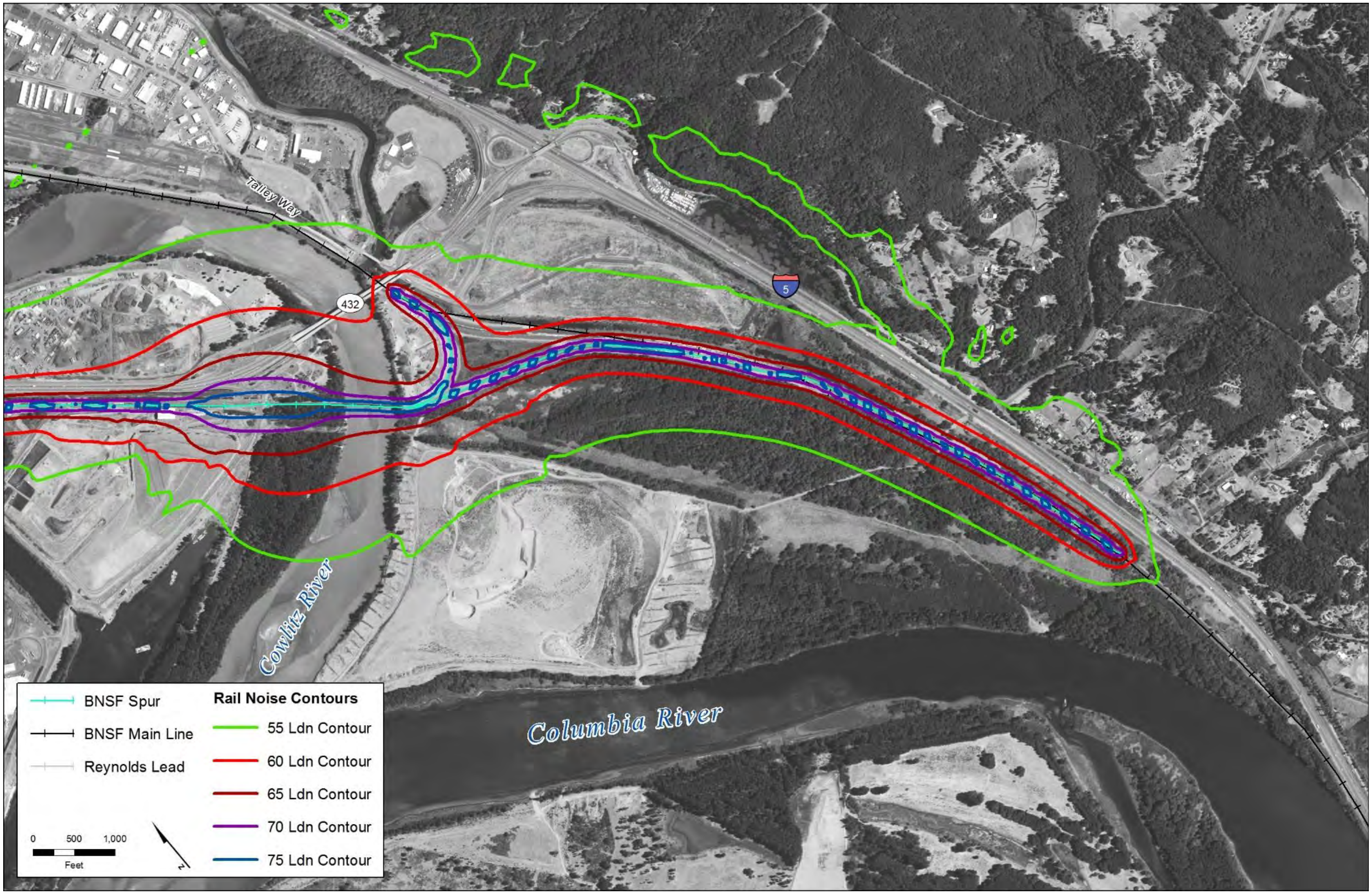


Figure 5.5-7b. Noise Contours with Proposed Action-Related Trains, Beginning of Reynolds Lead

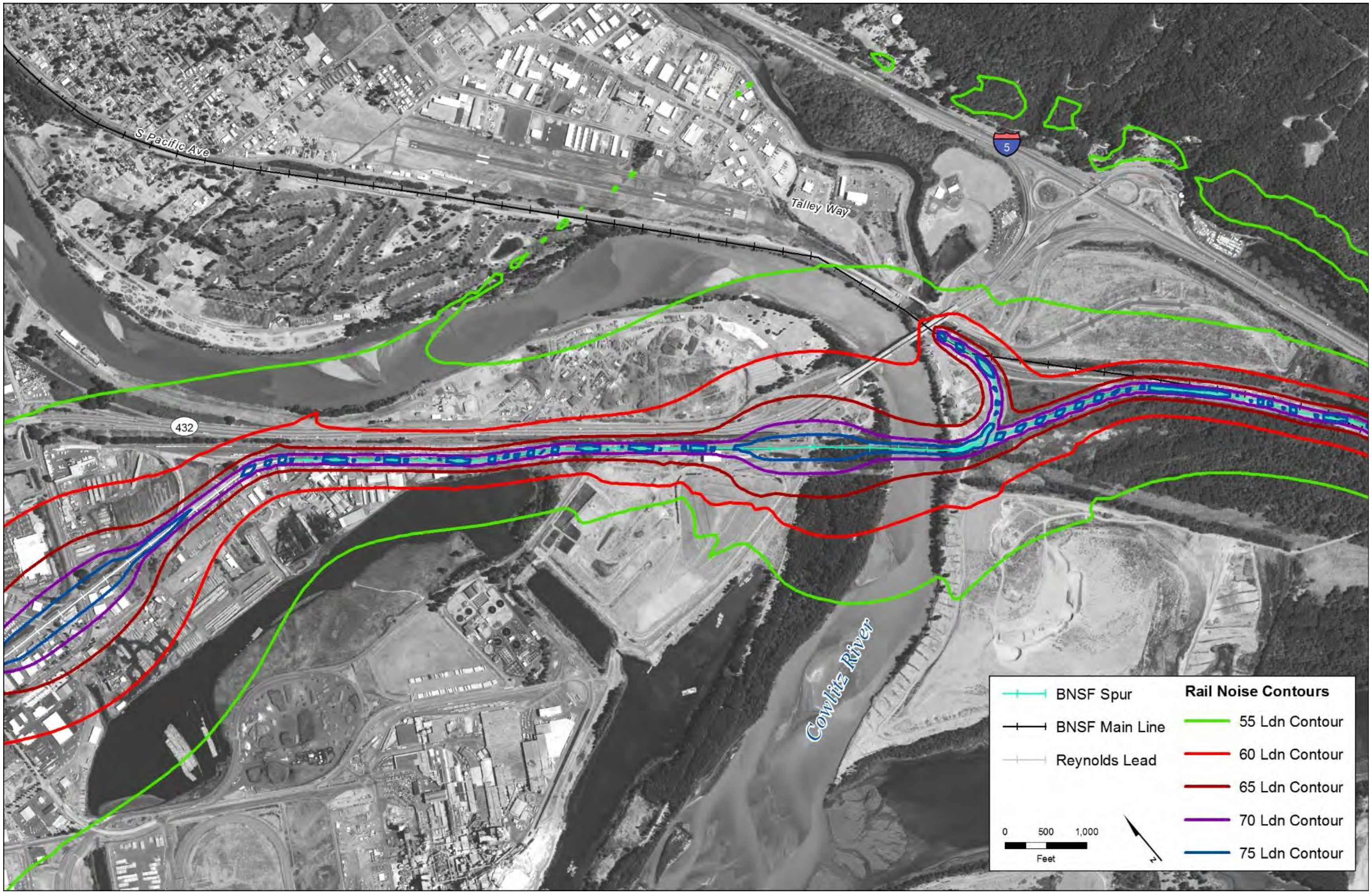


Figure 5.5-7c. Noise Contours with Proposed Action-Related Trains, Mid-Reynolds Lead

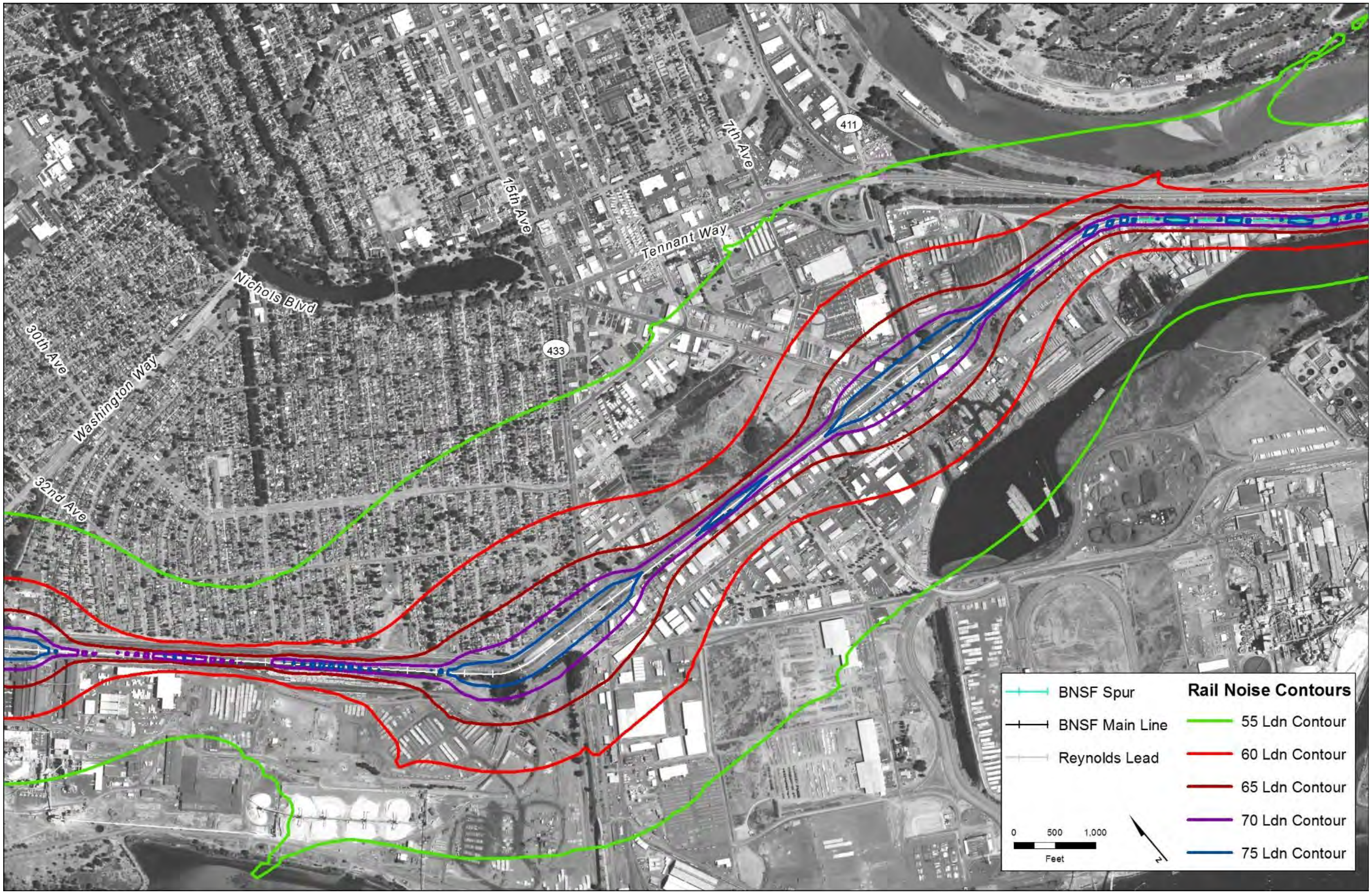


Figure 5.5-7d. Noise Contours with Proposed Action-Related Trains, End of Reynolds Lead

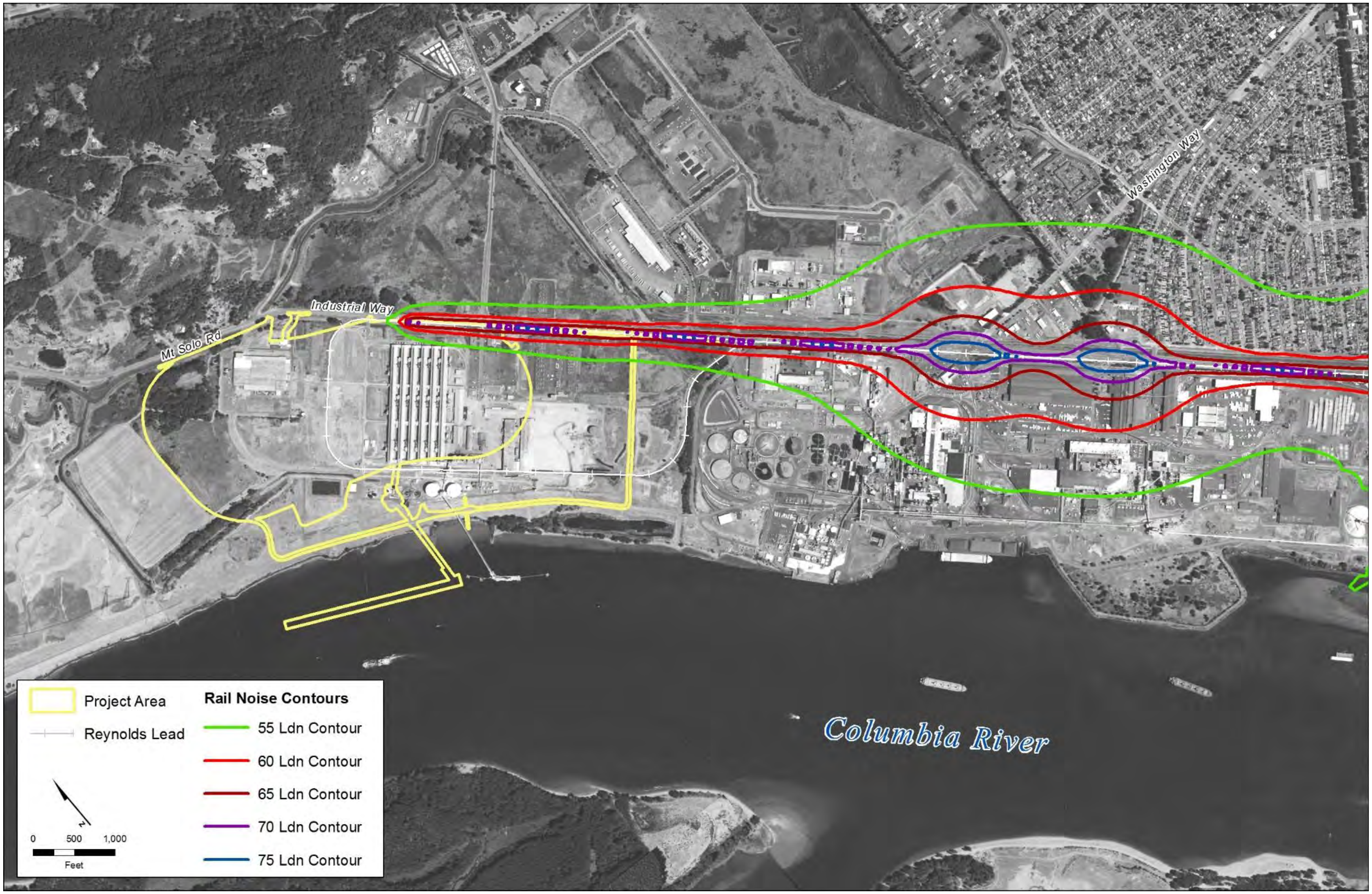


Figure 5.5-8. Noise-Sensitive Receptors Predicted to be Exposed to Moderate and Severe Noise Impacts

Note: If the Oregon Way/Industrial Way Intersection Project grade-separates the Oregon Way and Industrial Way crossings with the Reynolds Lead, all severe and moderate noise impacts near the Oregon Way and Industrial Way crossings would not occur.

Table 5.5-4. Estimated Number of Noise-Sensitive Receptors with Noise Impacts with Proposed Action-Related Train Traffic

	Estimated Number of Receptors Impacted	
Reynolds Lead Crossing(s)	**Moderate Noise Impact** [a]	**Severe Noise Impact** [a]
3rd Avenue & California Way	34 single-family residences	10 single-family residences
Oregon Way & Industrial Way[b]	135 single-family residences 18 multifamily residences[c]	34 single-family residences 5 multi-family residences[e]
Private driveway at Weyerhaeuser (near Douglas Street & Industrial Way)	4 single-family residences 2 multifamily residences[d]	0
Total Receptors	**193 (229 residences)**	**49 (60 residences)**

Notes:

[a] Per FTA/FRA guidance as described in Section 5.5.3, *Methods*.

[b] If the Industrial Way/Oregon Way Intersection Project grade-separates the Oregon Way and Industrial Way crossings of the Reynolds Lead by 2028, the moderate and severe noise impacts at the Oregon Way and Industrial Way crossings would not occur because Proposed Action-related trains would not be required to sound horns for public safety at these crossings.

[c] Estimated 52 individual residences affected.

[d] Estimated 4 individual residences affected.

[e] Estimated 16 individual residences affected.

As shown in the Table 5.5-4, an estimated 193 receptors representing approximately 229 residences would be exposed to a moderate noise impact, and an estimated 49 receptors representing approximately 60 residences would be exposed to a severe noise impact with Proposed Action-related trains. These impacts would be the same with or without the track improvements to the Reynolds Lead because the train noise would be dominated by the locomotive horn sounding at grade crossings. Proposed Action-related trains without horn sounding would not result in noise impacts on the Reynolds Lead.

The Industrial Way/Oregon Way Intersection Project led by Cowlitz County Public Works, currently in the preliminary design and NEPA and SEPA environmental compliance phase, is addressing traffic congestion, freight mobility, and safety issues at the Industrial Way/Oregon Way intersection. In January 2017, one of two design options advanced to the Environmental Impact Statement would grade-separate the Reynolds Lead crossing with Oregon Way and Industrial Way meaning that trains would not be required to sound horns for public safety at the Oregon Way and Industrial Way crossings of the Reynolds Lead. If this design option is identified as the preferred alternative and the project is constructed before 2028, all noise impacts from Proposed Action-related rail traffic within the immediate vicinity of the crossings at Oregon Way and Industrial Way, as shown in Table 5.5-4, would not occur. Therefore, an estimated 40 receptors representing approximately 42 residences would be exposed to a moderate noise impact, and an estimated 10 receptors representing approximately 10 residences would be exposed to a severe noise impact with Proposed Action-related trains traveling on the Reynolds Lead.

Emit Noise from Vessel Operations

The Proposed Action would load 70 vessels per month or 840 vessels per year. This equates to 1,680 vessel transits in the Columbia River. Noise from Proposed Action-related vessels would not cause a noise impact at noise-sensitive receptors. For vessels moored at the project area docks (Docks 2 and 3), the noise associated with stationary vessels is estimated to be 29 dBA at the closest noise-sensitive receptors on Mt. Solo Road, approximately 3,800 feet from the docks in the project area. This estimated Proposed Action-related ship noise would be comparable to or less than ambient noise levels at this noise-sensitive receptor.

Proposed Action-related vessel traffic is comparable to or less than existing noise levels, and is unlikely to cause noise impacts along the Columbia River. For vessels under way in the Columbia River, vessel traffic is expected to be 70 ships per month during full operation in 2028. This corresponds to an average of 4.7 vessel transits per day. The noise-sensitive receptors on Barlow Point Road are all more than 400 feet from the edge of the Columbia River. The anticipated typical minimum distance between these closest receptors and the vessels would be about 1,600 feet. The 32 L_{dn} experienced by these closest noise-sensitive receptors would be comparable or less than existing noise levels.

Table 5.5-5 summarizes the potential L_{dn} from Proposed Action vessel traffic in 2028 at various perpendicular distances from the Columbia River navigational channel. Overall, the estimated noise exposure from Proposed Action-related vessel traffic would be comparable to or less than ambient noise levels at noise-sensitive receptors and is unlikely to cause noise impacts along the Columbia River.

Table 5.5-5. Potential Noise Exposure Levels from Vessel Traffic at Various Perpendicular Distances from the Columbia River Navigational Channel

Distance (feet)	L_{dn}
400	44
600	40
800	38
1000	36
1200	34
1400	33
1600	32

Noise from foghorns is infrequent and is not expected to cause noise impacts at the noise-sensitive receptors. A foghorn recorded from Barlow Road sounded for approximately 4 seconds every 2 minutes and achieved a maximum noise level of 60 dBA at its point of closest approach to the measurement location (approximately 1,800 feet). These noise levels represent the highest foghorn sound levels to which noise-sensitive receptors on Barlow Point Road are exposed. In addition, with the exception of one noise-sensitive receptor, the levee that runs between the Columbia River and Barlow Point Road serves to some extent as a sound barrier.

Emit Noise from Rail Traffic on Main Line Routes in Washington State

As described in Section 5.1, *Rail Transportation*, the Proposed Action would add 8 loaded and 8 empty trains per day (16 total trains per day) to BNSF main line routes in Washington State. Figure 5.5-9 illustrates the expected rail routes. Proposed Action-related trains would travel at similar speeds as existing trains and locomotives would sound horns consistent with existing practices. Therefore, the wayside and horn noise levels associated with any Proposed Action-related train would not change substantially compared to existing conditions.

However, because the Proposed Action would result in more rail traffic on BNSF main line routes, average noise levels would increase. Generally, in areas where existing noise levels are low (particularly at night), there is a greater likelihood that increased train traffic would travel at night, and result in more noticeable noise, particularly near at-grade crossings where trains are required to sound horns for public safety. Table 5.5-6 provides a summary of existing train volumes, projected 2028 baseline train volumes, and projected 2028 train volumes with Proposed Action-related trains. The table also provides a summary of the potential increase in train-related L_{dn} levels from the addition of Proposed Action-related trains relative to baseline conditions in 2028.

Changes in a noise level of less than 3 dBA are not typically noticed by the human ear. As indicated in Table 5.5-6, the potential increase from Proposed Action-related trains would be less than 3 dBA on BNSF main line routes in Washington State. On most route segments, the potential increase would be less than 1 dBA, which is within the level of precision for acoustical measurements. Therefore, noise impacts from Proposed Action-related trains on the routes to and from Longview would not be expected.

Figure 5.5-9. Projected 2028 Daily Train Volumes with Proposed Action–Related Trains

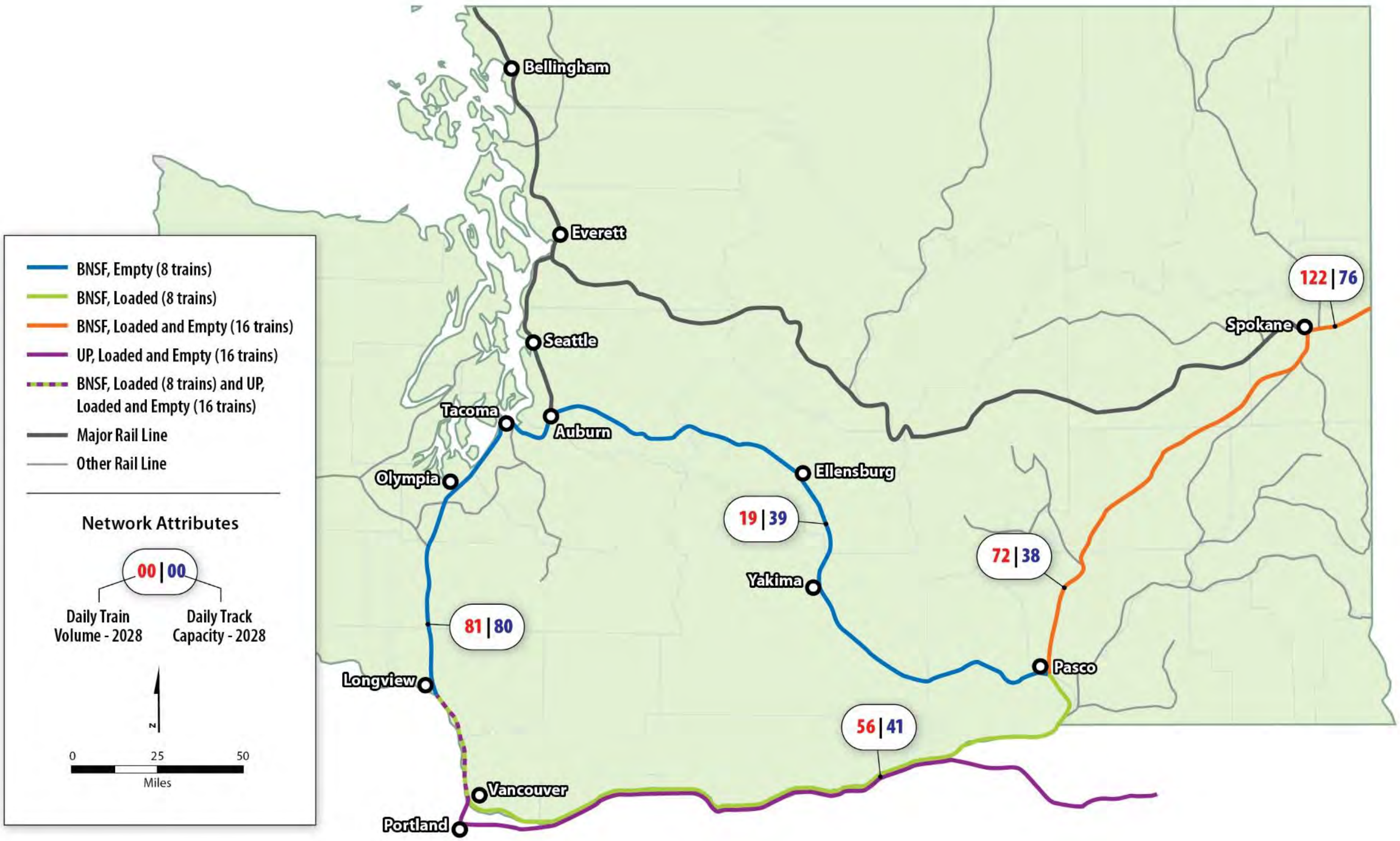


Table 5.5-6. Estimated Increase in Noise Exposure from Proposed Action-Related Trains

Route Segment	Trains per Day 2015	Projected Baseline 2028	Projected 2028 Baseline with Proposed Action-Related Trains	Estimated L_{dn} Increase
Idaho/Washington State Line–Spokane	70	106	122	0.6
Spokane–Pasco	39	56	72	1.1
Pasco–Vancouver	34	48	56	0.7
Vancouver–Longview Junction	50	73	81	0.5
Longview Junction–Auburn	50	73	81	0.5
Auburn–Pasco	7	11	19	2.4

5.5.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products, such as calcine petroleum coke, coal tar pitch, and cement. The No-Action Alternative would require approximately 2 train trips per day on the Reynolds Lead and BNSF Spur.

The potential for changes in noise levels for 2 train trips per day on the Reynolds Lead and BNSF Spur were analyzed for 2028. Plots of the equal L_{dn} noise levels from rail traffic related to the No-Action Alternative in 2028 are available in the *SEPA Noise and Vibration Technical Report*. This assessment concluded the net increases relative to the existing noise exposure from 2 train trips per day on the Reynolds Lead and BNSF Spur would not result in adverse noise impacts. No-Action Alternative construction-related and operation-related vehicle traffic volumes would be expected to be less than the Proposed Action, which would not result in an adverse noise impact. Therefore, No-Action Alternative-related construction and operations traffic would not result in an adverse noise impact.

There would be no vibration impacts because the closest receptors are too far away to experience meaningful vibration generated by trains on the Reynolds Lead and BNSF Spur.

5.5.6 Required Permits

No permits related to noise and vibration would be required for construction and operation of the Proposed Action.

5.5.7 Proposed Mitigation Measures

No adverse vibration impacts are predicted. Therefore, this section describes the proposed mitigation measures that would reduce impacts related to noise from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

5.5.7.1 Voluntary Mitigation

The Applicant has committed to implementing the following measures.

- Prior to the start of construction, the Applicant will develop a construction noise control plan to be implemented by the construction contractor. The plan will include limiting all construction activity that would exceed applicable regulations to daytime hours (7:00 a.m. to 10:00 p.m.) to ensure aggregate noise complies with WAC 173-60-50 (3)(a) requirements. The plan will also identify the limited equipment or processes that would be allowed to operate during nighttime hours. The construction noise control plan will be available to the public prior to and during the entire construction period and the Applicant will notify the Highlands neighborhood and local businesses of pile driving activities.
- Prior to the start of construction, the Applicant will install, monitor, and respond to community inquiry via a dedicated line (phone, text, and email). The dedicated line will have language options for English and Spanish speakers. The surrounding community will be broadly informed of the noise limits and how to file a complaint. The community inquiry line will be monitored 24 hours a day, 7 days a week, during active construction. Complaints will be promptly investigated and actions would be taken to control noise to comply with noise level regulatory limits. The Applicant will provide reports to the Cowlitz County Sherriff's Office on a monthly basis.
- To reduce rail noise along the Reynolds Lead, the Applicant will work with LVSW and other stakeholders to convert the Oregon Way and Industrial Way crossings to "quiet crossings." The Applicant will fund additional electronics, barricades, and crossing gates to convert the crossings to "quiet crossings."

5.5.7.2 Applicant Mitigation

The Applicant will implement the following measures to mitigate impacts related to noise and vibration.

Project Area Noise Mitigation

Noise impacts from coal export terminal operations in the project area could be reduced through terminal design or installing building sound insulation for residences that would be exposed to noise levels above the applicable Washington State maximum permissible noise level as a result of the Proposed Action. Given the preliminary nature of the coal export terminal design and operations, it is not known at this time whether terminal design would prevent noise levels from exceeding the applicable standard at all noise-sensitive receptors. If the design would not prevent exceedance of the maximum permissible noise level (WAC 173-60), mitigation of noise impacts from terminal operations could be addressed by the following measure.

MM NV-1. Monitor and Control Increased Noise from Coal Export Terminal Construction and Operations at Closest Residences.

If agreed to by the property owner(s), the Applicant will monitor noise levels at the two residences nearest the project area to detect possible noise impacts from the Proposed Action during construction and operations. Noise will be monitored during construction and until at least 6 months after initiation of operations. The Applicant will submit monthly noise reports to Cowlitz County Building and Planning. If the monitoring identifies a noise impact due to coal export terminal operations, the Applicant will reduce the noise exposure of the receptors with modifications to terminal operations or installation of building sound insulation at the noise receptor.

Rail Noise Mitigation

Horn sounding could be eliminated by establishing a Quiet Zone, which includes enhanced safety measures at at-grade crossings, such that the use of train horns would not be required. FRA provides detailed instructions on the application process for a Quiet Zone (Federal Railroad Administration 2015). The following mitigation measures will address the moderate and severe noise impacts from Proposed Action-related trains.

MM NV-2. Support Implementation of a Quiet Zone along the Reynolds Lead.

To address moderate and severe noise impacts along the Reynolds Lead due to rail traffic, before beginning full operations, the Applicant will coordinate with the City of Longview, Cowlitz County, LVSW, and the affected community to inform interested parties on the FRA process to implement a Quiet Zone that will include the 3rd Avenue and California Avenue crossings. Public outreach on the Quiet Zone process will include low-income and minority populations. The Applicant will assist interested parties in the preparation and submission of the Quiet Zone application to FRA. If the Quiet Zone is approved, the Applicant will fund the Quiet Zone improvements, which could include electronics, barricades, and crossing gates.

MM NV-3. Explore Feasibility of Reducing Sound Levels.

If the Quiet Zone for the Reynolds Lead is not implemented, the Applicant will fund a sound reduction study to identify ways to mitigate the moderate and severe impacts from train noise from Proposed Action-related trains along the Reynolds Lead. The study methods will be discussed with Cowlitz County, the Washington State Department of Ecology, and the Washington State Department of Health for approval.

5.5.7.3 Other Measures to Be Considered

The following measure could be implemented to mitigate noise impacts from project-related elements outside the control of the Applicant.

- To address noise from rail traffic on the Reynolds Lead, the City of Longview, LVSW, and interested parties should work with the Applicant to explore a Quiet Zone along the Reynolds Lead.

5.5.8 Unavoidable and Significant Adverse Environmental Impacts

The Proposed Action would add 16 trains per day on the Reynolds Lead and BNSF Spur and increase average daily noise levels. Noise levels would exceed applicable criteria for noise impacts at noise-sensitive locations. The noise impacts would occur near at-grade crossings on the Reynolds Lead from train horn noise intended for public safety. Railroad noise is exempt from Washington State and local noise standards; however, it is possible for communities to work with FRA to apply for and implement a Quiet Zone to limit train horn sounding. The Applicant will work with the City of Longview, Cowlitz County, LVSW, the affected community, and other applicable parties to apply for and support the implementation of a Quiet Zone. However, if a Quiet Zone is not implemented and Proposed Action-related train horns are sounded for public safety, then the noise impacts would remain and would be an unavoidable and significant adverse environmental impact.

5.6 Air Quality

Air quality is essential to human and environmental health, and is protected by federal, state, and local regulations. Air pollution can harm humans, plants, animals, and structures. Ambient air quality can be affected by climate, topography, meteorological conditions, and pollutants emitted from natural or human sources.

This section describes air quality in the study area. It then describes impacts on air quality that could result from construction and operation of the Proposed Action and No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action. Fugitive emissions from coal dust, which can also affect air quality, are addressed separately in Section 5.7, *Coal Dust*.

5.6.1 Regulatory Setting

Laws and regulations related to air quality are summarized in Table 5.6-1.

Table 5.6-1. Regulations, Statutes, and Guidelines for Air Quality

Regulation, Statute, Guideline	Description
Federal	
Clean Air Act and Amendments	Enacted in 1970, as amended in 1977 and 1990, requires EPA to develop and enforce regulations to protect the public from air pollutants and their health impacts.
National Ambient Air Quality Standards (U.S. Environmental Protection Agency)	Specifies the maximum acceptable ambient concentrations for seven criteria air pollutants: CO, O_3, NO_2, SO_2, lead, PM2.5, and PM10. Primary NAAQS set limits to protect public health, and secondary NAAQS set limits to protect public welfare. Geographic areas where concentrations of a given criteria pollutant exceed a NAAQS are classified as nonattainment areas for that pollutant.
State	
Washington State General Regulations For Air Pollution Sources (WAC 173-400) and Washington State Clean Air Act (RCW 70.94)	Establish the rules and procedures to control or prevent the emissions of air pollutants. Provides the regulatory authority to control emissions from stationary sources, reporting requirements, emissions standards, permitting programs, and the control of air toxic emissions.
Washington State Operating Permit Regulation (WAC 173-401)	Establishes the elements for the state air operating permit program.
Washington State Controls for New Sources of Toxic Air Pollutants (WAC 173-460)	Establishes the systematic control of new or modified sources emitting toxic air pollution to prevent air pollution, reduce emissions, and maintain air quality that will protect human health and safety.
Washington State Ambient Air Quality Standards (WAC 173-476)	Establishes maximum acceptable levels in the ambient air for particulate matter, lead, SO_2, NO_2, O_3, and CO. Washington State adopts current federal NAAQS in state regulations.

Regulation, Statute, Guideline	Description
Local	
Southwest Clean Air Agency (SWCAA 400)	Regulates stationary sources of air pollution in Clark, Cowlitz, Lewis, Skamania, and Wahkiakum Counties.

Notes:
EPA = U.S. Environmental Protection Agency; CO = carbon monoxide; O_3 = ozone; NO_2 = nitrogen oxides; SO_2 = sulfur dioxide; PM2.5 = particulate matter less than or equal to 2.5 micrometers in size; PM10 = particulate matter less than or equal to 10 micrometers in size; NAAQS = National Ambient Air Quality Standards; WAC = Washington Administrative Code; RCW = Revised Code of Washington; SWCAA = Southwest Clean Air Agency

5.6.1.1 Federal and State Ambient Air Quality Standards

Federal and state regulations govern maximum concentrations for criteria air pollutants, which are key indicators of air quality (Table 5.6-2).

The federal standards, referred to as National Ambient Air Quality Standards (NAAQS), were established by the U.S. Environmental Protection Agency (EPA) under authority of the Clean Air Act to protect the public from air pollution. The NAAQS consist of primary standards and secondary standards. Primary standards are designed to protect public health, including sensitive populations such as asthmatics, children, and the elderly. Secondary standards are designed to protect public welfare from effects such as visibility reduction, soiling, and nuisance (e.g., preventing air pollution damage to vegetation).

States are required to meet the national standards. A state can set more stringent ambient air quality standards within the state. Washington State adopts current federal NAAQS in state regulations (Chapter 173-476 WAC, Ambient Air Quality Standards). Under the federal Clean Air Act, states are authorized to administer monitoring programs in different areas to determine if those areas are meeting the NAAQS.

EPA regulates nonroad mobile sources under the Clean Air Act to control emissions from nonroad engines (such as construction equipment, locomotives, and vessels). Regulations relevant to the Proposed Action include locomotive emission standards for new and rebuilt locomotive engines and the North America Emission Control Area for marine vessels limiting the sulfur content in fuel oil for marine vessels.

Table 5.6-2. State and Federal Ambient Air Quality Standards

Pollutant	Primary	Secondary
Carbon monoxide		
8-hour average[a]	9 ppm	No standard
1-hour average[a]	35 ppm	No standard
Ozone		
8-hour average[b,c]	0.070 ppm	0.070 ppm
Nitrogen dioxide		
1-hour average[d]	100 ppb	No standard
Annual average	53 ppb	53 ppb
Sulfur dioxide		
3-hour average[e]	No standard	0.50 ppm
1-hour average[f]	75 ppb	No standard
Lead		
Rolling 3-month average	0.15 μg/m³	0.15 μg/m³
PM10		
24-hour average[g]	150 μg/m³	150 μg/m³
PM2.5		
Annual average[h]	12 μg/m³	15 μg/m³
24-hour average[i]	35 μg/m³	35 μg/m³

Notes:
[a] Not to be exceeded on more than 1 day per calendar year as determined under the conditions indicated in 173 WAC 476.
[b] In December 2015, EPA lowered the federal standard for 8-hour ozone from 0.075 ppm to 0.070 ppm.
[c] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.070 ppm.
[d] 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years.
[e] Not to be exceeded more than once per calendar year.
[f] 99th percentile of 1-hour daily maximum concentrations averaged over 3 years.
[g] Not to be exceeded more than once per year average over 3 years.
[h] Annual mean averaged over 3 years.
[i] 98th percentile averaged over 3 years.
Source: 173 WAC 476; U.S. Environmental Protection Agency 2012.
ppm = parts per million; ppb= parts per billion; PM10 = particulate matter with a diameter of less than or equal to 10 micrometers; PM2.5 = particulate matter with a diameter less than or equal to 2.5 micrometers; μg/m³ = micrograms per cubic meter

5.6.1.2 Federal and State Air Toxics

Under the federal Clean Air Act, EPA controls air toxics, which are pollutants known or suspected to cause cancer or other serious health effects, such as birth defects or reproductive effects. Examples of air toxics include benzene, formaldehyde, and toluene. EPA has identified 188 air toxics, which it refers to as hazardous air pollutants (HAPS). No ambient air quality standards have been established for HAPS, and instead EPA has identified all major industrial stationary sources that emit these pollutants and developed national technology-based performance standards to reduce their emissions. The performance standards are designed to ensure that major sources of HAPS are controlled, regardless of geographic location.

An action that requires a Notice of Construction application under WAC 173-400-110 is subject to the review requirements of controls for new sources of toxic air pollutants except if either of the following criteria are met: (1) emissions before control equipment of each toxic air pollutant from a new source are less than the applicable *de minimis* emission threshold for the toxic air pollutant listed in WAC 173-460-150; or (2) the increase in emissions from each modification is less than the applicable *de minimis* emission threshold for the toxic air pollutant listed in WAC 173-460-150. Southwest Clean Air Agency has a separate list of pollutants that may apply to emissions from this stationary source. The purpose is to establish the systematic control of new or modified sources emitting toxic air pollutants to prevent air pollution to the extent reasonably possible and maintain levels of air quality to protect human health.

5.6.2 Study Area

The study area for direct impacts on air quality is the area in and near the project area that could be affected by construction and operation activities in the project area. The study area for indirect impacts includes Cowlitz County and accounts for rail operations in Cowlitz County, and vessel activity on the Columbia River. An assessment of air quality impacts from Proposed Action-related trains and vessels for the routes in Washington State is also provided.

For inhalation health risks related to diesel particulate matter, the study area for direct impacts is the area that could be affected by terminal operations in the project area. The study area for indirect impacts is the area that could be affected by terminal and rail operations in Cowlitz County.

5.6.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on air quality associated with the construction and operation of the Proposed Action and No-Action Alternative. Sources from outside of Washington State were used when no applicable state or local methods or guidance were available.

5.6.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and the No-Action Alternative on air quality in the study area.

- Data and information on coal export terminal construction and operation (URS Corporation 2015)
- Northwest International Air Quality Environmental Science and Technology Consortium for existing conditions data (2015)
- California's Air Resource Board vessel transit emissions study (California Air Resources Board 2011)
- California Environmental Protection Agency's guidance manual for preparation of health risk assessments (California Environmental Protection Agency 2003)
- National Climatic Data Center Longview, Washington climate data (National Climatic Data Center 2011)
- U.S. Environmental Protection Agency air pollutant emissions factors (U.S. Environmental Protection Agency 1995a, 1995b, 1995c, 1996)

- U.S. Environmental Protection Agency's air modeling guidance (U.S. Environmental Protection Agency 2004, 2014)
- U.S. Environmental Protection Agency's vessel fuel consumption data (U.S. Environmental Protection Agency 2000)
- U.S. Environmental Protection Agency's NONROAD Model (U.S. Environmental Protection Agency 2009)
- U.S. Environmental Protection Agency's vessel exhaust emission standards (U.S. Environmental Protection Agency 2012)
- U.S. Environmental Protection Agency's national-scale air toxic assessment (U.S. Environmental Protection Agency 2011)
- Washington State Department of Ecology statewide emissions inventory levels (Washington State Department of Ecology 2014)

5.6.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on air quality.

The analysis evaluated emissions from construction and operations of the Proposed Action. Air emissions were estimated for the criteria air pollutants carbon monoxide, nitrogen oxides, sulfur dioxide, particulate matter less than or equal to 2.5 micrometers in diameter (PM2.5), and particulate matter less than or equal to 10 micrometers in diameter (PM10). Also included were volatile organic compounds (VOCs), an important precursor to ozone. Total suspended particles and diesel particulate matter were also estimated. Because construction emissions are temporary and have a short period of activity, these emissions were only evaluated in comparison with emissions thresholds. Operations emissions, however, were evaluated with respect to their impacts on air quality. Diesel particulate matter was evaluated with respect to the potential to increase inhalation cancer risk.

Construction

The Applicant has identified three construction-material-delivery scenarios: delivery by truck, rail, or barge.

- **Truck.** If material is delivered by truck, it is assumed approximately 88,000 truck trips would be required over the construction period. Approximately 56,000 truck trips would be needed during the peak construction year.
- **Rail.** If material is delivered by rail, it is assumed approximately 700 train trips would be required over the construction period. Approximately two-thirds of the rail trips would occur during the peak construction year.
- **Barge.** If material is delivered by barge, it is assumed approximately 1,130 barge trips would be required over the construction period. Approximately two-thirds of the barge trips would occur during the peak construction year. Because the project area does not have an existing barge dock, the material would be unloaded at an existing dock elsewhere on the Columbia River and transported to the project area by truck.

The emissions for all three scenarios were analyzed to determine the scenario with the highest emissions. Emissions were estimated for the peak construction year in each scenario.

The following sources of emissions were evaluated.

- Construction equipment operations
- Fugitive dust from earthwork activity
- Vehicle delays at at-grade rail crossings
- Construction worker vehicles commuting to the project area
- Truck emissions associated with delivery of construction supplies and materials
- Locomotive emissions associated with delivery of construction supplies and materials by rail
- Tug emissions associated with delivery of construction supplies by barge

Emissions were estimated based on frequency and duration of use and fuel types using EPA emissions data or the EPA NONROAD model for nonroad construction equipment activity. The *SEPA Air Quality Technical Report* (ICF 2017a) provides detailed information on the methods used to calculate emissions for the peak year of construction.

Operations

The air quality model assessed emissions from operation of the Proposed Action and their impact on local air quality. The air quality modeling method followed general EPA protocols used in air quality permitting. Representative background concentrations for the study area (Northwest International Air Quality Environmental Science and Technology Consortium 2015)[1] were used to determine background concentrations in air quality analyses since no representative monitoring data are available with the exception of PM2.5.[2]

The transfer and storage of coal at the coal export terminal would create fugitive emissions of coal dust. Emissions were estimated for the following operations.

- Unloading coal from rail cars
- Transferring coal on conveyors
- Piling coal onto storage piles
- Storing[3] coal in stockpiles
- Loading coal onto vessels

Fugitive coal dust emissions during rail transport from loaded and unloaded trains were also estimated.

[1] The Northwest International Air Quality Environmental Science and Technology Consortium (NW AIRQUEST) developed background design value estimates for 2009 through 2011 based on model-monitor interpolated products that provide realistic background design value estimates where nearby ambient monitoring data are unavailable. The work is sponsored by EPA Region 10, Ecology, and others.

[2] Representative PM2.5 background air monitoring data for 2013 through 2016 from Ecology's Longview PM2.5 monitor were used to determine the PM2.5 background concentration.

[3] Fugitive emissions from coal stockpiles would occur as a result of wind erosion.

In addition, the assessment considered emissions from the following operations.

- Locomotives idling during coal unloading and moving Proposed Action-related trains travelling to and from the project area
- Docked cargo vessels idling during coal loading (vessel hoteling) and transiting to and from the project area
- Tugs transiting to and from the project area and assisting cargo vessels with maneuvering, docking, undocking at the proposed docks
- Operations, maintenance and emergency equipment
- Employee vehicles
- Vehicles idling during delays caused by Proposed Action-related trains at at-grade crossings along the Reynolds Lead and BNSF Spur

Emissions were evaluated using EPA's standard regulatory air dispersion model, AERMOD (Version 15181). To assess impacts associated with the Proposed Action, the model was used to predict the increase in criteria air pollutant concentrations. The model's maximum incremental increases for each pollutant and averaging time were added to applicable background concentrations and compared to the federal and state ambient air quality standards presented in Table 5.6-2.

An inhalation-only[4] health risk assessment was performed using the AERMOD dispersion model to assess the increased cancer risk associated with the Proposed Action-related increase in diesel particulate matter emissions. The assessment was performed per California Environmental Protection Agency guidance using Ecology's (2008) evaluation and selection of available guidelines. The results from the modeling are discussed in terms of increased inhalation cancer risk per million people. Because no baseline inhalation cancer risk for Cowlitz County that accounts for diesel particulate matter is available,[5] the California EPA Office of Environmental Health Hazard Assessment cancer potency value was applied to the EPA (2011) average Cowlitz County diesel particulate matter concentration (1.14 $\mu g/m^3$) to establish a baseline for comparison in this analysis. The resulting countywide average inhalation cancer risk from diesel particulate matter emissions is approximately 300 cancers per million. Additional information on the methods used is provided in the *SEPA Air Quality Technical Report*.

Annual locomotive and vessel emissions for Proposed Action-related trains and vessels were estimated for Cowlitz County and Washington State and compared to existing annual emissions to provide context for potential air quality impacts in these areas. The *SEPA Air Quality Technical Report* provides detailed information on the methods used to calculate and model emissions during operations.

Additional details regarding the methods and assumptions of the emissions estimates from the different sources are provided below.

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[4] The risk assessment only considered the cancer risk by the inhalation pathway because the risk contributions by other pathways of exposure are difficult to quantify and are known to be negligible relative to the inhalation pathway.

[5] Because the EPA 2002 health assessment document for diesel engine exhaust does not find data sufficient to quantitatively determine the diesel cancer potency factor.

- **Coal Storage and Handling.** The tandem rotary unloaders and approximately one-third of conveyors would be enclosed. Unenclosed transfer activities at the coal stockpiles would have systems in place for dust control (watering or dry fogging). Watering of the coal stockpiles would help to reduce wind erosion. In general, the combination of these control systems would be expected to provide a high level of dust control (up to 99%). However, because not all transfer and conveyor operations would be fully enclosed, a more conservative effectiveness assumption of 95% was used in this analysis.
- **Locomotives.** The impact analysis approach for rail operations used EPA-projected emissions factors for line-haul locomotives, which are based on projected changes in locomotive fleet over the next 30 years (U.S. Environmental Protection Agency 2009). These emissions were based on locomotive engine load and associated fuel consumption during transport to and from the coal export terminal and during unloading of coal from train cars. It was assumed that all locomotives would use ultra-low-sulfur diesel (15 parts per million [ppm] sulfur).
- **Vessels.** The impact analysis approach for vessel operations assumed that each cargo vessel receiving coal would need three tugs for maneuvering, and would require 3 hours total time to assist with docking and departing operations. Further, it was estimated that an average of 13 hours would be needed to load each vessel with coal, and during this period of time, the vessel would be using auxiliary engines. To comply with International Maritime Organization 2016 Emission Control Areas for North America, all vessels were assumed to use the maximum allowed sulfur content marine distillate fuel of 0.1% (1,000 ppm). It was also assumed that all tugboats would use ultra-low-sulfur diesel (15 ppm sulfur).

5.6.4 Existing Conditions

This section describes the existing environmental conditions in the study area related to air quality that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

5.6.4.1 Attainment Status

EPA and Ecology designate regions as being attainment or nonattainment areas for regulated air pollutants. Attainment status indicates that air quality in an area meets the federal, health-based ambient air quality standards. Nonattainment status indicates that air quality in an area does not meet those standards. Cowlitz County is currently in attainment for all NAAQS. This designation means that EPA and Ecology expect the area to meet air quality standards.

5.6.4.2 Air Quality Conditions

This section describes climate, meteorological, and air quality conditions in the study area.

Climate and Meteorological Conditions

The project area is located along the Columbia River in southwestern Washington, approximately 50 miles east of the Pacific Ocean. The region is characterized as a mid-latitude, west coast marine-type climate. The Cascade Range to the east has a large influence on the climate in Cowlitz County. The Cascade Range forms a barrier from continental air masses originating over the Columbia River Basin. The Cascades also induce heavy amounts of rainfall; as moist air from the west rises, it is forced to rise up the mountain slopes, which produces heavier rainfall on the western slopes of the Cascades and moderate rainfall in the low-lying areas, such as Longview.

Summers in the region are mild and dry. Winters are cool, but typically wet and cloudy with a small range in daily temperature. The average annual precipitation in Longview is approximately 48 inches, with most precipitation falling from November through March (National Climate Data Center 2011). Average annual rain events, taken as days with more than 0.01 inch of rainfall, occur approximately 175 days per year, based on National Climatic Data Center summaries.

Temperatures are usually mild in the Lower Columbia River Basin. Days with maximum temperatures above 90 degrees Fahrenheit (°F) occur about seven times per year on average. Days with a minimum temperature below 32°F occur about 57 times per year on average, and temperatures below 0°F occur only very rarely (none recorded between 1931 and 2006). Mean high temperatures range from the high 70s in the summer to mid-40s (°F) in winter, while average lows are generally in the low 50s in summer and mid-30s in winter.

Meteorological data collected by the Weyerhaeuser meteorological tower at the nearby Mint Farm Industrial Park between 2001 and 2003 (URS Corporation 2015) indicates that the prevailing winds near the project area are from the west-northwest and southeast, following along the alignment of the Columbia River. In the fall and winter (October through March), the winds are primarily from the southeast and east; the winds are typically from the west-northwest in the spring and summer (April through September).

Cowlitz County

Cowlitz County is in attainment or unclassified for all criteria air pollutants, indicating that air quality near the project area meets the federal and state ambient air quality standards.

The only available local air pollutant monitoring is for PM2.5, at a station approximately 1.5 miles east of the project area. The monitoring data show that PM2.5 levels meet the PM2.5 air quality standards. Although no other monitoring data are available, concentrations of other criteria air pollutants in the study area also are expected to meet air quality standards.

The Longview air toxics study showed measured levels of toxic air pollutants were below levels of concern for short-term and long-term exposures (Southwest Clean Air Agency 2007). The study found that, of the air toxics that could be directly monitored, the air toxics of most concern for potential health risk in Longview are acetaldehyde, arsenic, benzene, manganese, and formaldehyde, while diesel particulate matter was identified as the most likely contributor to cancer risk in Washington State. No further studies on air toxic monitoring in the Longview-Kelso area have been conducted since that time.

Toxic air releases from manufacturers and others are reported annually in Washington as part of the federal Emergency Planning and Community Right-to-Know Act. This inventory is publicly available and allows the public to see what types of pollutants are released into the environment by large industrial sources. Additionally, EPA compiles a comprehensive National Emissions Inventory every 3 years. This inventory includes emissions of air toxics from industrial, commercial, mobile, and area sources, and is used by EPA in their National Air Toxics Assessment (NATA). The most recent (2011) NATA showed Cowlitz County had an overall inhalation cancer risk of 30 cancers per million, which is lower than the state average of 40 cancers per million, as well as below the national averages of

40 cancers per million (U.S. Environmental Protection Agency 2011). However, NATA does not quantify cancer risk associated with exposure to diesel particulate matter.[6]

Air Quality along Transportation Routes

Rail Traffic

The broader study area includes the rail transportation routes for Proposed Action-related trains in Washington State. Figure 5.1-1 in Section 5.1, *Rail Transportation*, illustrates the routes expected to be used by Proposed Action-related trains. Loaded and empty BNSF Railway Company (BNSF) trains would be expected to travel the same route between the Washington–Idaho State line and Pasco. West of Pasco, westbound loaded trains would be expected to travel to the project area along the Columbia River Gorge route, through Vancouver to Longview Junction on the BNSF main line, and then along the BNSF Spur and Reynolds Lead to the project area. Empty trains would be expected to travel from the project area along the Reynolds Lead and BNSF Spur to Longview Junction, on the BNSF main line to Auburn, over Stampede Pass, then through Yakima and back to Pasco. Union Pacific Railroad (UP) trains would travel in Washington State between Vancouver and the project area.

Air quality on the rail route from the Idaho border to Pasco is generally good. Spokane is a maintenance area[7] for carbon monoxide, but has not had an exceedance of the standard in more than 10 years. High winds in this region between spring and fall can combine with dry weather conditions to create dust storms, which can lead to extremely high levels of PM10. Air quality through the Columbia Gorge is generally good, with the primary concern focused on visibility impairment and regional haze issues; standards established to protect visibility are much lower than for health effects. The air quality from Vancouver to Longview is generally good. The few days with higher levels of particulates mostly occur during the home heating season.

The return rail route passes through Tacoma to Auburn, over the Cascades via Stampede Pass, then back to Pasco via Yakima and onward to Spokane. The area east of Auburn experiences some of the highest ozone levels in western Washington, although these levels are still below the NAAQS. The ozone monitoring site near Enumclaw has shown exceedances of the 8-hour ozone standard during the past 3 years (Washington State Department of Ecology 2015). Air quality from Stampede Pass through Yakima and back to Pasco is generally good. Recent monitoring data in the Yakima area has shown higher than usual levels of PM2.5 containing nitrate. In Yakima, much of the PM2.5 comes from wood burning, with the highest levels in winter as a result of increased wood burning along with stagnant air conditions (Washington State Department of Ecology 2015). Nitrate accounts for up to 25% of the wintertime PM2.5 in the Yakima area. High levels of daily PM2.5 are found in Ellensburg for 2 to 3 weeks each year.

Ecology (2011) estimated inhalation cancer risk from all existing sources of air pollutants based on 2005 NATA assessment.[8] Updating this assessment using the 2011 NATA data shows that Vancouver and Spokane, the major population centers along the rail route, have a cancer risk of up to 1,000 and 500 cancers per million, respectively. For the smaller communities along the rail route (Kelso,

[6] Development of a cancer risk baseline associated with diesel particulate matter exposure is described in Section 5.6.3 *Methods.*

[7] A maintenance area is one that has been in nonattainment but currently meets air quality standards.

[8] Including quantifying the cancer risk for diesel particulate matter.

Longview, Yakima, and Pasco), cancer risks ranged from less than 75 cancers per million to 500 cancers per million.

Vessel Traffic

Vessel traffic would traverse the Columbia River between the project area and the mouth of the river. Wahkiakum and Pacific Counties in Washington State on the Columbia River are also designated as attainment areas for criteria air pollutants.

5.6.5 Impacts

This section describes the potential impacts on air quality that would result from construction and operation of the Proposed Action and No-Action Alternative.

5.6.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area as a result of construction and operation of the Proposed Action. The analysis and discussion of direct and indirect impacts are combined.

Construction

Construction-related activities associated with the Proposed Action could result in direct and indirect impacts as described below. As described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

The construction material delivery scenario with the highest emissions would be the barge scenario, which would deliver construction materials via barge and truck. Haul truck emissions are included for the truck trips needed to make deliveries of construction material from the barge dock to the project area. Maximum annual construction emission estimates for the peak construction year are shown in Table 5.6-3. Table 5.6-4 illustrates the maximum daily construction emission estimates.[9]

[9] The estimated emissions shown assume that best management practices would be followed, including measures to reduce idling and dust generated by soil disturbance, and the application of water along access roads to minimize track-out of soil. Maximum daily emissions are relevant to short-term air quality standards that may be of concern for a long-term construction project. Construction emissions were based on a construction schedule of 5 days per week with maximum activity levels for construction and earth movement equipment.

Table 5.6-3. Estimated Maximum Annual Construction Emissions

Source	Construction Emissions (tons per year)								
	CO	NO_X	SO_2	PM2.5	PM10	VOCs	TSP	HAPS	DPM
Combustion Sources									
Equipment (in project area)	9.04	24.60	0.95	1.93	1.93	2.23	2.34	0.05	2.34
Haul trucks (in project area)	0.88	4.06	0.01	0.13	0.19	0.18	0.23	0.004	0.23
Haul trucks (in study area)[a]	2.04	9.37	0.03	0.31	0.44	0.41	0.54	0.010	0.54
Barges (in study area)[b]	15.68	59.0	0.028	1.06	1.06	1.51	1.29	0.03	1.29
Passenger commute vehicles/crossing-delay (in study area)[a]	7.5	0.05	0.010	0.04	0.22	0.13	0.22	0.001	<0.001
Total Combustion Sources (in project area)	**9.92**	**28.66**	**0.96**	**2.06**	**2.12**	**2.41**	**2.57**	**0.05**	**2.57**
Total Combustion Sources (all study area)[c]	**19.5**	**38.1**	**1.0**	**2.4**	**2.8**	**2.95**	**3.3**	**0.07**	**3.1**
Fugitive Sources									
Fugitive earthwork (project area)	—	—	—	1.22	5.87	—	12.00	—	—
Total Fugitive Sources	**—**	**—**	**—**	**1.22**	**5.87**	**—**	**12.00**	**—**	**—**
Total									
Construction emissions sources (project area)	**9.9**	**28.7**	**0.96**	**3.28**	**7.99**	**2.41**	**14.6**	**0.05**	**2.6**
All construction emissions sources[c]	**19.5**	**38.1**	**1.0**	**3.6**	**8.7**	**2.95**	**15.3**	**0.07**	**3.1**
PSD significance thresholds (40 CFR 52.21)	**100**	**40**	**40**	**10**	**15**	**40**	**—**	**—**	**—**

Notes:

[a] Not in the project area but in Cowlitz County.

[b] Not in the project area. Based on barge maneuvering time for docking of 0.5 hour in and 0.5 hour out; does not include transit on the Columbia River.

[c] Rounded. Does not include barge emissions, but does include haul truck emissions to the project area.

CO = carbon monoxide; NO_X = nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 = particulate matter less than or equal to 2.5 micrometers in diameter**;** PM10 = particulate matter less than or equal to 10 micrometers in diameter**;** VOCs = volatile organic compounds; TSP = total suspended particles; HAPS = hazardous air pollutants; DPM = diesel particulate matter; Fugitive Sources = emissions that are not directly vented through a stack, chimney, vent, or other functionally equivalent opening; PSD = prevention of significance deterioration

Table 5.6-4. Estimated Maximum Daily Construction Emissions

	Construction Emissions (pounds per day)								
Source	**CO**	**NO_x**	**SO_2**	**PM2.5**	**PM10**	**VOCs**	**TSP**	**HAPS**	**DPM**
Combustion Sources									
Equipment (in project area)	82.89	229.60	8.67	17.66	17.66	20.40	21.49	0.42	21.50
Haul trucks (in project area)	14.40	54.70	0.20	2.60	5.00	3.10	6.10	0.10	6.12
Haul trucks (in study area)[a]	24.00	110.48	0.33	3.66	5.21	4.81	6.34	0.12	6.34
Barges (in study area)[b]	120.80	454.70	0.21	8.14	8.14	11.6	9.90	0.61	9.90
Passenger commute and crossing delay (in study area)[a]	20.00	1.43	0.03	0.11	0.58	0.35	0.58	0.01	<0.001
Total Combustion Sources (in project area)	**97.29**	**284.3**	**8.87**	**20.26**	**22.66**	**23.50**	**27.59**	**0.52**	**27.62**
Total Combustion Sources (all study area)[c]	**141.29**	**396.2**	**9.23**	**24.0**	**28.5**	**28.7**	**34.5**	**0.65**	**34.0**
Fugitive Sources									
Fugitive earthwork (in project area)	—	—	—	6.80	32.6	—	66.7	—	—
Total Fugitive Sources	—	—	—	**6.80**	**32.6**	—	**66.7**	—	—
Total									
Construction emissions sources (project area)	**97.29**	**284.3**	**8.87**	**27.1**	**55.3**	**23.5**	**94.3**	**0.52**	**27.6**
All construction emissions sources[c]	**141.29**	**396.2**	**9.23**	**30.8**	**61.1**	**28.7**	**101.21**	**0.65**	**34.0**

Notes:

[a] Not in the project area but in Cowlitz County.

[b] Not in the project area. Based on barge maneuvering time for docking of 0.5 hour in and 0.5 hour out; does not include transit on the Columbia River.

[c] Rounded. Does not include barge emissions, but does include haul truck emissions to the project area.

CO = carbon monoxide; NO_X= nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 = particulate matter less or equal to than 2.5 micrometers in diameter; PM10 = particulate matter less than or equal to 10 micrometers in diameter; VOCs = volatile organic compounds; TSP = total suspended particles; HAPS = hazardous air pollutants; DPM = diesel particulate matter; Fugitive Sources = emissions that are not directly vented through a stack, chimney, vent, or other functionally equivalent opening

The maximum annual construction-related emissions would be below the prevention of significance deterioration (PSD) thresholds[10] established by EPA, as shown in Table 5.6-3. This means that although emissions of criteria air pollutants would occur during construction, they would not be expected to cause a substantial change in air quality or adversely affect sensitive receptors[11] near the project area.[12]

Operations

Sources of emissions during operations would include coal handling equipment; coal storage piles; maintenance, operation, and emergency equipment; employee commute vehicles; and Proposed Action-related rail and vessel operations.

Table 5.6-5 presents emissions from coal export terminal operations and related rail and vessel operations in the study area. As shown in Table 5.6-5, rail and vessel transport would be the largest sources of emissions. The Proposed Action would produce small quantities of air pollutants from maintenance, operations, and emergency equipment. The table also shows fugitive emissions related to coal transfer and storage.

Table 5.6-5. Maximum Annual Average Emissions from Operations

	Maximum Annual Average Emissions (tons per year)								
Source	**CO**	**NO_x**	**SO_2**	**PM2.5**	**PM10**	**TSP**	**VOCs**	**HAPS**	**DPM**
Fugitive Sources									
Coal transfer (except coal storage piles)									
Material handling	—	—	—	0.28	1.84	5.25	—	—	—
Coal storage piles									
Wind erosion	—	—	—	0.40	2.59	3.05	—	—	—
Material handling	—	—	—	0.14	0.92	2.62	—	—	—
Mobile Sources									
Maintenance/operations/emergency equipment									
Combustion	1.45	4.36	0.20	0.31	0.31	0.38	0.37	0.01	0.38
Employee commute and crossing delay	2.05	0.13	0.003	0.02	0.08	0.08	0.04	0.01	<0.01
Locomotive									
Combustion (study area)[a]	10.18	23.3	0.036	0.48	0.50	0.60	0.80	0.11	0.60
Fugitive dust (study area)[a]	—	—	—	0.13	0.88	1.03	—	—	—
Combustion (project area)	5.04	14.0	0.02	0.29	0.30	0.36	0.56	0.05	0.27
Fugitive dust (project area)	—	—	—	0.48	3.13	3.68	—	—	—

[10] The PSD significance levels are the lowest thresholds that would define the emissions as less than a major modification to a major stationary source. This applies to areas in attainment with the National Ambient Air Quality Standards (NAAQS).

[11] Sensitive air quality receptors were defined as a facility or land use that houses or attracts members of a population who are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of sensitive receptors include schools, hospitals, day care centers, convalescent facilities, senior centers, and parks or recreational facilities.

[12] While the study area is not a major stationary source subject to federal PSD rules (40 CFR 52.21), the emission threshold levels were used to evaluate potential impact from construction.

	Maximum Annual Average Emissions (tons per year)								
Source	**CO**	**NO_x**	**SO_2**	**PM2.5**	**PM10**	**TSP**	**VOCs**	**HAPS**	**DPM**
Vessels									
Combustion (study area)[a]	37.9	24.8	3.04	1.64	1.78	2.17	14.1	0.03	0.00
Combustion (project area)	65.9	23.3	4.52	1.02	1.05	1.27	15.3	0.08	0.56
Total: All Mobile Sources, Project Area, Study Area	122.5	89.89	7.82	4.37	8.03	9.57	31.17	0.29	1.82
Total Project Area Sources	70.94	37.30	4.54	1.79	4.48	5.31	15.86	0.13	0.83
Fugitive Dust Only, Project Area	—	—	—	1.43	9.36	15.63	—	—	—
Mobile Combustion Sources, Project Area	72.4	41.66	4.74	2.10	4.79	5.69	16.23	0.14	1.21

Notes:

[a] Study area beyond the project area.

CO = carbon monoxide; NO_X = nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 **=** particulate matter less or equal to than 2.5 micrometers in diameter**;** PM10 = particulate matter less or equal to than 10 micrometers in diameter**;** TSP = total suspended particles; VOCs = volatile organic compounds; HAPS = hazardous air pollutants; DPM = diesel particulate matter

Criteria Air Pollutants

An analysis was performed with the AERMOD dispersion model and the results were compared with the NAAQS. Two sets of emissions were developed for use in the impact assessment. The first set was used to model annual average concentrations, reflecting emissions over an entire year with train and vessel arrivals spread across the year to simulate the average anticipated activity at the coal export terminal. The second set of emissions was used to determine the short-term concentrations (24-hour or less concentrations), reflecting peak emissions that could occur during the course of an hour. Peak activity at the coal export terminal included a coal train unloading, a vessel loading with coal, and a second vessel docking. Tables 5.6-6, 5.6-7, and 5.6-8 present the modeling results.

Table 5.6-6 summarizes the maximum predicted criteria air pollutant concentrations due to maintenance and operations of the coal export terminal. This includes handling and moving the coal, coal storage piles, tandem rotary unloaders, mobile source equipment, and employee vehicles. Coal export terminal-only estimated emissions, in combination with the background concentrations, would not exceed any NAAQS.

The highest percentage increase in concentration due to terminal-only operations is the 24-hour PM10 impact, an increase of 88 $\mu g/m^3$, or approximately 59% of the PM10 NAAQS. The largest source of this increase is fugitive emissions from the coal piles, followed closely by material handling of the coal, and, to a lesser extent, by the unloading of the coal train. The next highest increase in concentration due to terminal-only operations is the 24-hour PM2.5 impact, an increase of 11.2 $\mu g/m^3$, or approximately 32% of the PM2.5 NAAQS. This increase is mostly from the coal piles, but material handling and fuel combustion from locomotives and vehicles also contribute. Similarly, the 1-hour NO_2 impact would increase 18.8 $\mu g/m^3$, approximately 10% of the NO_2 NAAQS. Emissions of all other pollutants would increase less than 2% of the relevant NAAQS.

Table 5.6-6. Maximum Modeled Concentrations from Operation of the Coal Export Terminal[a]

Pollutant	Averaging Period	Modeled Impact (µg/m³)	Background[b,c] (µg/m³)	Total Predicted Concentration (µg/m³)	NAAQS (µg/m³)
CO	1 hour[d]	12.8	827	840	40,000
	8 hour[d]	5	600	605	10,000
NO_2	1 hour[e,f]	18.8	56.6	75.4	188
	Annual[f,g]	0.4	5.3	5.7	100
SO_2	1 hour[h]	1.2	14.7	15.9	196
	3 hour[i]	0.75	11.5	12.3	1,300
PM2.5	24 hour[j]	11.2	19.3	30.5	35
	Annual[k]	0.23	6.2	6.4	12
PM10	24 hour[l]	88	23	111	150

Notes:
[a] Coal export terminal operation sources include coal handling and movement; coal storage piles; rotary rail unloaders; mobile operation, maintenance, and emergency equipment; and employee vehicles.
[b] Background design value estimates for 2009 through 2011, based on model-monitor interpolated products (except PM2.5) sponsored by EPA Region 10, Ecology, and others. From NW AIRQUEST tool, Washington State University (http://www.lar.wsu.edu/nw-airquest/lookup.html.)
[c] PM2.5 background based on Ecology's Kelso Monitor (2013 through 2016). The reported 24-hour values are the maximum of the 3-year average of the yearly 98th percentile of the daily concentration.
[d] Modeled impact is the highest second high for each calendar year over the 3 modeled years.
[e] The NO_2 1-hour modeled impact is the 3-year average of the annual 98th percentile of 1-hour daily maximum concentrations.
[f] Modeled NO_2 impacts applied the Tier III Ozone Limiting Method (OLM), using an ozone background of 42 ppb, as per the NW AIRQUEST tool. For additional information regarding the modeling methods, see the *SEPA Air Quality Technical Report*.
[g] The NO_2 annual modeled impact is the maximum annual mean over the 3 modeled years.
[h] The SO_2 1-hour modeled impact is the 3-year average of the 99th percentile of the 1-hour daily maximum concentrations.
[i] The SO_2 3-hour modeled impact is not to be exceeded more than once per year.
[j] The PM2.5 24-hour modeled impact is the 98th percentile of daily concentrations averaged over 3 years.
[k] The PM2.5 annual modeled impact is the 3-year average of the annual mean.
[l] The PM10 24-hour modeled impact is the 2nd highest concentration over a 3-year period. This is more conservative than the NAAQS compliance methodology of the 3-year average of the highest 2nd high concentration for each year.

µg/m³ = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards; CO = carbon monoxide; NO_2 = nitrogen dioxide; SO_2 = sulfur dioxide; PM2.5 **=** particulate matter less than or equal to 2.5 micrometers in diameter**;** PM10 = particulate matter less than or equal to 10 micrometers in diameter

Table 5.6-7 presents the modeling results for all operations in the project area, including the terminal operation activities and rail[13] and vessel[14] operations in the project area. Estimated emissions from all project area operations, in combination with background concentrations, would not exceed any NAAQS.

[13] Locomotive emissions from idling during unloading and from transport in the project area.
[14] Vessel hoteling during loading, docking and undocking, and tug emissions during maneuvering.

Table 5.6-7. Maximum Modeled Concentrations from All Operations in the Project Area[a]

Pollutant	Averaging Period	Modeled Impact ($\mu g/m^3$)	Background[b,c] ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
CO	1 hour[d]	223	827	1,050	40,000
	8 hour[d]	51	600	651	10,000
NO_2	1 hour[d,e]	94.3	56.6	151	188
	Annual[f,g]	13.7	5.3	19	100
SO_2	1 hour[h]	10.6	14.7	25.3	196
	3 hour[i]	10.2	11.5	21.7	1,300
PM2.5	24 hour[j]	11.9	19.3	31.2	35
	Annual[k]	0.81	6.2	7.0	12
PM10	24 hour[l]	92.6	23	116	150

Notes:

[a] Sources include all coal export terminal operations as well as locomotive, and vessel operations in the project area.

[b] Background design value estimates for 2009 through 2011, based on model-monitor interpolated products (except PM2.5) sponsored by EPA Region 10, Ecology, and others. From NW AIRQUEST tool, Washington State University (http://www.lar.wsu.edu/nw-airquest/lookup.html.)

[c] PM2.5 background based on Ecology's Kelso Monitor (2013 through 2016). The reported 24-hour values are the maximum of the 3-year average of the yearly 98th percentile of the daily concentration.

[d] Modeled impact is the highest second high for each calendar year over the 3 modeled years.

[e] The NO_2 1-hour modeled impact is the 3-year average of the annual 98th percentile of 1-hour daily maximum concentrations.

[f] Modeled NO_2 impacts applied the Tier III Ozone Limiting Method (OLM), using an ozone background of 42 ppb, as per the NW AIRQUEST tool. For additional information regarding the modeling methods, see the *SEPA Air Quality Technical Report*.

[g] The NO_2 annual modeled impact is the maximum annual mean over the 3 modeled years.

[h] The SO_2 1-hour modeled impact is the 3-year average of the 99th percentile of the 1-hour daily maximum concentrations.

[i] The SO_2 3-hour modeled impact is not to be exceeded more than once per year.

[j] The PM2.5 24-hour modeled impact is the 98th percentile of daily concentrations, averaged over 3 years.

[k] The PM2.5 annual modeled impact is the 3-year average of the annual mean.

[l] The PM10 24-hour modeled impact is the 2nd highest concentration over a 3-year period. This is more conservative than the NAAQS compliance methodology of the 3-year average of the highest 2nd high concentration for each year.

$\mu g/m^3$ = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards; CO = carbon monoxide; NO_2 = nitrogen dioxide; SO_2 = sulfur dioxide; PM2.5 **=** particulate matter less than or equal to 2.5 micrometers in diameter**;** PM10 = particulate matter less than or equal to 10 micrometers in diameter

The highest increase in concentrations due to all project area operations is the 24-hour PM10 impact: 92.6 $\mu g/m^3$, or approximately 62% of the PM10 NAAQS. The largest source of this increase is the fugitive emissions from the coal piles, followed closely by material handling of the coal, and, to a lesser extent, by the unloading of the coal train. The next highest concentration increase is the 1-hour NO_2 impact: 94.3 $\mu g/m^3$, or approximately 50% of the NO_2 NAAQS. Similarly, the 24-hour PM2.5 would increase 11.9 $\mu g/m^3$, or approximately 34% of the PM2.5 NAAQS. All other pollutants would increase less than approximately 15% of the relevant NAAQS.

Table 5.6-8 presents the modeling results for all operations in the study area, including terminal operations, rail[15] and vessel[16] operations and vehicle delay at at-grade rail crossings in the study area. Estimated emissions from all study area operations, in combination with the background concentrations, would not exceed any NAAQS.

Table 5.6-8. Maximum Modeled Concentrations from All Operations in the Study Area[a]

Pollutant	Averaging Period	Modeled Impact ($\mu g/m^3$)	Background[b,c] ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
CO	1 hour[d]	377	827	1,204	40,000
	8 hour[d]	99	600	699	10,000
NO_2	1 hour[d,e]	94.3	56.6	151	188
	Annual[f,g]	13.7	5.3	19.0	100
SO_2	1 hour[h]	10.6	14.7	25.3	196
	3 hour[i]	10.2	11.5	21.7	1,300
PM2.5	24 hour[j]	12.5	19.3	31.8	35
	Annual[k]	0.83	6.2	7.0	12
PM10	24 hour[l]	93.6	23	117	150

Notes:

[a] Sources include all coal export terminal operations as well as locomotive and vessel operations and vehicle delay at at-grade rail crossings in the study area.

[b] Background design value estimates for 2009 through 2011, based on model-monitor interpolated products (except PM2.5) sponsored by EPA Region 10, Ecology, and others. Source: NW AIRQUEST tool. Washington State University (http://www.lar.wsu.edu/nw-airquest/lookup.html.)

[c] PM2.5 background based on Ecology's Longview Monitor (2013 through 2016). The reported 24-hour values are the maximum of the 3-year average of the yearly 98th percentile of the daily concentration.

[d] Modeled impact is the highest 2nd high for each calendar year over the 3 modeled years.

[e] The NO_2 1-hour modeled impact is the 3-year average of the annual 98th percentile of 1-hour daily maximum concentrations.

[f] Modeled NO_2 impacts applied the Tier III Ozone Limiting Method, using an ozone background of 42 ppb, as per the NW AIRQUEST tool. For additional information regarding the modeling methods, see Section 2.1.2.2, *Operations Impact Analysis Approach*.

[g] The NO_2 annual modeled impact is the maximum annual mean over the 3 modeled years.

[h] The SO_2 1-hour modeled impact is the 3-year average of the 99th percentile of the 1-hour daily maximum concentrations.

[i] The SO_2 3-hour modeled impact is not to be exceeded more than once per year.

[j] The PM2.5 24-hour modeled impact is the 98th percentile of daily concentrations, averaged over 3 years.

[k] The PM2.5 annual modeled impact is the 3-year average of the annual mean.

[l] The PM10 24-hour modeled impact is the 2nd highest concentration over a 3-year period. This is more conservative than the NAAQS compliance methodology of the 3-year average of the highest 2nd high concentration for each year.

$\mu g/m^3$ = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards; CO = carbon monoxide; SO_2 = sulfur dioxide; NO_2 = nitrogen dioxide; PM2.5 = particulate matter less than or equal to 2.5 micrometers in diameter; PM10 = particulate matter less than or equal to 10 micrometers in diameter

[15] Locomotive emissions from idling during unloading and from transport in the study area.

[16] Vessel hoteling during loading, tug assistance during docking and undocking, and cargo and tug transits in the study area.

These results are similar to those for project area sources. The highest increase in concentrations due is the 24-hour PM10 impact at 93.6 μg/m^3, or approximately 62% of the PM10 NAAQS. The largest source of this increase is the fugitive emissions from the coal piles, followed closely by material handling of the coal, and, to a lesser extent, by the unloading of the coal train. The next highest concentration increase is the 1-hour NO_2 impact, which would increase 94.3 μg/m^3, or approximately 50% of the 1-hour NO_2 NAAQS. This increase is almost exclusively due to the line-haul locomotive emissions, but the switch locomotive engines also contribute. The 24-hour PM2.5 impact would increase 12.5 μg/m^3, or approximately 36% of the PM2.5 NAAQS. All other pollutants would increase less than approximately 15% of the relevant NAAQS.

Diesel Particulate Matter

Diesel particulate matter is defined in state regulations as a toxic air pollutant (WAC 173-460-150). An inhalation-only health risk assessment was performed using the AERMOD dispersion model to assess increased cancer risk associated with increased diesel particulate matter emissions related to the Proposed Action. Increased diesel particulate matter exposure during operations would be primarily from Proposed Action-related train locomotive diesel emissions. The risk assessment only considers the cancer risk by the inhalation pathway because the risk contributions by other pathways of exposure are difficult to quantify and are known to be negligible relative to the inhalation pathway.

The assessment looked at two scenarios.

- **Fixed emissions scenario.** Assumes diesel particulate matter emissions in 2028 when the coal export terminal reaches maximum capacity.
- **Average lifetime emissions scenario.** Averages diesel particulate matter emissions starting in 2018, reaching full capacity in 2028, and continuing at full capacity to reflect the cleaner Tier 4 locomotive engines gradually entering the fleet each year as older locomotives are retired.

A risk level of 1 cancer per million implies a likelihood that one person, out of 1 million people exposed to the same concentration of the same pollutant, would contract cancer if exposed continuously (24 hours per day/7 days per week) to that specific concentration over 70 years (an assumed lifetime)[17] per EPA (2016) guidance. This cancer risk would be in addition to any existing risk.

The cancer risk analysis follows standard approaches including use of the conservative assumption of continuous lifetime exposure. This overstates cancer risk even for residential locations where people typically spend more time, because individuals are mobile, spending time in locations other than their residence on an average day and even changing residences over a lifetime. Cancer risk is further overstated for land uses where people spend less time, such as commercial and industrial locations where people typically spend even less time than at residential locations.

New stationary sources of air pollution are subject to WAC 173-460 (Controls of New Sources of Toxic Air Pollutants). This regulation establishes limits for toxic air pollutants. If a new stationary source is likely to exceed the Acceptable Source Impact Levels for one or more toxic air pollutants (such as diesel particulate matter) but the increased risk is less than 10 cancers per million, then the new source may be recommended for approval. While this regulation applies to stationary sources,

[17] Consistent with EPA (2016) assumption for purposes of NATA risk characterization.

not mobile sources such as rail locomotives, the health impacts from increased risk are the same for stationary and mobile sources. Therefore, an increased risk of 10 cancers per million is considered a significant and adverse impact whether from a stationary or mobile source.

To provide context for the increased cancer risk related to diesel particulate matter, results can be compared with the countywide baseline of 300 cancers per million, developed for purposes of the analysis, as described in Section 5.6.3.2, *Impact Analysis*. For example, an increased risk of 10 cancers per million would represent an approximately 3% increase over existing levels. Similarly, an increased risk of 30 cancers per million would represent an approximately 10% increase over existing levels.

Fixed Emissions Scenario (2028)

This section presents the cancer risk based on the fixed emissions scenario. Figure 5.6-1 depicts increased inhalation cancer risk related to diesel particulate matter emissions from coal export terminal sources (i.e., diesel-powered operation, maintenance, and emergency equipment). The contour for increased risk of 1 cancer per million extends across the width of the Columbia River and approximately 4 miles west of the project area and approximately 2.5 miles east of the project area. The 10 cancers per million risk contour is not shown on the figure because no locations would experience increased risk levels at or above 10 cancers per million.

Figure 5.6-2 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operation sources (i.e., terminal, rail, and vessel) in the project area. The contour for increased risk of 10 cancers per million extends across the Columbia River, approximately 1.3 mile southwest of the project area and approximately 0.1 mile northeast of the project area, and crosses Industrial Way near the northwest boundary of the project area. Portions of residential areas are within this contour.

Figure 5.6-3 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operation sources (terminal, rail, and vessel) in the Kelso-Longview area. The contour for increased risk of 10 cancers per million covers most of Longview south of Ocean Beach Highway as well as a portion of Kelso along the I-5 corridor. The contour for increased risk of 30 cancers per million along the Reynolds Lead is approximately 3,000 feet across and extends into the Highlands neighborhood. The highest increased risk level, 50 cancers per million, extends approximately 1,000 feet along portions of the Reynolds Lead and borders the Highlands neighborhood.

Figure 5.6-4 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operations (terminal, rail, and vessel) in Cowlitz County. The contour for increased risk of 10 cancers per million along the BNSF main line is approximately 2 miles across throughout Cowlitz County. The contour for increased risk of 30 cancers per million extends approximately 0.5 mile (or 0.25 mile on either side of the BNSF main line).

For further context, increased cancer risk related to emissions of diesel particulate matter from rail locomotives can be compared to that of diesel trucks. For example, the increased risk of 30 cancers per million at 0.25 mile from the Reynolds Lead and BNSF Spur (a 7.1-mile segment of rail line) resulting from the locomotive emissions from 16 Proposed Action-related train trips per day would be equivalent to the increased risk resulting from the emissions from approximately 1,100 diesel truck[18] trips per day along the same segment (i.e., 23 trucks per hour travelling in each direction).

[18] Assumes current fleet heavy-duty trucks traveling at 55 miles per hour.

Figure 5.6-1. Increased Diesel Particulate Matter Cancer Risk from Coal Export Terminal Sources—Fixed Emissions Scenario

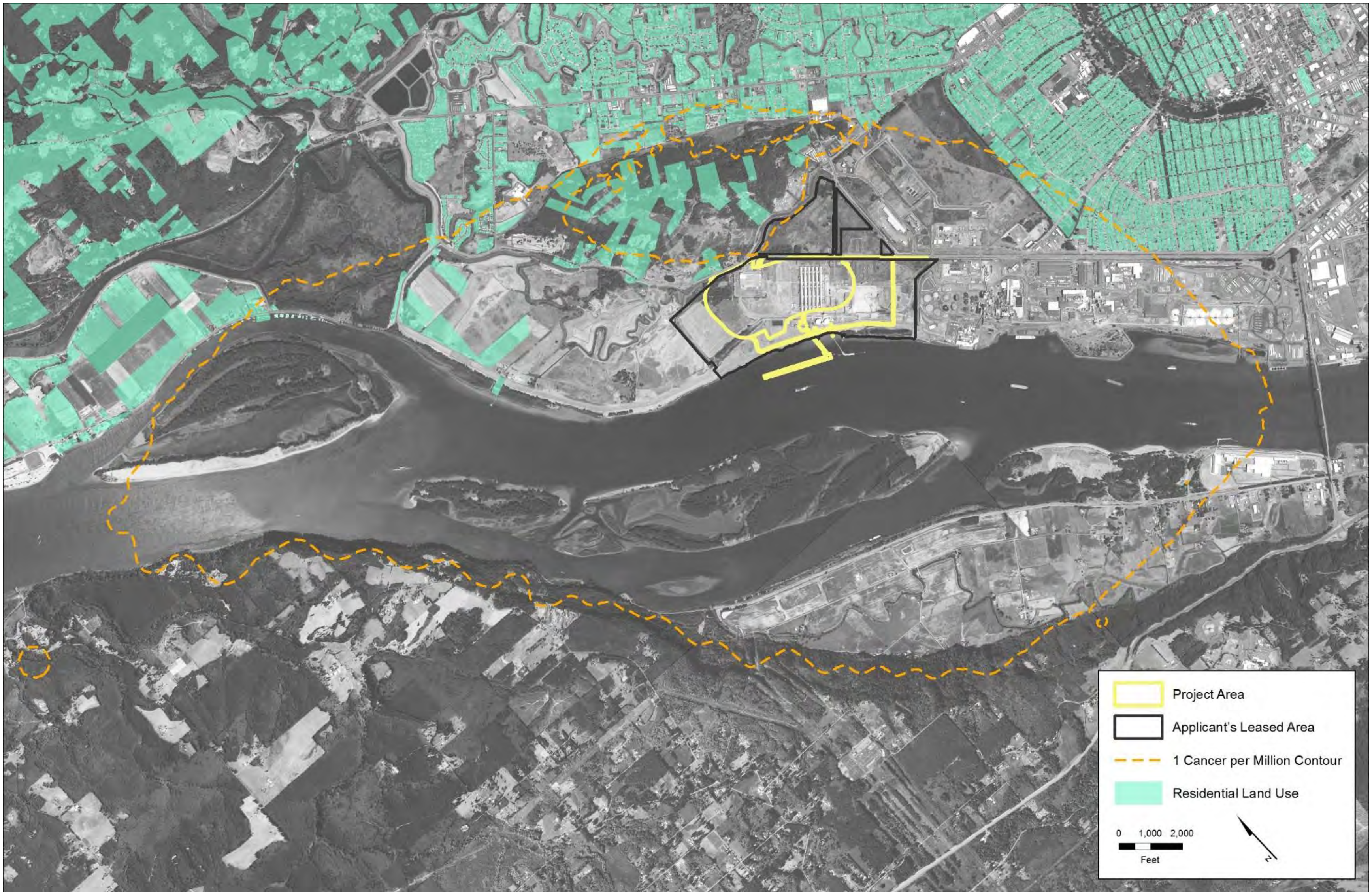


Figure 5.6-2. Increased Diesel Particulate Matter Cancer Risk from All Operations in the Project Area—Fixed Emissions Scenario

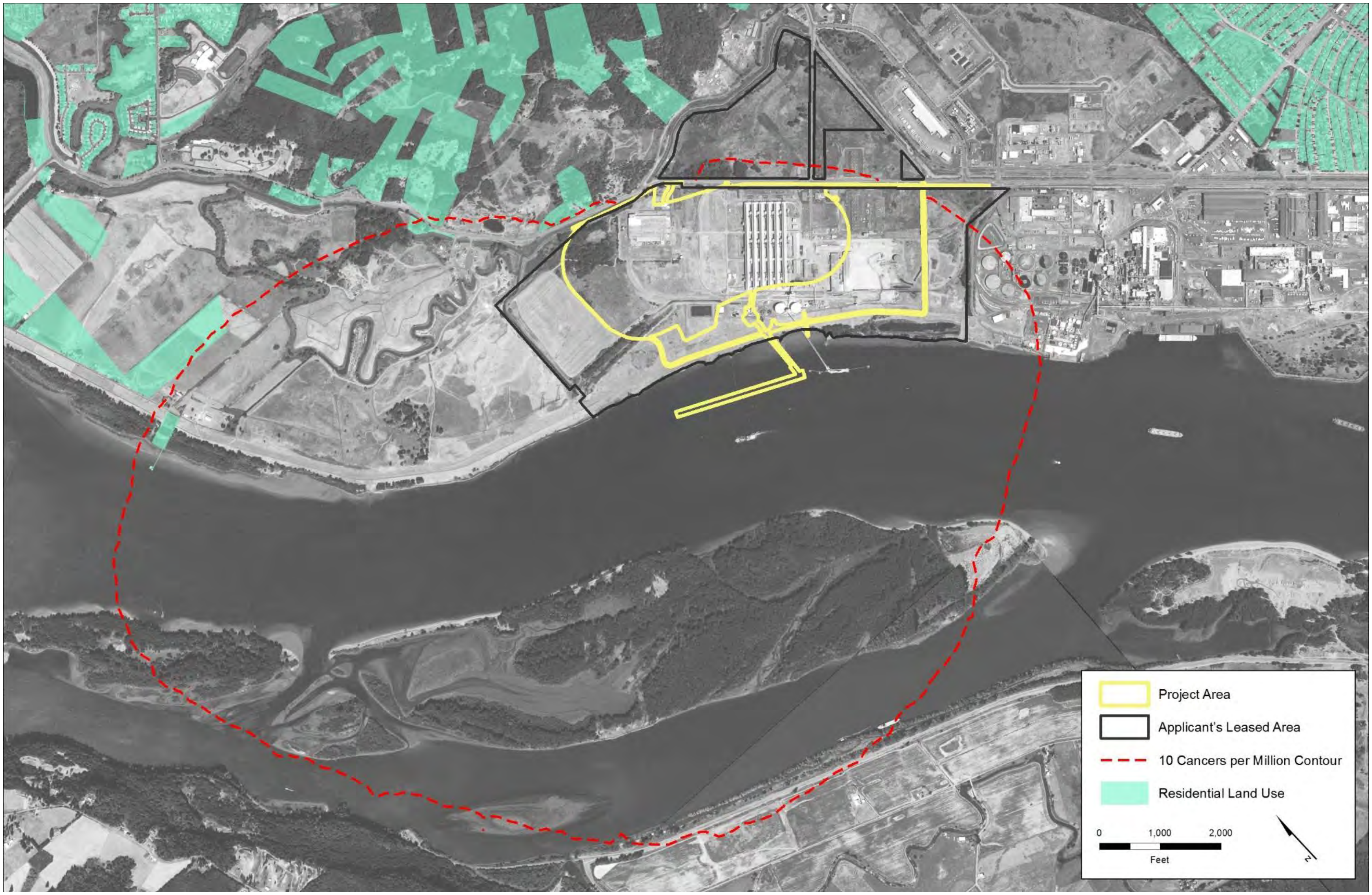


Figure 5.6-3. Increased Diesel Particulate Matter Cancer Risk from All Operation Sources in the Kelso-Longview Area—Fixed Emissions Scenario

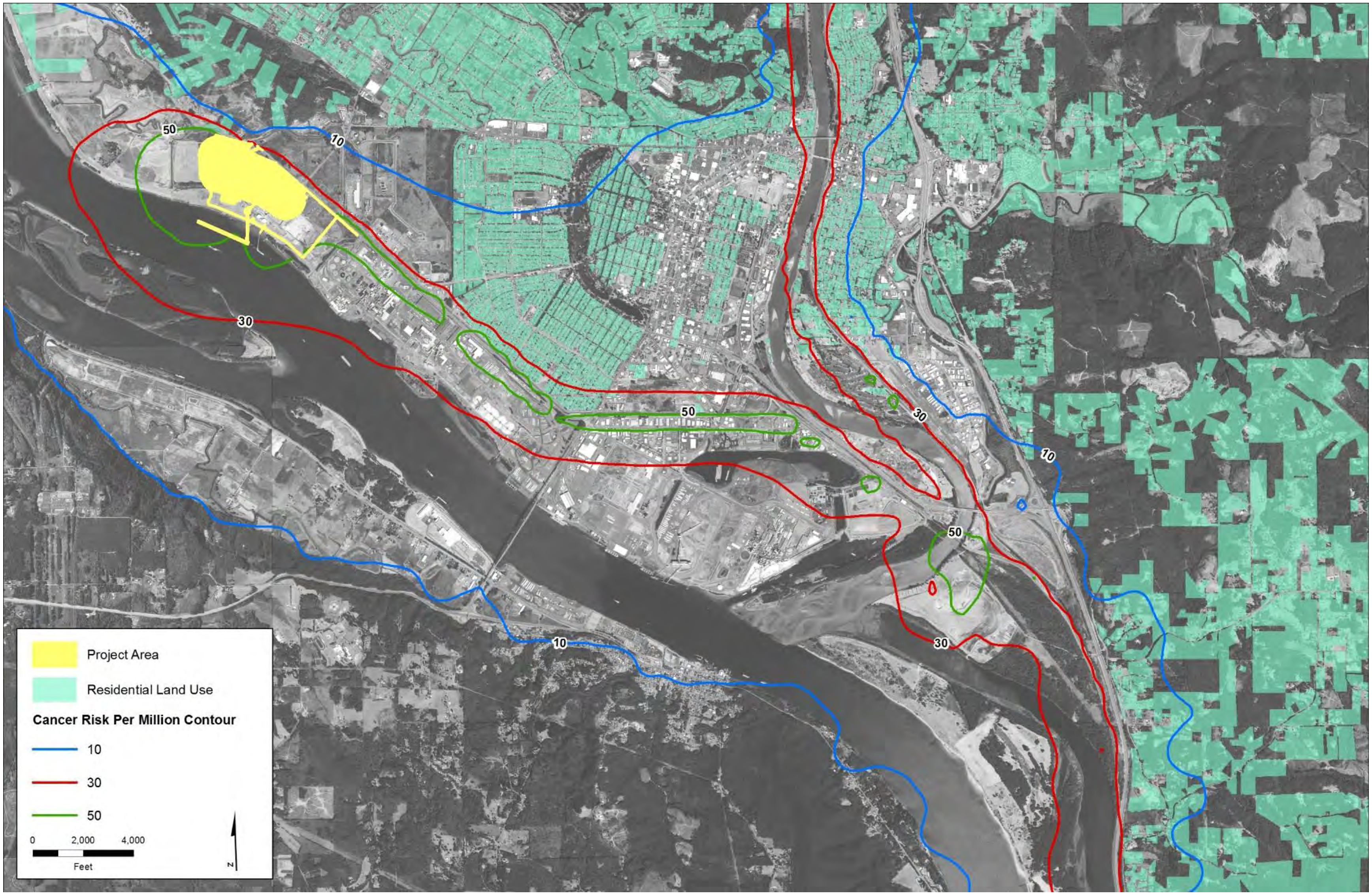
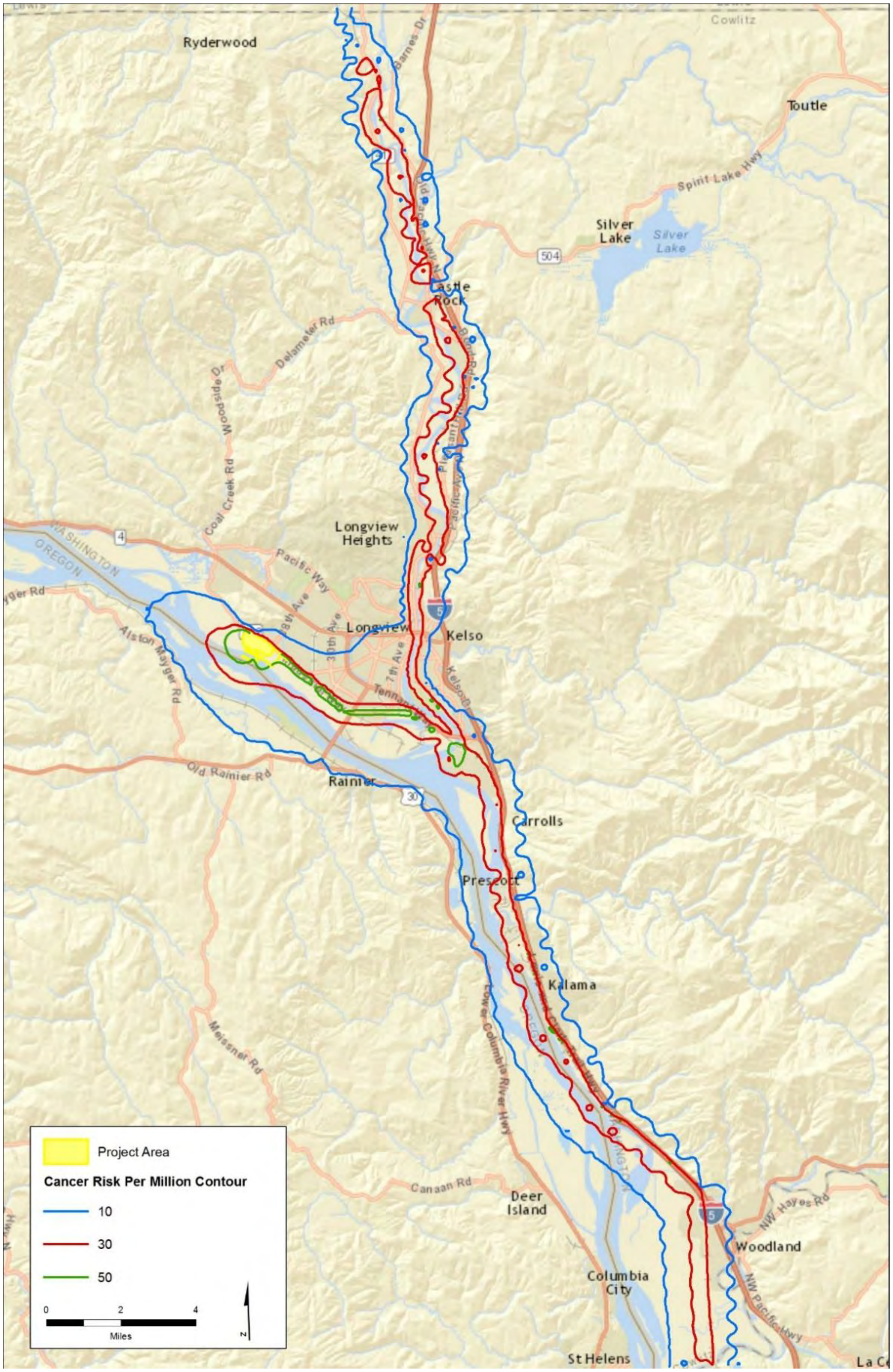


Figure 5.6-4. Increased Diesel Particulate Matter Cancer Risk from All Operation Sources in Cowlitz County—Fixed Emissions Scenario



Average Lifetime Emissions Scenario

This section presents cancer risk based on the average lifetime emissions scenario. Figure 5.6-5 depicts increased inhalation cancer risk related to diesel particulate matter emissions from coal export terminal sources (i.e., diesel-powered operations, maintenance, and emergency equipment). The contour for increased risk of 1 cancer per million extends across the width of the Columbia River, approximately 4 miles west of the project area, and approximately 2.5 miles east of the project area. These results are essentially the same as depicted for the fixed emission scenario in Figure 5.6-1, because changes in the emissions are estimated to be minimal for coal export terminal sources.

Figure 5.6-6 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operation sources (i.e., terminal, rail, and vessel) in the project area. The contour for increased risk of 10 cancers per million extends across the Columbia River including most of Lord Island, extends approximately 0.25 mile to the southeast of the project area, and crosses Industrial Way near the northwest boundary of the project area. Residential land uses are within this contour.

Figure 5.6-7 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operation sources (i.e., terminal, rail, and vessel) in the Kelso-Longview area of Cowlitz County. The contour for increased risk of 10 cancers per million covers Longview south of Washington Way as well as a portion of Kelso along the I-5 corridor. The contour for increased risk of 30 cancers per million along the Reynolds Lead is approximately 2,000 feet across and extends up to approximately 600 feet into the Highlands neighborhood. The highest increased risk level, 50 cancers per million, extends approximately 500 feet across along three small portions of the Reynolds Lead, approximately 1,200 feet across at the junction of the BNSF Spur and BNSF main line, and approximately 0.3 mile to the west and southwest of the project area boundary.

Figure 5.6-8 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operation sources (i.e., terminal, rail, and vessel) in Cowlitz County. The contour for increased risk of 10 cancers per million along the BNSF main line is approximately 1.5 miles across throughout Cowlitz County. The contour for increased risk of 30 cancers per million along the BNSF main line is up to approximately 0.4 mile wide (0.2 mile on either side of the main line).

For further context, increased cancer risk related to emissions of diesel particulate matter from rail locomotives can be compared to that of diesel trucks. For example, the increased risk of 30 cancers per million at 1,000 feet away from the Reynolds Lead and BNSF spur (a 7.1-mile segment of rail line) resulting from the locomotive emissions from 16 Proposed Action-related trains trips per day would be equivalent to the increased risk resulting from the emissions from approximately 860 diesel truck[19] trips per day along the same segment (i.e., 18 trucks per hour travelling in each direction).

[19] Assumes current fleet heavy-duty trucks traveling at 55 miles per hour.

Figure 5.6-5. Increased Diesel Particulate Matter Cancer Risk from Coal Export Terminal Sources—Average Lifetime Emissions Scenario

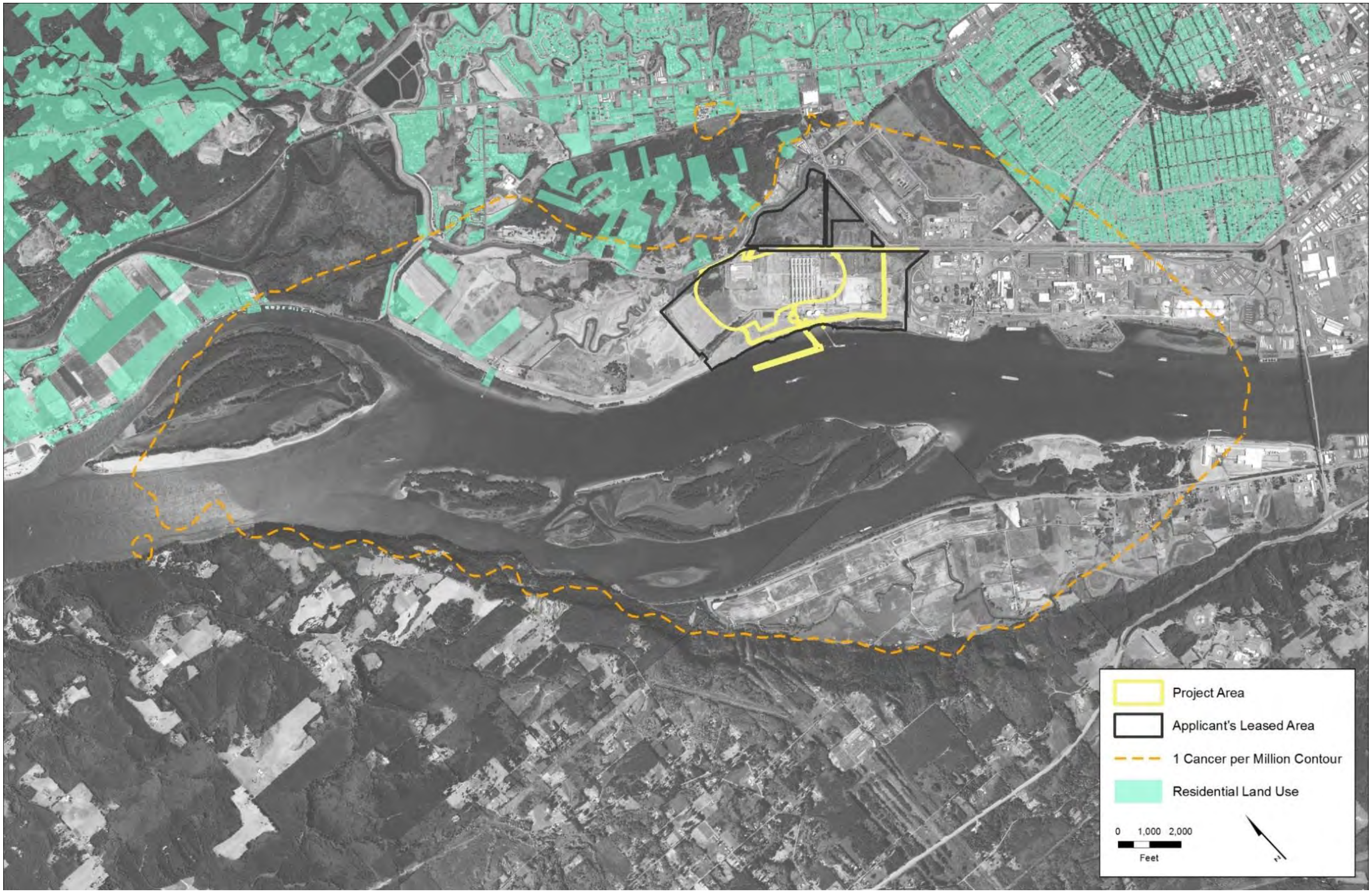


Figure 5.6-6. Increased Diesel Particulate Matter Cancer Risk from All Operations in the Project Area—Average Lifetime Emissions Scenario

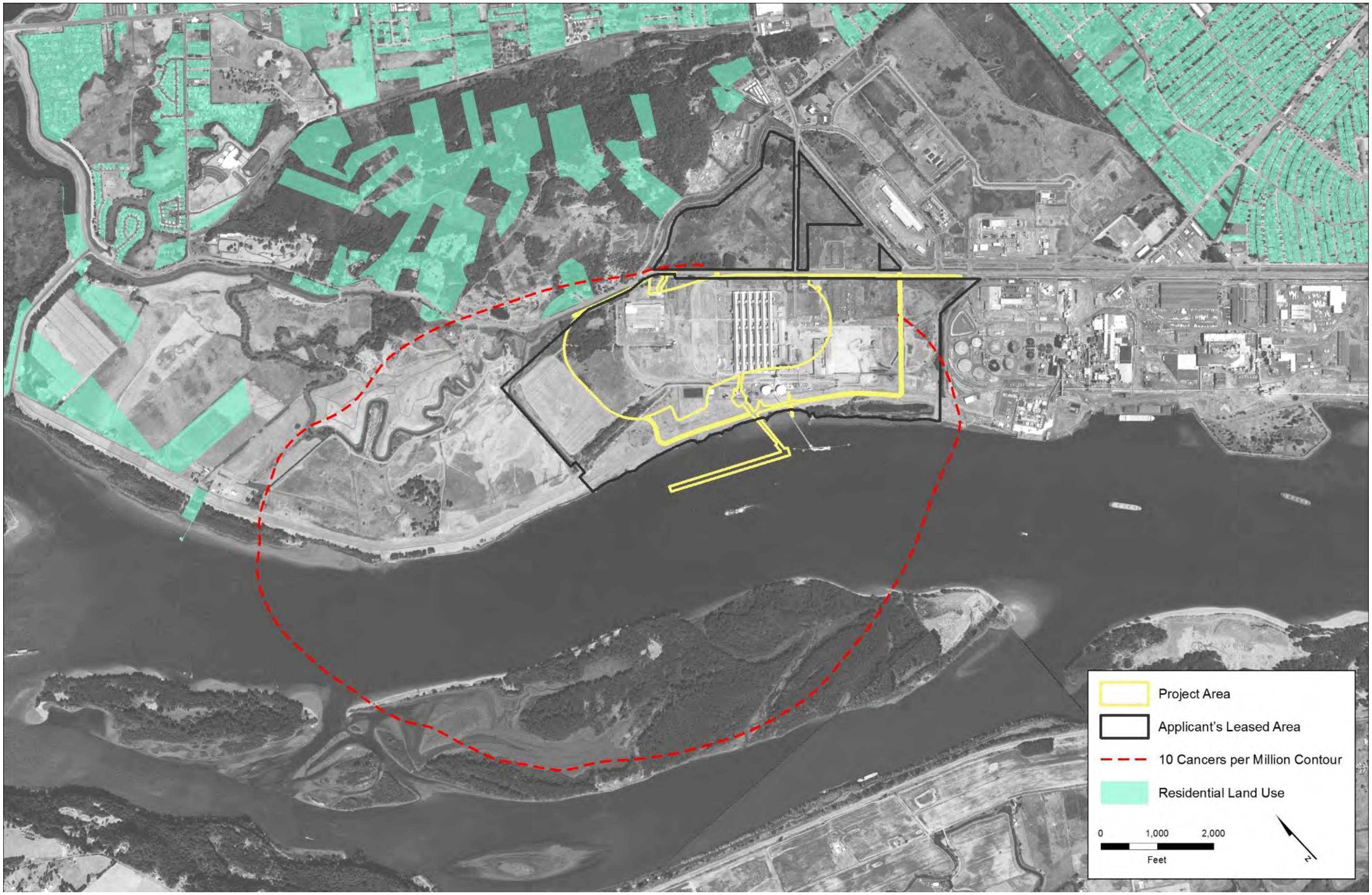


Figure 5.6-7. Increased Diesel Particulate Matter Cancer Risk from All Operation Sources in the Kelso-Longview Area—Average Lifetime Emissions Scenario

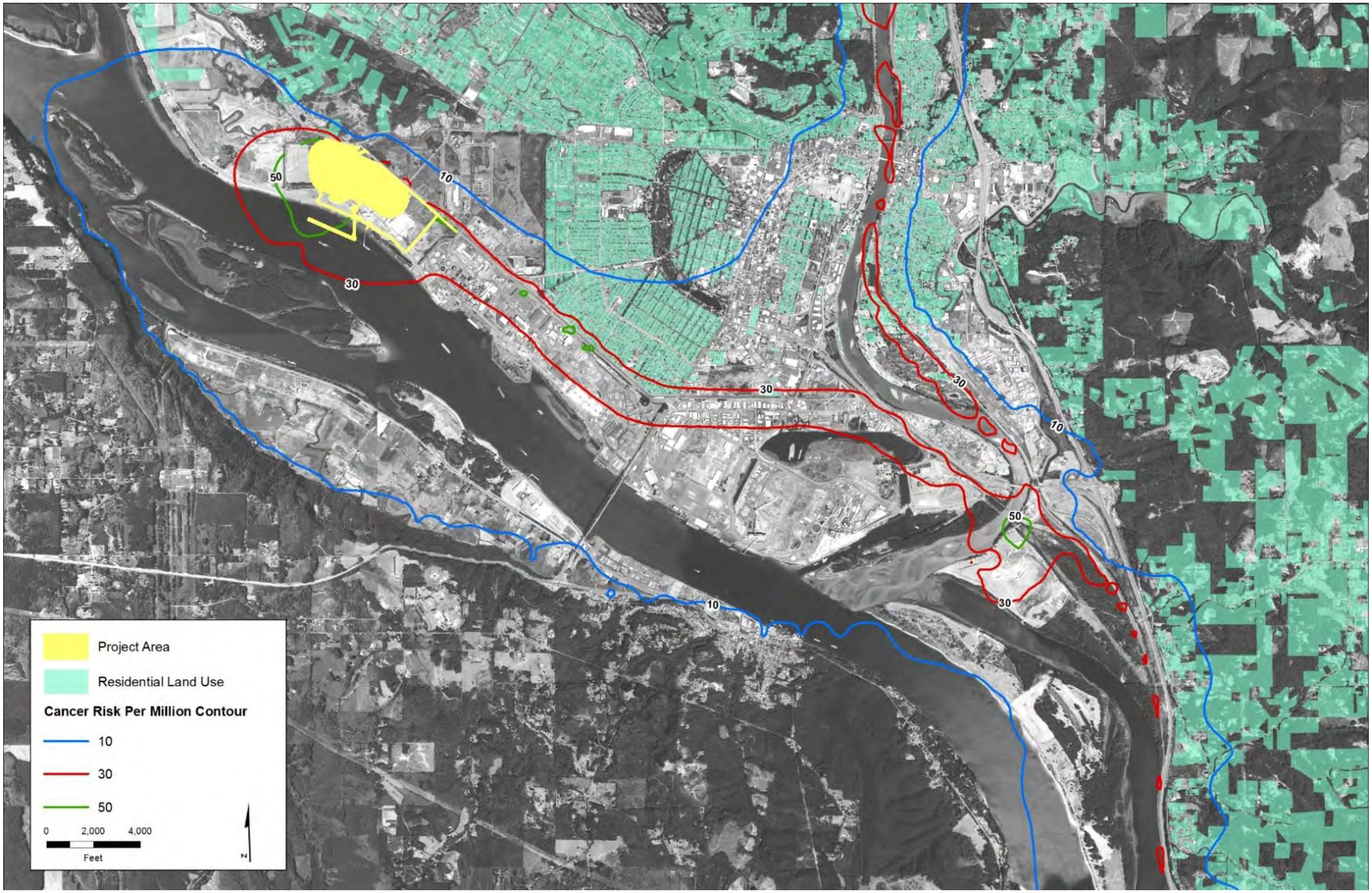
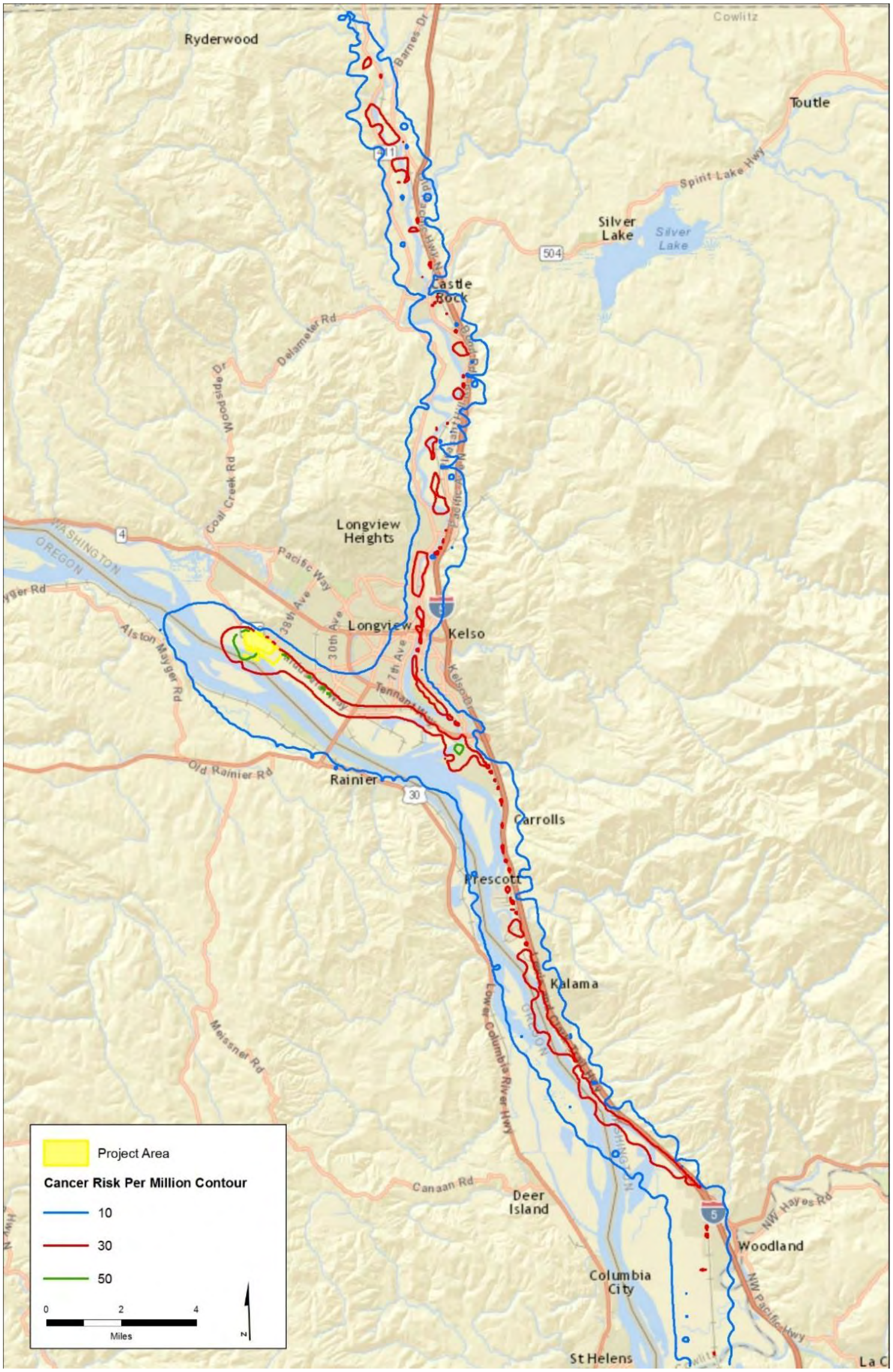


Figure 5.6-8. Increased Diesel Cancer Risk from All Operation Sources in Cowlitz County—Average Lifetime Emissions Scenario



Locomotive and Vessel Emissions in Context

This section compares annual emissions from Proposed Action-related rail and vessel operations in Cowlitz County and Washington State to total annual rail and vessel emissions in Cowlitz County and Washington State.

Cowlitz County

Annual Cowlitz County emissions from Proposed Action-related trains and vessels are shown in Table 5.6-9. This table also provides the 2011 Washington statewide emissions for locomotives and commercial marine vessels. Locomotive emissions would occur in the project area, on the Reynolds Lead and BNSF Spur, and on the BNSF main line in Cowlitz County. Vessel emissions would occur in the project area and on the Columbia River in Cowlitz County.

Table 5.6-9. Estimated Maximum Annual Average Emissions in Cowlitz County for Proposed Action-related Locomotives and Vessels Compared with the 2011 Cowlitz County Emissions Inventory

	Maximum Annual Average Emissions (tons per year)						
	CO	NO_x	SO_2	PM2.5	PM10	VOCs	DPM
Locomotives							
Proposed Action-related Locomotive Emissions	20	51	0.07	1.5	3.7	1.9	1.15
2011 Cowlitz County Locomotive Emissions	137	789	6	23	23	43	23
Commercial Marine Vessels							
Proposed Action-related Vessel Emissions	104	48	7.6	2.7	2.8	29	0.6
2011 Cowlitz County Commercial Marine Vessel Emissions	150	1,109	199	34	37	46	34

Notes:
Source of 2011 Cowlitz County locomotive and commercial marine vessel emissions: Washington State Department of Ecology 2014.
CO = carbon monoxide; NO_X= nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 = particulate matter less than 2.5 micrometers in diameter; PM10 = particulate matter less than 10 micrometers in diameter; VOCs = volatile organic compounds; DPM = diesel particulate matter

The largest locomotive emissions increase (as a percentage of existing rail emissions in Cowlitz County) for a single pollutant would be for PM10, which would increase by approximately 16%. The largest vessel emissions increase (as a percentage of existing commercial marine vessel emissions in Cowlitz County) for a single pollutant would be carbon monoxide and VOCs, which would increase approximately 69% and 63%, respectively. The increase in carbon monoxide emissions is primarily due to use of the auxiliary engines while vessels are docked. While this emission increase represents a substantial increase relative to the commercial marine vessel category, overall it represents a small increase (0.28% and 0.17%) in the total Cowlitz County carbon monoxide and VOC emissions.

Washington State

Annual statewide emissions from Proposed Action-related trains and vessels are shown in Table 5.6-10. This table also provides the 2011 Washington statewide emissions inventory totals for locomotives and commercial marine vessels. Locomotive emissions in Washington State would occur along the rail routes described in Section 5.1, *Rail Transportation*. Vessel emissions in the study area would occur along the Columbia River between the project area and out to 3 nautical miles beyond the mouth of the Columbia River. The largest increase in locomotive emissions for any one pollutant (as a percentage of 2011 statewide locomotive emissions) would be for carbon monoxide at 39%, followed by nitrogen oxides at a 15% increase.[20] For commercial marine vessels, the relative increase is smaller with a maximum increase of 12% for VOC and just under 11% for carbon monoxide.

Table 5.6-10. Estimated Maximum Annual Average Emissions in Washington State for Proposed Action-Related Locomotives and Vessels in Comparison with the 2011 Statewide Emissions Inventory

	Maximum Annual Average Emissions (tons per year)						
	CO	NO_x	SO_2	PM2.5	PM10	VOCs	DPM
Locomotives							
Proposed Action-related Locomotive Emissions	984	2,261	3	47	51	78	58
2011 Statewide Locomotive Emissions	2,536	15,026	95	428	430	810	428
Commercial Marine Vessels							
Proposed Action-related Vessel Emissions	276	161	21	10	11	93	10
2011 Statewide Commercial Marine Vessel Emissions	2,521	20,486	11,529	1,021	1,213	782	1,021

Notes:
Source of 2011 statewide emissions inventory is Washington State Department of Ecology 2014.
CO = carbon monoxide; NO_X= nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 **=** particulate matter less than 2.5 micrometers in diameter; PM10 = particulate matter less than 10 micrometers in diameter**;** VOCs = volatile organic compounds; DPM = diesel particulate matter

Sulfur Dioxide and Mercury Emissions

Combustion of Proposed Action-related coal in Asia could result in impacts on Washington State related to sulfur dioxide and mercury emissions. An analysis was conducted to determine the amount of sulfur dioxide and mercury emissions in Washington State, specifically attributable to the sulfur and mercury emitted from coal combustion in Asia from coal that passed through the coal export terminal. Appendix I, *Sulfur Dioxide and Mercury Emissions*, summarizes the methods, analyses, and findings. A full description of methods, analyses, and findings of the sulfur dioxide and mercury emissions analysis is provided in the *SEPA Coal Technical Report* (ICF 2017b).

Using data from models based on different market scenarios, the maximum Proposed Action coal source contribution of just the Asian sulfate[21] concentration in Washington State in 2040 would be

[20] The larger increase in carbon monoxide emissions reflects that no regulatory standards have been promulgated to reduce carbon monoxide emissions from locomotive engines since 1999, while extensive multi-tier federal regulatory standards have been implemented to substantially reduce nitrogen oxide locomotive emissions by 2028.

[21] Sulfur dioxide emitted from coal combustion is converted into compounds called sulfates. These may be carried through the troposphere and deposited in Washington State.

less than 0.2%. This assumes that overall growth in coal combustion in Asia will reduce sulfur dioxide emissions due to application of additional control technology.

Combustion of coal in Asia could result in impacts on Washington State related to mercury emissions. Appendix I, *Sulfur Dioxide and Mercury Emissions,* shows the annual mercury deposition amounts associated with coal exported from the coal export terminal over Washington State, starting in 2025. In the first 5 years, the deposition amounts vary only slightly across the scenarios. All scenarios show an increase in mercury deposition by 2040, with a maximum deposition amount of 7.6 milligrams per year per square kilometer. This deposition amount represents less than 0.3% of the total Asian-sourced mercury deposition over Washington State as estimated by Strode et al. (2008) at 2,900 milligrams per year per square kilometer. For more information, see Appendix I, *Sulfur Dioxide and Mercury Emissions*.

5.6.5.2 No-Action Alternative

Under the No Action Alternative, the Applicant would not construct the Proposed Action and impacts on air quality related to construction and operation of the Proposed Action would not occur. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses, including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

Expanded bulk terminal operations and maintenance would result in increased emissions of air pollutants. Emissions were estimated for planned future rail and vessel operations and emissions associated with truck transport to the nearby Weyerhaeuser facility (Table 5.6-11). The largest emissions for any single air pollutant would be nitrogen oxides at 4.4 tons per year. These emissions are lower than the Proposed Action, which were shown not to cause a substantial change in air quality or adversely affect nearby population areas.

Table 5.6-11. Estimated No-Action Alternative Annual Average Emissions from Rail, Vessel, and Haul Trucks

	Maximum Annual Average Emissions (tons per year)								
Source	**CO**	**NO_X**	**SO_2**	**PM2.5**	**PM10**	**VOCs**	**TSP**	**HAPS**	**DPM**
Locomotive combustion	1.4	3.1	0.01	0.06	0.07	0.11	0.08	0.01	0.06
Vessel combustion	2.6	1.1	0.19	0.06	0.06	0.63	0.08	0.003	0.02
Haul trucks	0.1	0.2	0.002	0.01	0.04	0.02	0.04	0.001	0.04
Total	**4.1**	**4.4**	**0.20**	**0.13**	**0.17**	**0.76**	**0.20**	**0.014**	**0.12**

Notes:
CO = carbon monoxide; NO_X= nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 = particulate matter less than or equal to 2.5 micrometers in diameter; PM10 = particulate matter less than or equal to 10 micrometers in diameter; VOCs = volatile organic compounds; TSP = total suspended particles; HAPS = hazardous air pollutants; DPM = diesel particulate matter

5.6.6 Required Permits

The following permit would be required for the Proposed Action.

- **Notice of Construction—Southwest Clean Air Agency.** Businesses and industries that cause, or have the potential to cause, air pollution are required to receive approval from the local air agency prior to beginning construction. These are requirements of Washington's Clean Air Act and apply statewide (Chapter 70.94 Revised Code of Washington [RCW]). Businesses located in Cowlitz County are regulated by the Southwest Clean Air Agency. The agency rules generally require an air permit for stationary sources emitting more than 0.75 ton per year of PM10 or 0.5 ton per year of PM2.5.[22] It is anticipated that these levels would be exceeded and the Applicant would need to file a permit application and receive an approved Notice of Construction air permit prior to constructing, installing, establishing, or modifying any equipment or operations that may emit air pollution.

5.6.7 Proposed Mitigation Measures

Project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action would reduce air quality impacts. Proposed mitigation for coal dust emissions is described in Section 5.7, *Coal Dust*.

5.6.7.1 Other Measures to be Considered

Other measures that could be implemented to mitigate impacts on air quality that occur as a result of Proposed Action-related elements outside the control of the Applicant include the following. These measures are provided for consideration by agencies, organizations, and others for permitting or planning.

- To reduce potential cancer risk from diesel emissions in the Highlands area, it is recommended that Tier 4 locomotives[23] be used by all BNSF and UP Proposed Action-related trains. Cleaner burning Tier 4 locomotives have been available since 2015. However, due to the long life of railroad engines, these cleaner burning engines may take decades to substantially reduce emissions.

5.6.8 Unavoidable and Significant Adverse Environmental Impacts

Project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action would reduce air quality impacts related to construction and operation of the coal export terminal. Based on the inhalation-only health risk assessment, diesel particulate matter emissions primarily from Proposed Action-related train locomotives traveling along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County would result in areas of increased cancer risk at or above 10 cancers per million which would represent an unavoidable and significant adverse impact.

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[22] Other criteria air pollutants have higher emission thresholds.

[23] Locomotives that are compliant with EPA locomotive emissions standards that went into effect in 2015.

5.7 Coal Dust

Coal dust is a form of particulate matter[1] and can affect air quality. Coal loaded onto trains consists of pieces and particles of differing size, including small particles, or dust. Wind and air moving over the train may cause coal dust to blow off the rail cars, disperse, and settle onto the ground or other surfaces. Coal dust can also be created from the movement and transfer of coal at an industrial facility. The deposition of coal dust can be a nuisance and affect the aesthetics, look, or cleanliness of surfaces.

This section provides an introduction to coal dust and describes existing conditions related to coal dust. It then describes impacts related to coal dust that could result from construction and operation of the Proposed Action and the No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action.

5.7.1 Regulatory Setting

Laws and regulations relevant to coal dust are summarized in Table 5.7-1.

Table 5.7-1. Regulations, Statutes, and Guidelines Applicable to Coal Dust

Regulation, Statute, Guideline	Description
Federal	
Clean Air Act and Amendments	Enacted in 1970, as amended in 1977 and 1990, requires EPA to develop and enforce regulations to protect the public from air pollutants and their health impacts.
National Ambient Air Quality Standards	Specifies the maximum acceptable ambient concentrations for seven criteria air pollutants: CO, O_3, NO_2, SO_2, lead, PM10 and PM2.5. Primary NAAQS set limits to protect public health, and secondary NAAQS set limits to protect public welfare. Geographic areas where concentrations of a given criteria pollutant exceed a NAAQS are classified as nonattainment areas for that pollutant.
State	
Washington State General Regulations For Air Pollution Sources (WAC 173-400) and Washington State Clean Air Act (RCW 70.94)	Establishes the rules and procedures to control or prevent the emissions of air pollutants. Provides the regulatory authority to control emissions from stationary sources, reporting requirements, emissions standards, permitting programs, and the control of air toxic emissions.

[1] Particulate matter is a complex mixture of extremely small particles and liquid droplets. Particulate matter pollution can be composed of a number of components, including nitrates, sulfates, organic chemicals, metals, soil, and dust particles.

Regulation, Statute, Guideline	**Description**
Local	
Southwest Clean Air Agency (SWCAA 400)	Regulates stationary sources of air pollution in Clark, Cowlitz, Lewis, Skamania, and Wahkiakum Counties.

Notes:
EPA = U.S. Environmental Protection Agency; CO = carbon monoxide; O_3 = ozone; NO_2 = nitrogen oxides; SO_2 = sulfur dioxide; PM2.5 = particulate matter up to 2.5 micrometers in size; PM10 = particulate matter up to 10 micrometers in size; NAAQS = National Ambient Air Quality Standards; WAC = Washington Administrative Code; RCW = Revised Code of Washington; SWCAA = Southwest Clean Air Agency

In occupational settings (such as coal mines), exposure to airborne coal dust is regulated by agencies such as the Occupational Safety and Health Administration and the Mine Safety and Health Administration. In nonoccupational settings (such as outdoor exposures) exposure to coal dust in combination with all other types of particulate matter and dust in the air is regulated by the U.S. Environmental Protection Agency (EPA). The federal[2] regulation that applies to particulate matter is part of the National Ambient Air Quality Standards (NAAQS). These standards apply to particle sizes with diameter of less than or equal to 10 micrometers (PM10) and particles with a mean diameter of less than or equal to 2.5 micrometers (PM2.5) (40 Code of Federal Regulations [CFR] 50). The NAAQS were established under the authority of the federal Clean Air Act to protect human health, including sensitive populations such as children and the elderly, with a margin of safety.

There are no federal or state guidelines or standards that identify acceptable levels of ambient dust deposition. Washington Administrative Code (WAC) 173-400-040(3) relates to fallout, but does not provide a reference level: "No person shall cause or allow the emissions of particulate matter from any source to be deposited beyond the property under direct control of the owner or operator of the source in sufficient quantity to interfere unreasonably with the use and enjoyment of the property upon which the material is deposited." The New Zealand Ministry of Environment *Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions* (New Zealand Ministry of Environment 2001) cites acceptable levels of dust deposition and identifies two benchmarks for dust nuisance impacts[3] above current background levels.

- 4.0 grams per square meter per month (g/m^2/month) for industrial or sparsely populated locations. This equates to an approximate visible layer of dust on outdoor furniture or window sills.
- 2.0 g/m^2/month for sensitive residential locations. This is the benchmark used in the analysis.

A highly visible dust, such as black coal dust, will cause visible soiling at lower levels than other types of dust. British Columbia, Canada, has a less stringent maximum desirable level for average dustfall in a residential area of 5.1 g/m^2/month and for nonresidential areas of 8.7 g/m^2/month (British Columbia Ministry of Environment 2014).

[2] States are required to meet the national standards. A state can set more stringent ambient air quality standards within the state. Washington State adopts current federal NAAQS in state regulations (Chapter 173-476 WAC, Ambient Air Quality Standards).

[3] Refers to the level of dust deposition that affects the aesthetics, look, or cleanliness of surfaces but not the health of humans and the environment.

5.7.1.1 Railroad Coal Dust Requirements

The BNSF Railway Company (BNSF) Coal Loading Rule[4] requires all shippers at any Montana or Wyoming coal mine to take measures to load cars in a way that ensures coal dust losses in transit are reduced by at least 85% compared to rail cars where no remedial measures have been taken. This is most commonly done by loading coal rail cars with a modified loading chute that produces a coal bed with a rounded top. This shaped profile limits the loss of coal dust from wind while the train is moving. In addition to the shaped profile, topper agents (i.e., surfactants) are applied to the surface of the coal mound to limit coal dust loss. The topper agent is applied before leaving the coal mine area. The Safe Harbor provision in the BNSF Coal Loading Rule identifies five acceptable topper agents and application rates that BNSF states have been shown to reduce coal dust losses by at least 85% when used in conjunction with coal load profiling. A shipper can use any of the five approved topping agents.[5]

In 2014, BNSF constructed and began operating a surfactant spray facility along its main line in Pasco, Washington, where coal trains traveling west along the main line route through the Columbia River Gorge are sprayed with a topper agent to lessen potential coal dust release from rail cars.

On March 3, 2017, a consent decree was finalized between BNSF and the Sierra Club and other environmental groups to settle a lawsuit over alleged coal dust and petroleum coke (petcoke) emissions from rail cars operating on rail routes in Washington State. As part of the settlement agreement, BNSF will conduct a study on the feasibility of physical covers for coal and petcoke rail cars and pay $1 million to fund environmental projects across Washington State. BNSF will also clean up coal and petcoke materials on or adjacent to BSNF's right-of-way at five locations in Washington State. As outlined in the settlement, the Sierra Club and environmental groups agree not to bring similar litigation against BNSF for 5 years.

5.7.2 Study Area

The study area for direct impacts is the area in and near the project area that could be affected by construction and operation activities in the project area.

The study area for indirect impacts differs for each co-lead agency.

- **Cowlitz County and Ecology.** The areas within 1,000 feet of the Reynolds Lead and BNSF Spur.
- **Ecology only.** The areas within 1,000 feet of the rail routes for Proposed Action-related trains on BNSF main line routes in Washington State.

5.7.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts of coal dust associated with the construction and operation of the Proposed Action and the No-Action Alternative.

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[4] For more information, see http://www.bnsf.com/customers/what-can-i-ship/coal/coal-dust.html.
[5] For more information, see http://www.bnsf.com/customers/what-can-i-ship/coal/include/dust-toppers.xls.

5.7.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on coal dust in the study area.

- *Draft Environmental Impact Statement, Tongue River Railroad Company* (Surface Transportation Board 2015).
- *Millennium Coal Export Terminal, Longview, Washington, Air Quality Environmental Report* (URS Corporation 2015).
- *Final Report Environmental Evaluation of Fugitive Coal Dust Emissions from Coal Trains Goonyella, Blackwater and Moura Coal Rail Systems Queensland Rail Limited* (Connell Hatch 2008: 41).
- *Duralie Extension Project, Air Quality Assessment* (Heggies 2009).
- *Analysis of Carry-Back at the RG Tanna Coal Terminal (Draft), Exploration & Mining* (Commonwealth Scientific and Industrial Research Organisation 2007).
- *Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State* (Jaffe et al. 2015).
- *Inorganic composition of fine particles in mixed mineral dust– pollution plumes observed from airborne measurements during ACE-Asia* (Maxwell-Meier et al. 2004).
- Information from the Applicant about anticipated coal handling and transfer activities in the project area.
- Information from the *SEPA Rail Transportation Technical Report* (ICF and Hellerworx 2017) on the rail routes of Proposed Action-related trains through Washington State.
- *Coal Train PMCA Study, Appendix A, Gateway Pacific Terminal at Cherry Point: Train Emission and Coal Dust Assessment in Washington* (NewFields Companies, LLC 2016).

5.7.3.2 Impact Analysis

This section describes the methods used to evaluate potential coal dust impacts of operation of the Proposed Action. No coal would be handled or transported as part of construction of the Proposed Action.

For operations of the coal export terminal, air quality modeling was performed for the following primary sources of coal dust.

- Transfer and handling of the coal from rail cars to storage piles.
- Storage of coal in storage piles.[6]
- Transfer and handling of coal from storage piles to vessels.

For coal transport via rail to the proposed coal export terminal, air quality modeling was conducted to estimate fugitive coal dust emissions impacts from moving trains with uncovered rail cars. Emissions estimates were based on emissions equations for moving coal trains as developed in the reports by Connell Hatch (2008) with modifications based on a 2014 air quality monitoring study

[6] Fugitive emissions from storage piles are caused by wind erosion.

conducted in Cowlitz County for the Proposed Action and a 2015 coal dust monitoring study from uncovered rail cars in Whatcom County, Washington. These studies are described in more detail under *Indirect Impacts*.

Direct Impacts

Operation of the Proposed Action could result in coal dust emissions, including during the handling and transfer of coal related to rail unloading, ship loading, conveyor transfer, coal-pile development and removal, and wind erosion of coal piles. Coal transfers would occur in enclosed areas (e.g., rotary coal car dump facility) and open areas (e.g., coal storage piles).

Coal dust emissions and deposition from full operations (44 million metric tons of coal per year) in the direct impact study area were estimated using the EPA standard regulatory air dispersion model, AERMOD (Version 15181). AERMOD was used because impacts would be localized, and the model is designed to assess emissions for multiple point, area, and volume sources in simple and complex terrain, and uses hourly local meteorological data. In addition, AERMOD estimates the deposition of particulates (such as coal dust) using information on the particulates' emissions rate and particle sizes.

Table 5.7-2 summarizes the sources of coal dust emissions and estimated annual average emissions rates used in the analysis.

Table 5.7-2. Coal Dust Total Suspended Particulates Emissions Rates at Full Terminal Operations

Operation	Annual Average Total Suspended Particulates Emissions Rate (tons per year)
Coal pile wind erosion	3.05
Coal pile development and removal	2.62
Vessel transfer and conveyors	5.25
Train unloading	3.68
Total	**14.60**

Coal dust emissions were characterized as two source types: volume and area. Coal transfer operations were characterized as volume sources, which included eight transfer towers, a rotary rail dump, surge bin work points, and two conveyors to load coal onto cargo vessels with emissions rates estimated based on EPA AP-42, Section 13.2.4. Area sources are used to model low-level ground releases. The coal piles were modeled as area sources with the emissions estimated following the EPA AP-42, Section 13.2.5 approach. The coal dust emissions from tandem rotary unloaders that would unload the coal were modeled as a volume source with emissions estimated following the EPA AP-42, Section 13.2.5 approach. Emissions rates in the project area used meteorological data from Weyerhaeuser's Mint Farm meteorological station (years 2001 to 2003), which is located approximately 0.5 mile southeast of the project area.

The modeling was completed for the deposition of the coal particles and a more conservative assumption about the effectiveness of full enclosures and spray/fogging for conveyors. A 95% reduction effectiveness was assumed for the enclosed conveyor and spray/fogging systems, which is consistent with a permit from the Oregon Department of Environmental Quality (2013) for the

Coyote Island Terminal proposal at the Port of Morrow. The analysis used particle size distribution data from mines in Australia (Katestone 2009).

The U.S. Geological Survey is preparing a study that identifies methods for determining potential impacts on aquatic resources from coal dust exposure. The study, not yet published, uses two locations along rail lines in the Columbia River in Washington State as examples. The study will consider diet and other pathways of exposure and also compare results to levels of concern determined in previous studies.

Indirect Impacts

For the transport of the coal via Proposed Action-related trains to the coal export terminal, air quality modeling was conducted based on the coal dust emissions estimated from a moving train with adjustments in the emissions rates based on the air quality monitoring studies described below. The modeling adjustments are described in the *SEPA Coal Technical Report* (ICF 2017). In the Columbia River Gorge, an additional adjustment was made to include an effective wind speed to determine the strength of the coal dust emissions.[7]

Over the past 10 years, air quality monitoring studies have collected information on the deposition and ambient concentration levels of coal dust associated with coal train operations. These studies have been conducted in various locations, including Australia, Canada, and the United States. However, the available documentation from these studies often does not provide information on all factors that affect coal dust emissions from trains.[8] However, as mentioned previously, two studies of coal dust from coal trains were recently completed: one in Cowlitz County for this EIS and the other in Whatcom County for a separate proposal.

Cowlitz County Field Study

To supplement data from existing studies, a field study to inform this EIS was conducted in October 2014 to collect sample data on coal dust emitted from existing coal trains on the BNSF main line just north of the Lewis River in Cowlitz County where several loaded coal trains pass each day (Figure 5.7-1). In this area, freight trains generally travel at speeds of approximately 40 to 45 miles per hour. These data were used to improve knowledge regarding coal dust emissions and improve the reliability of the impact assessment.

The objective of the sampling program was to collect coal dust data at a location in Cowlitz County under conditions that were conducive to coal dust emissions from passing coal trains. The study measured fugitive coal dust emissions from passing trains with a set of air samplers on each side of the tracks, to measure the upwind background concentrations and deposition, and the downwind concentrations and deposition—the difference being the contributions of the passing trains. The *SEPA Coal Technical Report* contains detailed information on the study including the sampling program, laboratory analysis, quality assurance, and results.

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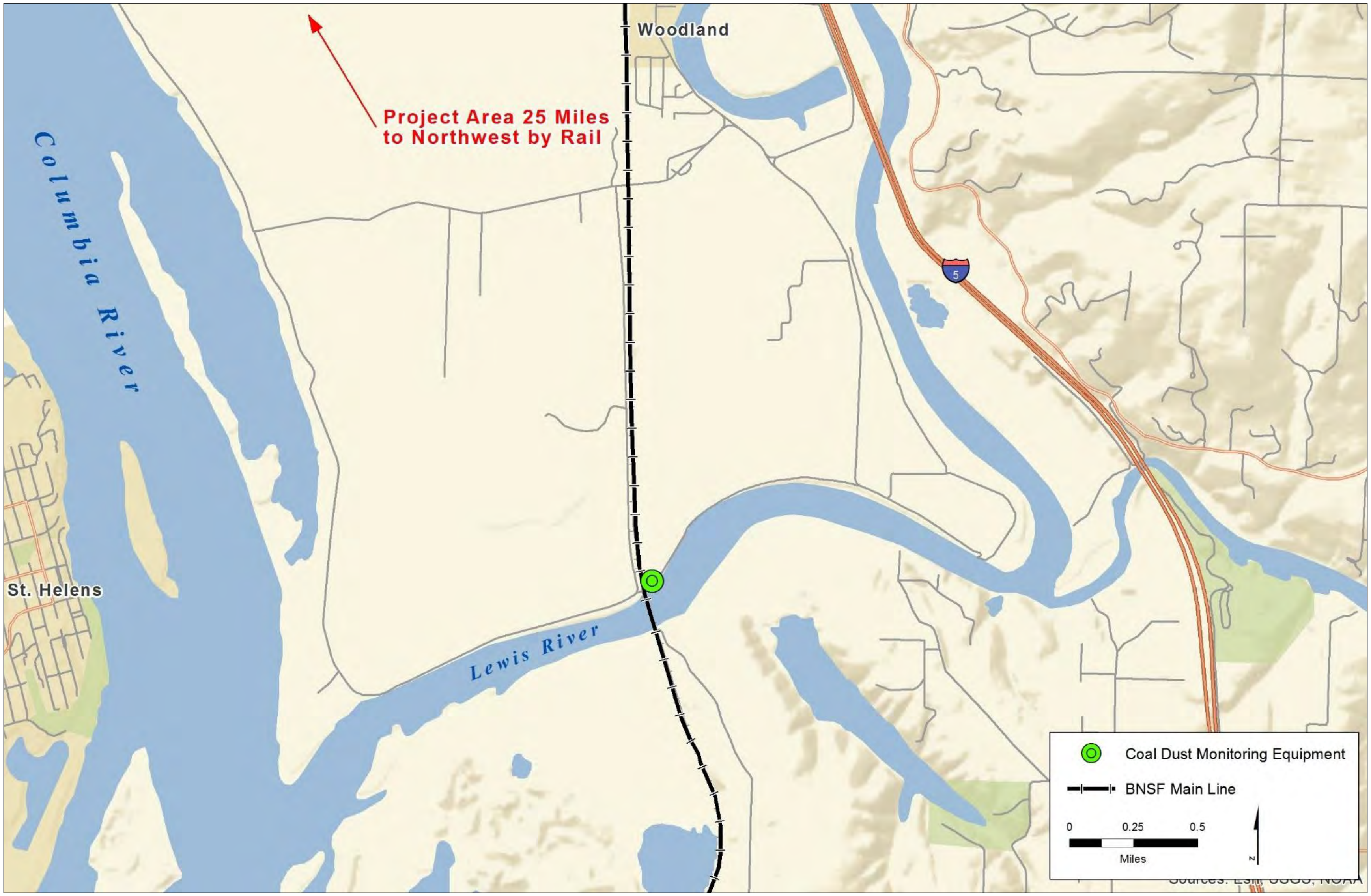
[7] The effective wind speed is the speed of the train plus the component of the ambient wind in the direction of the train. If the wind component is opposite the direction of the train then the component is subtracted.

[8] Factors include rail car size, number of rail cars, shaping of the coal in the rail car, application and type of topping agent, distance over which the coal is transported, and meteorological conditions.

Figure 5.7-1. Coal Dust Monitoring Location



Data were collected during the first 2 weeks in October 2014. This analysis used the data collected during the field study to evaluate coal train emissions estimates based on studies in Australia, to verify their applicability to similar projects in the United States, and to evaluate the potential future impacts from the increased transport of coal to the proposed export terminal via rail.

Data collected at the site included the following.

- Continuous airborne particulate matter using a size-segregating laser-based optical scattering technique with data recorded at a 10-second time resolution. Measurements were made at the anticipated downwind (east) side of the tracks.
- Short-term particulate matter deposition using deposition plates on both sides of the tracks that sampled during triggered events with a train passage.
- Short-term airborne particulate matter on both sides of the tracks using impaction sampling techniques triggered during selected train passages.
- Integrated 24-hour airborne particulate matter using filter-based techniques with measurements primarily focused on the anticipated downwind (east) side of the tracks.
- Meteorological measurements of wind speed, wind direction, temperature, humidity and solar radiation at a 30-second time resolution to document the conditions during the sampling events.
- Train speed and video recording (documenting the number of coal cars, etc.).

During the study period, 23 coal trains were observed and samples were obtained for 22 of the trains. Of the 22 sample sets, 11 were submitted to the laboratory for full analyses, along with data from two noncoal freight trains for comparison.[9] Prior to the start of the study period, it was verified with the receivers of the coal (TransAlta Power Plant near Centralia and Westshore Terminals in British Columbia, Canada) that the coal was originating from the Powder River Basin and that surfactant was applied at the mine. At the time of this study the BNSF Pasco spray station was not yet operational and no additional surfactant material was being applied to the coal after leaving the mine.

To determine the coal particle concentrations from the collected samples, analytical methods were developed to evaluate the coal particle concentrations in the three different types of measurements and collection devices: fallout of particles; airborne concentrations in the optical microscopy size range; and particles in the "respirable" size range. All data collected during the measurement program were processed and validated prior to using in the coal dust analysis.

Air quality modeling was performed using AERMOD for the periods in which wind direction was clearly across the rail line and when a complete set of deposition plates and impaction samplers were recorded at the study site. This resulted in four periods in which suitable measurements were made for comparison to modeling results. A key input to the modeling is the emissions factor used to characterize the amount of coal dust from a moving fully loaded coal rail car. The approach used the equation reported in the Connell Hatch study (2008). This equation has since been used in a number of environmental studies in Australia (GHD 2012; Heggies 2009).

[9] The other data were not analyzed because the train came to a complete stop on the section of track being studied.

The emissions factor for the rate of coal dust (total suspended particulates [TSP] sized) emitted is expressed in metric units of grams of TSP per kilometer or rail per metric ton of coal moved as follows.

$$\textit{Emissions Factor (loaded coal train)} = 0.0000378(V)^2 - 0.000126(V) + 0.000063$$

where V is the speed of the train (kilometer/hour)

This equation was developed from the analysis of coal dust loss (without mitigation) and a minimum air velocity needed for particle lift-off from a wind tunnel study over a variety of wind speeds. This emissions factor was further adjusted by 1.34 to account for the larger-sized rail cars used to transport coal in the United States (44.12 m^2) versus those used in Australia (30.37 m^2) (Connell Hatch 2008). Each loaded rail car was estimated to hold 122 tons of coal and an 85% emissions reduction effectiveness[10] was applied based on best practice of shaping the coal for transport by rail to minimize fugitive emissions and the application of a topping agent at the mine.

Emissions from empty coal cars were based on an analysis from a study at a coal export terminal at the Port of Gladstone, Australia. This study concluded the average amount of coal carry-back was 0.36 ton per car and the worst-case month was 0.93 ton per car following 2 months of heavy rainfall that increased the stickiness of the coal. The worst-case coal carry-back value was used in this assessment for empty rail cars. Emissions rates for each operational setting were calculated and used in the AERMOD dispersion model using the on-site monitored meteorological data.

Findings from the model were then used to adjust the emissions estimates to produce the best fit with the observed data. The revised emissions estimates were then adjusted to reflect the rail traffic for the Proposed Action and the impact assessed.

Whatcom County Field Study

To support the EIS for the proposed Gateway Pacific Coal Export Terminal in Whatcom County, Washington, a field study was conducted to collect data on coal dust and train emissions from passing loaded and unloaded coal trains on the BNSF main line in Whatcom County (NewFields Companies, LLC 2016). The particulate matter monitoring data were collected at Bow, Washington, during August and September 2015.[11] The data were reviewed to supplement knowledge regarding coal dust emissions and to improve the reliability of the assessment of potential impacts from Proposed Action-related trains. Because coal dust emissions are influenced by train speed, a subset of the fastest-moving loaded coals train was analyzed to determine what fraction of the monitored data collected was coal dust versus other forms of particulate matter. In addition, some empty coal and freight train data were analyzed for comparison with loaded coal trains. A total of 30 coal trains passed by the site during the study period at an average speed of 18 mph. The BNSF surfactant station near Pasco was in operation by the time of this study, so surfactant was likely applied to the rail cars. The *SEPA Coal Technical Report* contains detailed information on the analysis of the loaded and unloaded coal trains.

[10] BNSF tariffs require shippers to control coal dust emissions through use of load profiling and application of an approved topping agent or other measures to reduce emissions by at least 85% (BNSF Price List 6041-B and Appendices A and B, issued September 19, 2011).

[11] This was after the surfactant reapplication station near Pasco began operation in December 2014.

5.7.4 Existing Conditions

This section provides an introduction to coal dust and describes the existing conditions in the study area related to coal dust that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

5.7.4.1 Introduction to Coal Dust

Coal dust is a form of particulate matter. Particulate matter is composed of small particles suspended in the air. There are both natural and human sources of particulate matter. Natural sources include dust storms and smoke from wildfires. Human sources include but are not limited to smoke from industrial emissions, agricultural activities, construction activities, wood smoke, vehicle engine exhaust, dust from unpaved roads, tobacco smoke, and coal dust.

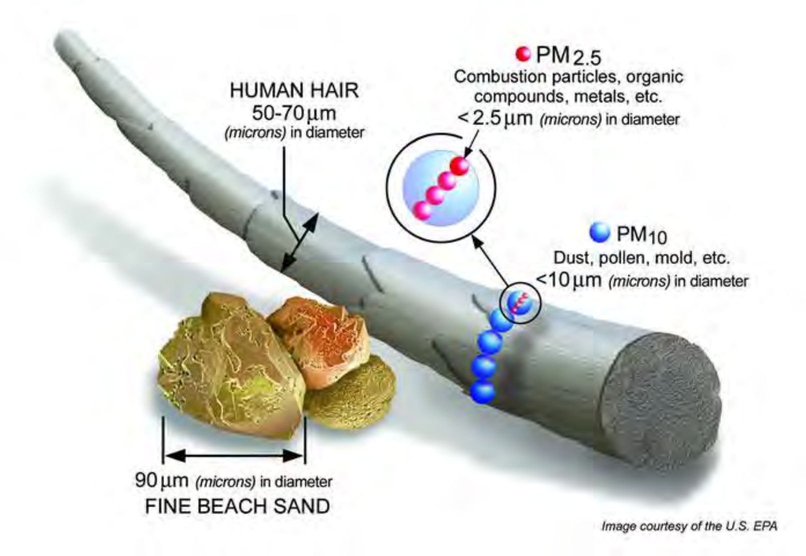
Coal loaded into train cars is made up of pieces and particles of differing size, including small particles, or dust. The movement of the rail cars during transit creates vibrations that can break larger pieces of coal into smaller particles, creating more dust. Likewise, during transit, wind and air moving over rail cars may blow coal dust[12] off the rail cars, disperse it in the air before the dust settles onto the ground. Coal dust may also be generated and dispersed by wind during coal stockpiling and handling activities. The distance from the train or stockpile to where the dust settles on the ground varies depending primarily on the size of the particles, meteorological conditions including wind speed, and/or train speed.

Coal Dust and Human Health

From a human health perspective, inhalation of coal dust (particulate matter) is the primary exposure pathway of concern. Ingestion of coal dust is a potential, but less significant, exposure pathway. The principal characteristic of concern for particulate matter related to human health is particle size. Some particles are visible to the unaided eye as dust or smoke, but the smaller, invisible particles pose a human health risk. When particulate matter is inhaled, larger particles are filtered in the nose or throat by cilia and mucus, but small particles can pass through into the lungs. The smallest particles can enter the circulatory system, where they harden and inflame the arteries. Most of the smallest particles are produced by combustion, such as the burning of wood or fossil fuels, although some may also be present in dust, such as road dust and coal dust. Figure 5.7-2 illustrates typical small particle sizes.

[12] Coal dust lost from rail cars is often referred to as fugitive coal dust. In the air quality regulatory context, emissions that are not emitted from a stack, vent, or other specific point that controls the discharge are known as fugitive emissions. For example, windblown dust is fugitive particulate matter.

Figure 5.7-2. Particulate Matter Particle Sizes



Source: U.S. Environmental Protection Agency 2013.

Because the health effects of particulate matter depend on particle size, scientists and regulatory agencies typically group small airborne particles into two categories based on particle size. The first category is *inhalable particles*, which includes PM10. For comparison, a human hair is approximately 70 micrometers (microns) in diameter. The second category is *inhalable fine particles*, which includes PM2.5. These particles are small enough to penetrate into the gas exchange regions of the lungs and are considered to pose the greatest risk to human health. The PM10 category includes PM2.5. As discussed in Section 5.7.1, *Regulatory Setting*, both sizes are regulated by federal law as criteria air pollutants. Particles smaller than 10 micrometers and larger than 2.5 micrometers are often referred to as *inhalable coarse particles*. Particulate matter is sometimes measured TSP. TSP measures particles of approximately 50 micrometers and smaller, and includes PM10 and PM2.5.

Coal dust contains large, visible particles and the smaller TSP, PM10, and PM2.5. The larger particles and TSP may result in nuisance impacts (impacts that affect the aesthetics, look, or cleanliness of surfaces). PM10 and PM2.5 have been determined to cause increased health hazard if the regulatory limits are exceeded (U.S. Environmental Protection Agency 2014). If any pollutant level exceeds regulatory limits, health impacts would depend on the concentration in the air, the duration of the exposure, and the number of times exposure occurs.

While coal dust impacts in coal mines have been widely studied, the health impacts of nonoccupational exposure to coal dust, such as coal dust from rail cars, have not been extensively studied. Some studies have found that communities near large coal-handling and processing facilities could have higher rates of respiratory complaints (Temple and Sykes 1992; Brabin et al. 1994). Others have found no difference between these communities and those farther away from coal facilities (Pless-Mulloli et al. 2000; Moffatt and Pless-Mulloli 2003).

The *Draft Environmental Impact Statement, Tongue River Railroad Company* (Surface Transportation Board 2015) considered human health impacts from coal dust inhalation for a proposed rail line in Montana. Using dispersion modeling, the study found the maximum annual average contribution of coal dust of 0.46 $\mu g/m^3$ per train round trip of PM10, and 0.09 $\mu g/m^3$ per train round trip of PM2.5. The per-train contribution to particulate matter of coal dust along the rail right-of-way for a 24-hour period was 1.85 $\mu g/m^3$ per train round trip for PM10, and 0.40 $\mu g/m^3$ per train round trip for PM2.5. Receptors used for modeling were placed every 10 meters out to 300 meters in a direction perpendicular to the rail track with maximum annual average concentrations found at either 40 or 50 meters. The study looked at human health impacts from coal dust ingestion by comparing concentration of coal dust and trace elements to federal health screening levels. The study concluded concentrations of coal dust constituents (including trace elements in coal and the chemical constituents of coal surfactants) in soil, dust, water, and fish would be below screening levels for human exposure for all evaluated pathways.

Emissions, Dispersion, and Deposition of Coal Dust

Rail cars and coal-handling facilities generate and emit coal dust. The total amount of fugitive coal dust released by a rail car depends on the following factors.

- Coal type and composition
- Coal moisture content
- Ambient wind speed and direction
- Precipitation falling on the coal
- Topper agents or dust suppressants
- Size of the top opening of the rail car
- Shape (profile) of the coal surface in the car
- Position of the car in the train
- Time and distance traveled
- Train speed

The amount of fugitive coal dust released by a coal-handling facility depends on the following factors.

- Transfer or handling process
- Enclosures or other physical barriers
- Additional controls, such as spraying/fogging
- Shape (profile) of coal pile
- Moisture and silt loading content of the coal
- Ambient wind speed
- Rainfall

Coal dust and other forms of particulate matter do not remain in the air indefinitely. Eventually, these particles settle out of the air and deposit on the ground. Coal dust may be deposited directly onto the rail ballast, along the rail right-of-way, or in adjacent areas. Where the coal dust lands (the distance from and the direction from the rail right-of-way) depends on particle size, wind speed, and other meteorological conditions. Human exposure to deposited coal dust can occur by human ingestion of soil, sediment, surface water, groundwater, agricultural products, fish, or other animals that have ingested soil or water tainted by coal dust deposits. Ecological impacts can occur by exposure of plants and animals to coal dust and its constituents in soil, sediment, surface water, and groundwater. Deposited coal dust could also cause nuisance impacts. Airborne coal dust may be deposited on houses, automobiles, boats, outdoor furniture, and other property.

Airborne coal dust dispersion can be predicted using mathematical models that describe the physical processes to simulate the particulate matter concentration. These models, known as dispersion models, take into account the time-varying sources of emissions, as well as meteorological and seasonal conditions. The models require reasonable estimates of emissions rates to yield reliable estimates of the dispersion and deposition of particulate matter. As discussed below, this analysis used a dispersion model to assess coal dust deposition from the Proposed Action.

Coal Dust Emissions from Rail Cars

Most coal dust from rail cars comes directly from the surface of the coal pile in the rail car (Queensland Rail 2008). Smaller amounts may come from coal that has fallen onto the surfaces of the car or the wheel assemblies during loading.

A study funded by the U.S. rail industry (Calvin et al. 1993) estimated a train operating under clear, dry, sunny conditions lost between 0.17% (shaped profile) and 0.34% (unshaped profile) of the total coal load, with no use of surfactants or topper agents. These estimates were based on measuring the weight of the cars after loading and again at the end of the trip. The study did not provide information on the particle sizes associated with this emissions of coal dust. The *Draft Environmental Impact Statement, Tongue River Railroad Company* (Surface Transportation Board 2015) notes that weighing cars before and after a trip does not account for the effects of the moisture content of coal. Some types of coal contain large amounts of water, up to more than 60% by weight in some lignite coals, and this technique is unreliable for estimating coal dust emissions because coal may dry out and become lighter during transport.

More recently, Ferreira et al. (2003) conducted full-scale measurements of coal dust emitted from coal trains. They placed dust-collecting instruments onto rail cars carrying coal from a port to a power station in Portugal. Some of the rail cars were equipped with mechanical covers that partially covered the coal load but left some of the coal exposed. Ferreira et al. found that these cars lost less than 0.001% of the loaded coal over a 220-mile trip with an average speed between 34 and 37 miles per hour.

An industry study conducted in Queensland, Australia also found the amount of coal dust emitted by rail cars to be small. This study, prepared on behalf of Queensland Rail Limited (now Aurizon), used a mathematical model (Witt et al. 1999) to predict the emissions of TSP-sized coal dust from trains moving on the Goonyella, Blackwater, and Moura rail systems in Queensland. The model estimated that these rail cars would lose an average of 0.0035% of their total load. For cars carrying approximately 90 tons of coal, typical for the cars in the study, this amounted to an average of about

6 pounds of coal dust lost per car, over trips between 100 and 300 miles in length (Queensland Rail 2008).

Witt et al. (1999) developed a computational fluid dynamics model that takes into account the effects of wind direction and velocity. Experimental measurements of dust lift-off from the surface in a wind tunnel at different travel speeds were used by Witt et al. (1999) to characterize the dust emissions rate. Based on the experimental data, Witt et al. developed a model for predicting the mass and particle size distribution lifted at different air speeds. The Queensland Rail (2008) study modified the equations that were developed by Witt et al. (1999) based on the emissions reported by Ferreira et al. (2003), as a function of train speed for particle size distributions. These equations were developed in the absence of any significant moisture. As such, the Queensland Rail study equations provide a conservative estimate because, by wetting the coal, surface precipitation tends to reduce actual emissions. This study did not include adjustments for the use of other dust control techniques such as covers or chemical topper agents.

The BNSF/UP Super Trial (BNSF Railway Company 2010) reported reductions in coal dust emissions using chemical topper agents. BNSF has imposed a tariff (a schedule of shipping rates and requirements) that requires coal shippers in Wyoming and Montana to control coal dust emissions from rail cars. One method allowed by the tariff is to use one of topper agents (surfactants) that, along with shaping the load profile, have been shown to reduce average coal dust emissions by at least 85%.

Airborne Coal Dust Dispersion

The concentration of coal dust in the air does not remain constant. Like all forms of particulate matter, coal dust disperses over time. Some studies that examine the movement of coal dust in the air use monitoring equipment to estimate the concentration of particulate matter. Others use mathematical dispersion models that describe the physical processes to simulate the particulate matter concentration.

The *Draft Environmental Impact Statement for Tongue River Railroad Company* (Surface Transportation Board 2015) used the AERMOD model to assess both air quality (ambient concentrations of particulate matter) and deposition. Results from the modeling showed a maximum increase in annual PM10 from coal dust emitted by trains of 6.1 micrograms per cubic meter ($\mu g/m^3$) at a distance of 50 meters from the rail line. The maximum annual increase in PM2.5 was 1.2 $\mu g/m^3$ at 50 meters from the rail line. Both of these increases would be insufficient to lead to a violation of NAAQS for either PM2.5 or PM10.

In another coal dust study, the *Pollution Reduction Program 4. - Particulate Emissions from Coal Trains* report (Australian Rail Track Corporation 2012) measured TSP, PM10, and PM2.5 concentrations as loaded and unloaded coal trains passed the monitors (4 meters from the nearest of four tracks) and compared these measurements with the concentration of particulate matter when no train was present. ARTC found that both loaded and unloaded coal trains were associated with higher measured concentrations of particulate matter. On average, coal trains increased the concentration of PM10 by as much as 7.6 $\mu g/m^3$ and the concentration of PM2.5 by as much as 2.1 $\mu g/m^3$ as the train passed by the monitor. The ARTC study did not analyze the measured particulate matter to determine the proportion of coal dust.

The Queensland, Australia Department of Science, Information Technology, Innovation and the Arts (DSITIA) conducted a 1-month study of dust at three sites in the Brisbane suburb of Tennyson. This study was conducted in response to community concern over dust from coal trains (Department of Science, Information Technology, Innovation and the Arts 2012). The monitoring site closest to the rail line was 6 meters (20 feet) from the track. The DSITIA study found that the major component of deposited dust was mineral dust (not coal dust), ranging between 40 and 50%. Coal accounted for 10 to 20% of deposited dust in the samples. Measurement of airborne dust levels indicated particulate matter concentrations increased by an average of less than 5 $\mu g/m^3$ when the train was passing by the monitor. The DSITIA study measured airborne dust concentrations as PM20 (particles with a diameter less than 20 micrometers), so the concentrations of PM10 and PM2.5 would have been lower.

Airborne Coal Dust Deposition

Coal dust emitted to the atmosphere settles out of the air and deposits on the ground. Coal dust may be deposited directly onto the rail ballast, along the right-of-way, or in adjacent areas. Where the coal dust lands (the distance from and the direction from the rail right-of-way) depends on particle size, wind speed, and other meteorological conditions.

A Queensland, Australia study of the deposition of coal dust along rail lines over a 6-month period found that the maximum deposition of coal dust (TSP size and smaller) occurred at approximately 3 meters (10 feet) from the edge of the track (Queensland Government Safety in Mines Testing and Research Station 2007).

An assessment for the *Draft Environmental Impact Statement, Tongue River Railroad Company* (Surface Transportation Board 2015) evaluated the amount of airborne coal dust deposition by particle size and mass. Particles larger than 250 micrometers deposit very quickly after being blown from a rail car and will deposit within the right-of-way of the railroad. The study concluded that these larger particles would deposit mostly within 5 meters (approximately 16.4 feet) of the center of the rail line and would not be likely to deposit outside of the rail right-of-way, even under unusually windy conditions.

Ecological Impacts of Coal Dust

The *Draft Environmental Impact Statement, Tongue River Railroad Company* (Surface Transportation Board 2015) evaluated the potential ecological impacts of coal dust. The following presents the methods and findings of the study. The study used an air dispersion and deposition model combined with a fate and transport model to estimate concentrations of coal dust in soil, water, and sediment. Coal from the proposed source mine in the Powder River Basin, Otter Creek, was used to characterize the trace metals in the coal. The study then compared estimated soil, sediment, and water concentrations of trace metals based on coal dust deposition modeling with EPA ecological soil screening levels to evaluate soil exposure for ecological receptors, including plants, soil invertebrates, avian wildlife, and mammalian wildlife (U.S. Environmental Protection Agency 2005). Freshwater screening values account for ecological impacts from fish exposure (U.S. Environmental Protection Agency 2013d). To evaluate the movement of dust to soil and subsequently to sediment and surface water, the study used the area-wide average deposition rate of particulates 250 micrometers in diameter and smaller. The study did not explicitly model particles of aerodynamic diameter 250 micrometers and larger because particles of this size would not deposit outside of the right-of-way. The study followed EPA risk assessment guidance to assume that 100% of the chemical constituents in coal dust are bioavailable (U.S. Environmental Protection Agency 2007). The study found that none of the chemical concentrations estimated for soil would result in values greater than the EPA ecological soil screening levels for plants, soil invertebrates, avian wildlife, or mammalian wildlife.

Concentrations of coal dust constituents in surface water were estimated based on the average deposition from air over a modeled watershed and subsequent runoff and erosion into a modeled water body. Nearly all of the estimated values for water in the model were well below available EPA freshwater screening benchmarks (U.S. Environmental Protection Agency 2013). The study found barium is the only coal dust constituent analyzed for which predicted concentration (10.1 micrograms per liter) would exceed the freshwater screening benchmark of 4.0 micrograms per liter. The study concluded that the concentration of barium from coal dust in freshwater would be unlikely to exceed the screening benchmark. The findings of the study found estimates of coal dust constituent concentrations in soil, sediment, and surface water were below screening levels for ecological exposure, with the exception of values for barium in surface water.

Based on the use of several conservative assumptions, the analysis overestimated the likely concentration of barium in surface water. Furthermore, when barium is released to water, the compound will precipitate, or come out of solution, as barium sulfate, which has low solubility in water. Therefore, the study did not expect that concentrations of soluble barium in surface water would exceed benchmark or screening levels.

Safety Impacts of Coal Dust

The *Draft Environmental Impact Statement, Tongue River Railroad Company* (Surface Transportation Board 2015) considered the potential for impacts from coal dust on safety through the fouling of railroad ballast. The Surface Transportation Board concluded that there is evidence that coal dust can harm the stability of railroad ballast. The study concluded higher levels of coal train traffic would result in more frequent impacts than lower traffic levels. Impacts at locations near the tracks would be greater than at locations farther away. Impacts from trains carrying coal with a shaped load profile and to which a topper agent has been applied would be less than impacts from trains carrying untreated coal.

Nuisance Impacts of Coal Dust

The potential for nuisance impacts (such as visible coal dust accumulating on window sills and outdoor furniture) at a specific location would be affected by many factors, including train traffic levels, train speed, coal dust emissions reduction measures in use, distance from the track, and local topographic and meteorological conditions. The *Draft Environmental Impact Statement, Tongue River Railroad Company* (Surface Transportation Board 2015) found higher levels of coal train traffic would result in more frequent impacts than lower traffic levels. Impacts at locations near the tracks would be greater than at locations farther away. Impacts from trains carrying coal with a shaped load profile and to which a topper agent was applied would have less impacts than trains carrying untreated coal.

5.7.4.2 Existing Conditions in the Study Area

The following describes the existing coal dust conditions in the study area.

Applicant's Leased Area

The existing bulk product terminal in the Applicant's leased area currently receives 1 to 2 coal trains per week, consisting of 25 to 30 coal rail cars. Coal is stored in silos in the Applicant's leased area, adjacent to the project area, and transferred via truck to the Weyerhaeuser facility, located 1 mile to the southeast. The coal is stored in silos; coal dust emissions are estimated to be small and confined almost entirely within the Applicant's leased area. Operations at the existing bulk product terminal are in compliance with the air permit issued by the Southwest Clean Air Agency.

Cowlitz County

Approximately 2 loaded coal trains, each consisting of approximately 125 cars, operate daily along the northbound BNSF main line in Cowlitz County (Western Organization of Resource Councils 2014).

Cowlitz County is classified as an attainment area or unclassified[13] for both PM10 and PM2.5. Of these two pollutants only PM2.5 is currently being monitored. Refer to Section 5.6, *Air Quality*, for additional information.

The PM2.5 monitoring station located at Olympic Middle School is a neighborhood-scale site, affected primarily by smoke from home heating. It is considered representative of the Longview-Kelso area and is used for curtailment calls during the home heating season. The estimated 24-hour design value in 2014 was 18 microns per cubic meter. While not a reference instrument, it is considered a strong indicator of the relative PM2.5 concentration of the Longview-Kelso area. Air quality in other locations of Cowlitz County is generally as good as or better than in the Longview-Kelso area.

EPA compiles a comprehensive National Emissions Inventory every 3 years. This inventory includes emissions of air toxics from industrial, commercial, mobile, and area sources, and is used by EPA in their National Air Toxics Assessment (NATA). The most recent (2011) NATA showed Cowlitz County had an overall inhalation cancer risk of 30 cancers per million, which is lower than the state average of 40 cancers per million, as well as below the national averages of 40 cancers per million (U.S. Environmental Protection Agency 2015). However, NATA does not quantify cancer risk associated with exposure to diesel particulate matter. For more information on NATA and diesel particulate matter, refer to Section 5.6, *Air Quality*.

[13] The U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) designate regions as being attainment or nonattainment areas for regulated air pollutants. Attainment status indicates that air quality in an area meets the federal, health-based ambient air quality standards. Unclassified is an area with not enough air quality monitoring data has been collected to classify the area.

Washington State

In 2014, approximately 2 to 4 loaded coal trains, each consisting of approximately 125 cars, operated daily in Washington State beyond Cowlitz County, mainly along the BNSF main line (Western Organization of Resource Councils 2014; *The Herald* 2013). Section 5.6, *Air Quality*, describes existing air quality conditions for PM10 and PM2.5 along Proposed Action-related rail routes.

5.7.5 Impacts

This section describes the potential direct and indirect impacts related to coal dust that would result from construction and operation of the Proposed Action and the No-Action Alternative.

5.7.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area as a result of construction and operation of the Proposed Action.

At full operation, Proposed Action-related trains would add 8 loaded and 8 empty coal trains per day (16 total trains per day) to the rail lines between the Powder River Basin or the Uinta Basin and the project area. In the project area, unloading facilities would unload coal from rail cars within an enclosed structure. The unloading facilities would contain equipment to rotate rail cars and discharge the coal from the rail cars into a large hopper. As the tandem rotary dumper rotates the rail cars and begins to unload the coal into hoppers beneath the dumper, sprayers would spray water to avoid and minimize dust dispersion within the enclosed structure.

A network of belt conveyors would transport coal from the rail car unloading facilities to the stockpile area, and from the stockpile area to the vessel-loading facilities, or from rail cars directly to the vessel-loading facilities. All transfer stations and approximately one-third of the conveyors would be enclosed. The stockpile area and vessel-loading conveyors would not be enclosed due to their operational requirements. The coal stockpile area would have a dust suppression system. Vessels would be loaded using shiploaders that would include enclosed boom and loading spout. The loading spout would also be telescopic and would be inserted below the deck of the vessel during vessel loading to minimize dust dispersion.

Construction

Construction of the Proposed Action would not result in direct or indirect impacts related to coal dust because construction would not include any coal-handling or transport activities.

Operations—Direct Impacts

Operation of the Proposed Action could result in the following direct impact. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

Emit and Deposit Coal Dust In and Near the Project Area

Operation of the Proposed Action would emit coal dust from coal handling and transport activities in the project area.[14] Table 5.7-3 illustrates the estimated maximum annual and monthly coal dust deposition at or beyond the project area boundary.

Table 5.7-3. Estimated Maximum Annual and Monthly Coal Dust Deposition

Location	Maximum Annual Deposition (g/m^2/year)	Maximum Monthly Deposition (g/m^2/month)	Benchmark Used for Analysis (g/m^2/month)[a]
Project area boundary (fence line) near Mt. Solo Road	1.99	0.40	2.00

Notes:
[a] Source: New Zealand Ministry of Environment 2001
g/m^2 = grams per square meter

The estimated maximum monthly coal dust deposition (0.40 g/m^2/month) would be at the project area boundary near Mt. Solo Road (Figure 5.7-3). This estimated deposition would be below the benchmark used for the analysis (2.0 g/m^2/month).

The estimated maximum annual coal dust deposition (1.99 g/m^2/year) also would be at the project area boundary near Mt. Solo Road (Figure 5.7-4). Within a few thousand feet of the project area, the annual deposition is estimated at 0.1 g/m^2; within 2.4 miles, it is estimated at 0.01 g/m^2.

Operations—Indirect Impacts

Operation of the Proposed Action would result in the following indirect impacts. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

Cowlitz County

A dispersion model was performed to assess coal dust deposition from Proposed Action-related trains along the Reynolds Lead and BNSF Spur and along the BNSF main line in Cowlitz County based on existing freight train speeds.

[14] All sources of coal dust emissions were included in the modeling.

Figure 5.7-3. Estimated Maximum Monthly Coal Dust Deposition

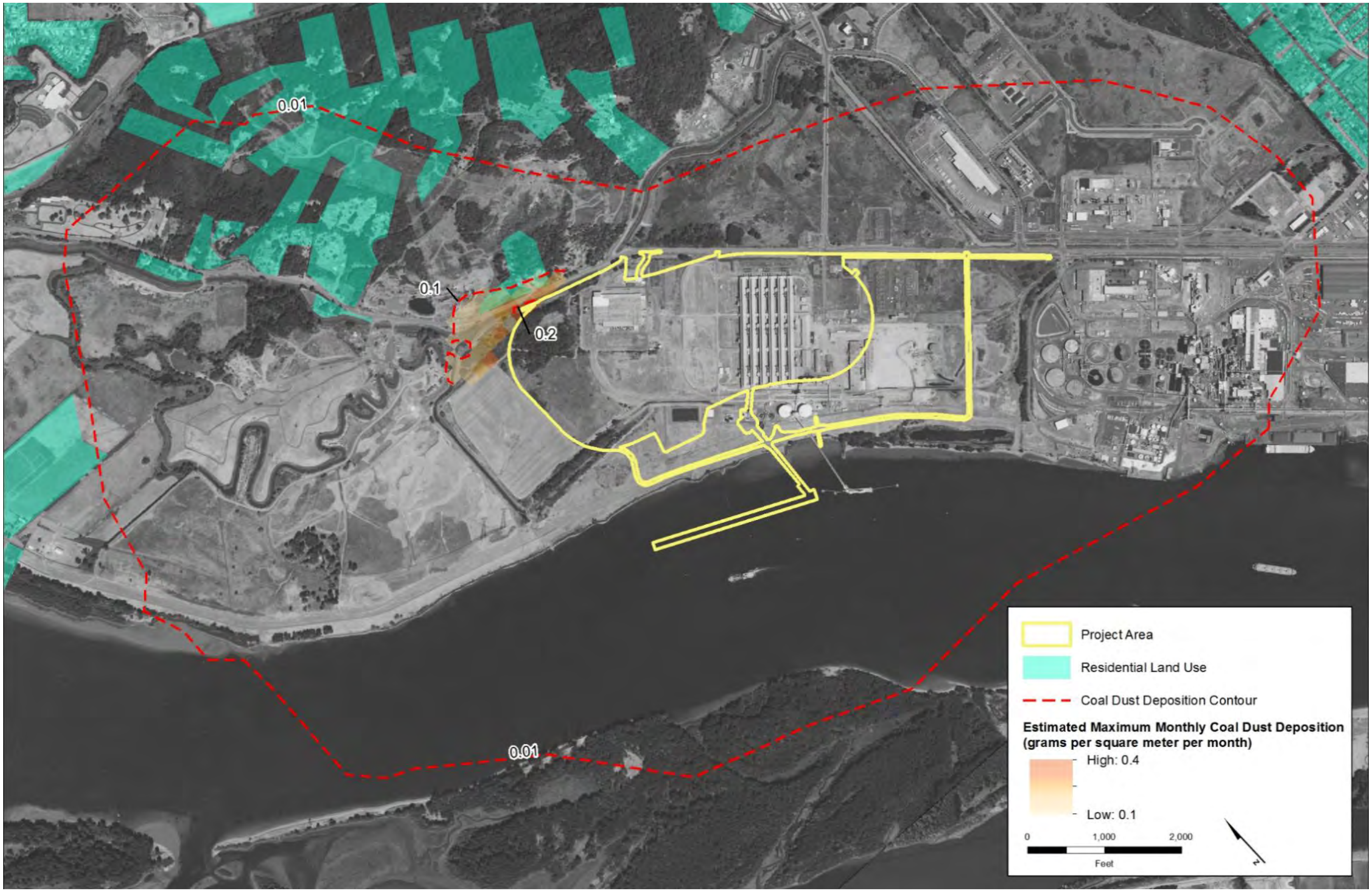
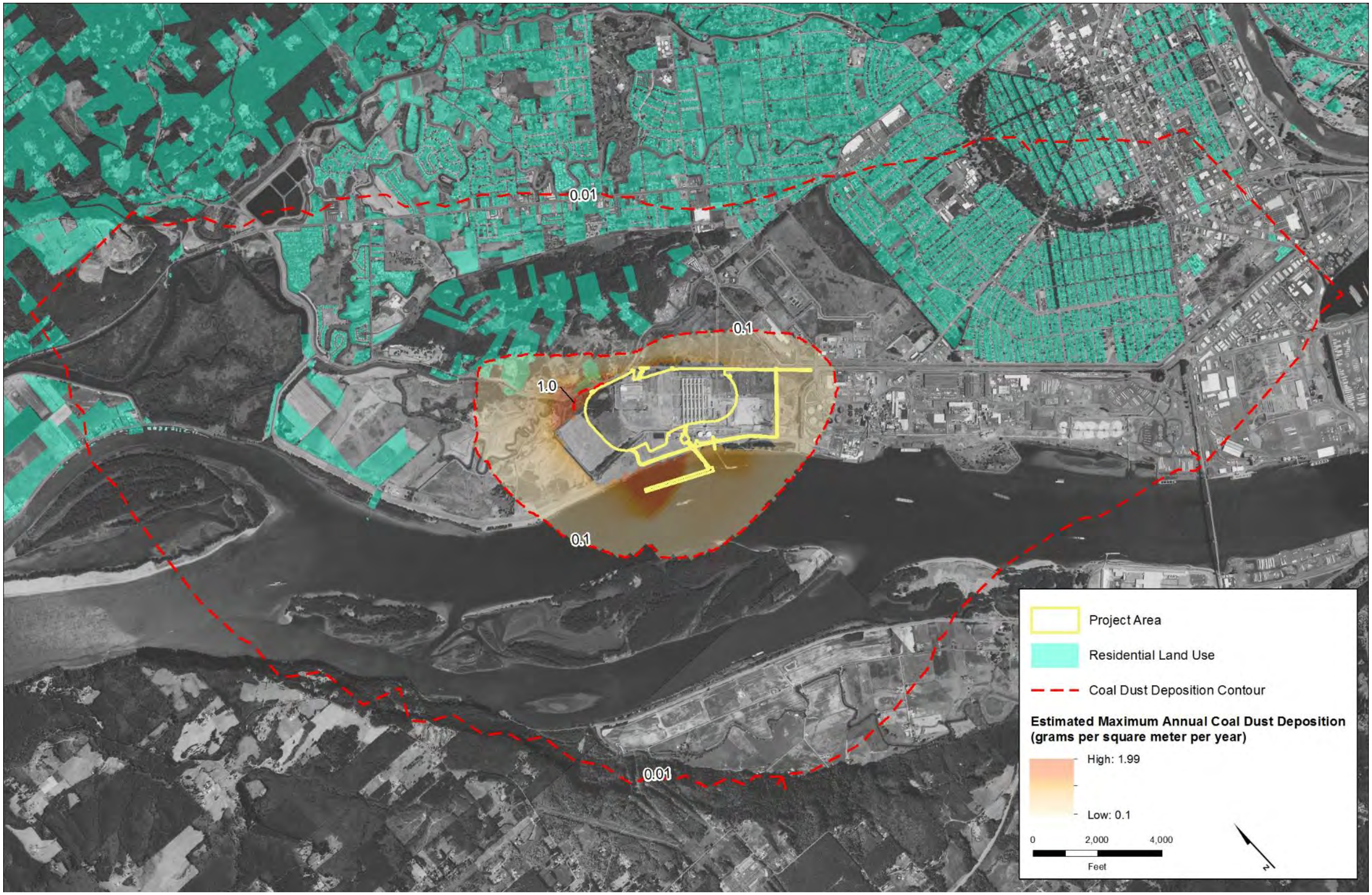


Figure 5.7-4. Estimated Maximum Annual Coal Dust Deposition



- **Reynolds Lead and BNSF Spur**. Adding modeled emissions of PM10 and PM2.5 due to coal dust from Proposed Action-related trains to background levels results in total concentrations below the NAAQS at 100 feet from the rail line (Table 5.7-4). The estimated maximum modeled 24-hour increase in PM10 concentration is 0.28 μg/m^3; the estimated maximum increase in 24-hour PM2.5 due to coal dust is 0.05 μg/m^3. The estimated annual PM2.5 concentration would increase 0.01 μg/m^3. Concentrations would decline by approximately 50% at approximately 160 feet from the rail line. The closest residence is located approximately 180 feet from the north side of the Reynolds Lead.

Table 5.7-4. Estimated Maximum PM10 and PM2.5 Concentrations for Coal Particles Only (100 Feet from Rail Line) —Reynolds Lead and BNSF Spur

Pollutant	Averaging Period	Maximum Modeled Impact (μg/m^3)	Background[a] (μg/m^3)	Total Concentration (μg/m^3)	NAAQS (μg/m^3)
PM10	24 hour[b]	0.28	28	28.28	150
PM2.5	24 hour[c]	0.05	16	16.05	35
	Annual[d]	0.01	5.3	5.31	12

Notes:
[a] Background concentrations are monitoring design values from Northwest International Air Quality Environmental Science and Technology Consortium (2015).
[b] The PM10 24-hour modeled impact is 3-year average of the second-highest concentrations.
[c] The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations.
[d] Modeled annual impact is the annual average over 3 modeled years.
NAAQS = National Ambient Air Quality Standards; μg/m^3 = micrograms per cubic meter

Table 5.7-5 reports the estimated maximum increase in deposition along the Reynolds Lead and BNSF Spur at the closest residence (approximately 180 feet from the Reynolds Lead). The estimated maximum monthly deposition would be below the benchmark used for the analysis (New Zealand Ministry of Environment 2001). These concentrations would decrease by 50% at approximately 340 feet from the Reynolds Lead and BNSF Spur.

Table 5.7-5. Estimated Coal Dust Deposition—Reynolds Lead and BNSF Spur

Distance (feet)	Average Maximum Monthly Deposition (g/m^2/month)	Maximum Monthly Deposition (g/m^2/month)	Benchmark Used for the Analysis (g/m^2/month)[a]
180	0.013	0.017	2.0
340	0.006	0.008	2.0

Notes:
[a] Source: New Zealand Ministry of Environment 2001
g/m^2/month = grams per square meter per month

- **BNSF Main Line.** Adding modeled emissions of PM10 and PM2.5 due to coal dust from Proposed Action-related trains to background levels results in total concentrations below the NAAQS at the closest residences (Table 5.7-6). While some receptors are as close as 50 feet, others are more than 100 feet from the BNSF main line and therefore would have lower concentrations than the 100-foot concentration shown in Table 5.7-6. These estimated concentrations are higher than estimates for the Reynolds Lead because higher train speeds on the main line[15] enhance the lift-off of coal particles from open rail cars. However, in all cases, these concentrations are below NAAQS.

Table 5.7-6. Estimated Maximum PM10 and PM2.5 Concentrations—BNSF Main Line, Cowlitz County

Pollutant	Averaging Period	Distance from Rail Line (feet)	Modeled Impact (μg/m³)	Background[a] (μg/m³)	Total Concentration (μg/m³)	NAAQS (μg/m³)
PM10	24 hours[b]	50	30.0	28.0	58.0	150
		100	23.0	28.0	51.0	150
PM2.5	24 hours[c]	50	4.5	21.0	25.5	35
		100	3.8	21.0	24.8	35
	Annual[d]	50	2.1	5.9	8.0	12
		100	1.7	5.9	7.6	12

Notes:

[a] Background concentrations are monitoring design values for Woodland, Washington (Northwest International Air Quality Environmental Science and Technology Consortium 2015).

[b] The PM10 24-hour modeled impact is 3-year average of the second-highest concentration.

[c] The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations. The modeled impact is different than the annual average due to day-to-day variation in meteorology.

[d] Modeled impact is the annual average over the 3 modeled years. The modeled impact is different than the 24-hour average due to day-to-day variation in meteorology.

NAAQS = National Ambient Air Quality Standards; μg/m³ = micrograms per cubic meter

The estimated maximum monthly coal dust deposition along the BNSF main line in Cowlitz County would be above the benchmark used for the analysis at certain distances (Table 5.7-7). These estimated depositions are higher than estimates for the Reynolds Lead and BNSF Spur because higher train speeds on the main line enhance the lift-off of coal particles from open rail cars. The estimated maximum monthly deposition is slightly above the benchmark used for the analysis at 100 feet (New Zealand Ministry of Environment 2001).[16] As a result, residents who live along the main line could experience nuisance levels which may include visible soiling on window sills, outdoor furniture, and other property.

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[15] Based on the near maximum coal train speed of 50 miles per hour observed during the coal dust monitoring (Figure 5.7-1).

[16] These modeled results are comparable to those found during recent monitoring conducted by Corporation of Delta (2014) that reported coal dust deposition amounts ranging from 2 to 10 g/m²/month (July 2013, April 2014, and October 2014) for an average of six 125-car loaded coal trains passing each day at an average speed of 35 miles per hour (Brotherston 2014). The dust fall monitor was located 66 feet from the BNSF main line.

Table 5.7-7. Estimated Coal Dust Deposition—BNSF Main Line, Cowlitz County[a]

Distance (feet)	Average Maximum Monthly Deposition (g/m^2/month)	Maximum Monthly Deposition (g/m^2/month)	Benchmark Used for the Analysis[b] (g/m^2/month)
50	**2.2**	**3.1**	2.0
100	1.4	**2.3**	2.0
150	1.0	1.8	2.0

Notes:
[a] **Bolded, shaded gray** indicates the estimated deposition would be higher than the benchmark used for the analysis.
[b] Source: New Zealand Ministry of Environment 2001
g/m^2/month = grams per square meter per month

Table 5.7-8 compares the maximum trace element concentrations found in coal dust with their respective acceptable source impact levels (ASIL).

Table 5.7-8. Estimated Maximum Concentrations of Trace Elements Compared with Acceptable Source Impact Levels—BNSF Main Line, Cowlitz County

Substance[a]	Maximum Concentration (μg/m^3)	ASIL (μg/m^3)	Averaging Time	Percentage of ASIL (%)
Arsenic and inorganic arsenic compounds	0.000062	0.000303	Annual	20.4
Beryllium and compounds	0.000007	0.000417	Annual	1.8
Cadmium and compounds	0.000002	0.000238	Annual	0.7
Chromium (VI)[b]	0.0000047	0.00000667	Annual	70.4
Cobalt as metal dust and fume	0.00013	0.1	24 hour	0.1
Copper, dusts and mists	0.0015	100.0	1 hour	0.002
Lead compounds	0.000038	0.0833	1 year	0.046
Manganese dust and compounds	0.00093	0.04	24 hour	2.3
Mercury, aryl and inorganic	0.000005	0.09	24 hour	0.005
Nickel and compounds	0.000031	0.0042	Annual	0.74
Selenium compounds	0.000065	20.0	24 hour	0.0003
Vanadium compounds	0.000732	0.2	24 hour	0.37
Crystal silica (PM4 -respirable) daily average	0.94[c]	3.0	8 hour	31

Notes:
[a] The fraction of trace elements found in coal is based on the maximum fraction of these elements found in two Powder River Basin coal beds (Stricker et al. 2007) in combination with the coal dust air quality modeling.
[b] Chromium (VI) is likely substantially lower than as shown in the table because the percent of chromium as chromium (VI) was conservatively assumed the same as coal fly ash, which is a post-combustion coal residual. Combustion is known to substantially increase the percentage of chromium as chromium (VI) (Stam et al. 2011).
[c] Based on analysis of coal dust sample from field program. Total crystal silica fraction in coal dust is the sum of the crystal silica quartz and silicate fractions.
ASIL = acceptable source impact level; μg/m^3 = micrograms per cubic meter

ASILs are screening concentrations for toxic air pollutant in the ambient air, and are based on the levels established in Washington Administrative Code (WAC) 173-460-150 for stationary sources, but are shown here for comparison purposes. As shown in Table 5.7-8, all predicted maximum concentrations of trace elements found in coal dust along the BNSF main line in Cowlitz County would be less than their respective ASILs.

BNSF Main Line in Columbia River Gorge

A dispersion model was run to assess the potential coal dust concentration and deposition from the Proposed Action-related to loaded trains traveling along the BNSF main line in the Columbia River Gorge. The model assumed an average 50-mph train speed operating on the BNSF main line near Dallesport, Washington, using readily available 2014 meteorological data from The Dalles, Oregon. Further details can be found in the *SEPA Coal Technical Report*.

Adding modeled concentrations of PM10 and PM2.5 due to coal dust from Proposed Action-related trains to background levels results in total concentrations below the NAAQS at a distance of 50 and 100 feet from the rail line (Table 5.7-9). Estimated concentrations are lower than those estimated for the BNSF main line in Cowlitz County because of the higher average wind speeds in the Columbia River Gorge, which increases dispersion, although the full effect is offset by the coal dust lift-off when the wind is blowing toward the train. In all cases, these concentrations remain below the NAAQS.

Table 5.7-9. Estimated Maximum PM10 and PM2.5 Concentrations—BNSF Main Line, Columbia River Gorge

Pollutant	Averaging Period	Distance from Rail Line (feet)	Modeled Impact (μg/m³)	Background[a] (μg/m³)	Total Concentration (μg/m³)	NAAQS (μg/m³)
PM10	24 hours[b]	50	18.8	56.0	74.8	150
		100	14.1	56.0	70.1	150
PM2.5	24 hours[c]	50	2.9	19.0	21.9	35
		100	2.2	19.0	21.2	35
	Annual[d]	50	0.94	6.1	7.0	12
		100	0.75	6.1	6.9	12

Notes:
[a] Background concentrations are monitoring design values for Columbia Hills Historical State Park, Washington (Northwest International Air Quality Environmental Science and Technology Consortium 2015).
[b] The PM10 24-hour modeled impact is the high 2nd high concentration.
[c] The PM2.5 24-hour modeled impact is the 98th percentile of the daily maximum concentrations.
[d] Modeled impact is the annual average.
μg/m³ = micrograms per cubic meter

The estimated maximum monthly coal dust deposition along the BNSF main line in the Columbia River Gorge would be above the benchmark used for the analysis at 50 feet (Table 5.7-10). The deposition amounts are similar to those found along the BNSF main line in Cowlitz County. Estimated maximum monthly deposition would occur during June.

Table 5.7-10. Estimated Coal Dust Deposition—BNSF Main Line, Columbia River Gorge

Distance (feet)	Average Maximum Monthly Deposition (g/m^2/month)	Maximum Monthly Deposition (g/m^2/month)	Benchmark Used for Analysis (g/m^2/month)
50	**2.2**	**2.6**	2.0
100	1.5	1.9	2.0
150	1.0	1.4	2.0

Notes:
[a] **Bolded, shaded gray** indicates the estimated deposition would be higher than the benchmark used for the analysis.
[b] Source: New Zealand Ministry of Environment 2001
g/m^2/month = grams per square meter per month

Washington State (Outside Cowlitz County and Columbia River Gorge)

The AERMOD air dispersion model was run to assess the potential coal dust concentration and deposition from both loaded and unloaded Proposed Action-related trains traveling along the BNSF main line from the Washington–Idaho border to just prior to entering the Columbia River Gorge using 3 years of Moses Lake, Washington, meteorological data (2010 through 2012). Adding modeled emissions of PM10 and PM2.5 due to coal dust from Proposed Action-related trains to background levels results in total concentrations below the NAAQS at a distance of 100 feet from the rail line (Table 5.7-11). These concentrations would decrease by 50% another 100 feet away from the rail line.

Table 5.7-11. Estimated Maximum PM10 and PM2.5 Concentrations (100 Feet from Rail Line) —BNSF Main Line, Washington State (Outside Cowlitz County and Columbia River Gorge)

Pollutant	Averaging Period	Modeled Impact ($\mu g/m^3$)	Background[a] ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM10	24 hour[b]	24.4	101.0	125.4	150
PM2.5	24 hour[c]	2.83	24.2	27.0	35
	Annual[d]	0.93	8.9	9.83	12

Notes:
[a] Background for PM10 is the maximum highest second high 24-hour average over the 3-year period (2012–2014) from Kennewick or Spokane. The background PM2.5 from the Spokane monitor from the 2012–2014 period.
[b] The PM10 24-hour modeled impact is 3-year average of the second-highest concentration.
[c] The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations. The modeled impact is different than the annual average due to day-to-day variation in meteorology.
[d] Modeled impact is the annual average over the 3 modeled years based on Moses Lake meteorological data (2010–2012). The modeled impact is different than the 24-hour average due to day-to-day variation in meteorology.
NAAQS = National Ambient Air Quality Standards; $\mu g/m^3$ = micrograms per cubic meter

The maximum monthly coal dust deposition (for both loaded and unloaded coal trains) along the BNSF main line in Washington State (outside of Cowlitz County and the Columbia River Gorge) would be below the benchmark used for the analysis (Table 5.7-12). The results show the increase in deposition for receptors located about 100 and 200 feet from the rail line.

Maximum monthly deposition occurs during December, but would be below the benchmark used for the analysis. The predicted maximum deposition of trace metals would be similar to the levels reported for Cowlitz County, which were not predicted to exceed the ASIL for any substance.

Table 5.7-12. Estimated Coal Dust Deposition (Loaded and Unloaded Trains)—BNSF Main Line, Washington State (Outside Cowlitz County and Columbia Gorge)

Distance (feet)	Average Maximum Monthly Deposition (g/m^2/month)	Maximum Monthly Deposition (g/m^2/month)	Benchmark Used for the Analysis (g/m^2/month)[a]
100	0.73	0.88	2.0
200	0.27	0.52	2.0

Notes:
[a] Source: New Zealand Ministry of Environment 2001
g/m^2/month = grams per square meter per month

Impact Summary

The coal dust analysis made the following conclusions.

- **Project area.** Estimated maximum monthly deposition of coal dust at the project area boundary would be 0.40 g/m^2/month, which is **below** the benchmark of 2.0 g/m^2/month (New Zealand Ministry of Environment 2001) used for this analysis.
- **Reynolds Lead and BNSF Spur, Cowlitz County:**
  - Estimated maximum PM10 and PM2.5 concentrations from coal dust emissions plus background 100 feet from the rail line would be 28.28 $\mu g/m^3$ for PM10 and 16.05 $\mu g/m^3$ (24-hour) and 5.31 $\mu g/m^3$ (annual) for PM2.5, which are **below** the applicable NAAQS.
  - Estimated maximum and average monthly deposition of coal dust 180 feet from the rail line would be 0.017 and 0.013 g/m^2/month, which are **below** the benchmark of 2.0 g/m^2/month (New Zealand Ministry of Environment 2001) used for this analysis.
- **BNSF Main Line, Cowlitz County:**
  - Estimated maximum PM10 and PM2.5 concentrations from coal dust emissions plus background 50 feet from the rail line would be 58.0 $\mu g/m^3$ for PM10 and 25.5 $\mu g/m^3$ (24-hour) and 8.0 $\mu g/m^3$ (annual) for PM2.5, which are **below** the applicable NAAQS.
  - Estimated maximum (at 100 feet) and average (at 50 feet) monthly deposition of coal dust would be 2.3 and 2.2 g/m^2/month, which are **above** the benchmark of 2.0 g/m^2/month (New Zealand Ministry of Environment 2001) used for this analysis.
- **BNSF Main Line, Columbia River Gorge:**
  - Estimated maximum PM10 and PM2.5 concentrations from coal dust emissions plus background at 50 feet from the rail line would be 74.8 $\mu g/m^3$ for PM10 and 21.9 $\mu g/m^3$ (24-hour) and 7.0 $\mu g/m^3$ (annual) for PM2.5, which are **below** the applicable NAAQS.
  - Estimated maximum (at 50 feet) and average (at 50 feet) monthly deposition of coal dust would be 2.6 and 2.2 g/m^2/month, which are **above** the benchmark of 2.0 g/m^2/month (New Zealand Ministry of Environment 2001) used for this analysis.

- **BNSF Main Line, Washington State (outside Cowlitz County and the Columbia River Gorge):**
  - Estimated maximum PM10 and PM2.5 concentrations from coal dust emissions plus background at 100 feet would be 125.4 $\mu g/m^3$ for PM10 and 27.0 $\mu g/m^3$ (24-hour) and 9.83 $\mu g/m^3$ (annual) for PM2.5, which are **below** the applicable NAAQS.
  - Estimated maximum and average monthly deposition of coal dust at 100 feet would be 0.88 and 0.73 g/m^2/month, which are **below** the benchmark of 2.0 g/m^2/month (New Zealand Ministry of Environment 2001) used for this analysis.

In 2015, a study was published that evaluated PM2.5 concentrations during the passing of a coal train on the BNSF main line in the Columbia River Gorge in Washington State (Jaffe et al. 2015). The study evaluated 2-minute average PM2.5 concentrations. After 2 minutes, PM2.5 concentrations returned to background levels. The study was conducted before the BNSF surfactant facility in Pasco began operation, and would be expected to have impacts similar to those modeled for the Proposed Action, which estimated coal dust emissions without additional surfactant applied in Pasco. Jaffe et al. (2015) monitored the maximum 2-minute concentration from a single unit coal train measured at 130 feet downwind of the coal train. As shown in Table 5.7-6, the maximum modeled 24-hour PM2.5 concentration was 3.8 $\mu g/m^3$ at 100 feet for a Proposed Action-related train, which is similar to results found by Jaffe (2.6 $\mu g/m^3$) if 8 unit trains are considered and expressing in terms of the regulatory averaging period of 24-hour concentration. Thus, the findings of Jaffe and the results of the analysis for the Proposed Action are generally consistent.

Overall, the impacts of PM10 and PM2.5 emissions due to coal dust from Proposed Action-related rail transport of coal would not be significant because emissions would be below applicable federal standards. The average and maximum monthly deposition of coal dust on the BNSF main line in Cowlitz County (at 50 and 100 feet, respectively) and Columbia River Gorge (at 50 feet) was estimated to be above the benchmark used for the analysis. Because no state or federal standards apply to deposition of coal dust, this impact is not considered significant.

5.7.5.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal and impacts related to coal dust from construction and operation of the Proposed Action would not occur. The Applicant would continue with current and future operations in the project area. The project area could be developed for other industrial uses, including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement. Petroleum coke transfer would have minimal coal dust emissions because the material is stored in a building and the transfer from vessel occurs through vacuum unloader.

5.7.6 Required Plans and Permits

Coal dust has no separate permitting requirements. The following required permit would be required in relation to air quality (including coal dust) for the Proposed Action.

- **Notice of Construction—Southwest Clean Air Agency.** Businesses and industries that cause, or have the potential to cause, air pollution are required to receive approval from the local air agency prior to beginning construction. These requirements of Washington's Clean Air Act apply statewide (Chapter 70.94 Revised Code of Washington [RCW]). Businesses located in Cowlitz County are regulated by the Southwest Clean Air Agency. The agency rules generally require an air permit for a stationary sources emitting more than 0.75 ton per year of PM10 or 0.5 ton per year for PM2.5.[17] It is anticipated these levels would be exceeded and the Applicant would need to file a permit application and receive an approved Notice of Construction air permit prior to constructing, installing, establishing, or modifying any equipment or operations that may emit air pollution.

5.7.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to coal dust from operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

5.7.7.1 Voluntary Mitigation

The Applicant has committed to implementing the following measure to mitigate impacts related to coal dust.

- To address coal dust emissions from rail cars, the Applicant will not receive coal trains unless the coal has been appropriately shaped in the rail cars and surfactant applied at the mine area.

5.7.7.2 Applicant Mitigation

The Applicant will implement the following measures to mitigate impacts related to coal dust.

MM CDUST-1. Monitor and Reduce Coal Dust Emissions in the Project Area.

To address coal dust emissions, the Applicant will monitor coal dust during operation of the Proposed Action at locations approved by the SWCAA. A method for measuring coal dust concentration and deposition will be defined by SWCAA. If coal dust levels exceed nuisance levels, as determined by SWCAA, the Applicant will take further action to reduce coal dust emissions. Potential locations to monitor coal dust concentration and deposition will be along the facility fence line in close proximity to the coal piles, where the rail line enters the facility and operation of the rotary dumper occurs, and at a location near the closest residences to the project area, if agreed to by the property owner(s). The Applicant will conduct monthly reviews of the concentration and deposition data and maintain a record of data for at least 5 years after full operations, unless otherwise determined by SWCAA. If measured concentrations exceed particulate matter (PM) air quality standards, the Applicant will report this information to SWCAA, Cowlitz County and Ecology. The Applicant will gather 1 year of fence line data on PM2.5 and PM10 prior to beginning operations and maintain the data as reference. These data will be reported to the SWCAA, Cowlitz County, and Ecology.

[17] Other criteria air pollutants have higher emissions thresholds.

MM CDUST-2. Establish Reporting Process for Coal Dust Complaints in Cowlitz County.

To address coal dust emissions, the Applicant will meet with the Southwest Clean Air Agency prior to the start of operations to design and implement a coal dust awareness and investigation system for community members in Cowlitz County. The system will receive complaints or concerns, investigate, respond, resolve and report findings to the complainant and Southwest Clean Air Agency. The system will be available in both English and Spanish during operation of the Proposed Action. The Applicant will operate the system or provide funding for Southwest Clean Air Agency to operate the system. A report will be submitted annually to Cowlitz County and the City of Longview and posted on Southwest Clean Air Agency website.

MM CDUST-3. Reduce Coal Dust Emissions from Rail Cars.

To address coal dust emissions, the Applicant will not receive coal trains unless surfactant has been applied at the BNSF surfactant facility in Pasco, Washington for BNSF trains traveling through Pasco. While other measures to control emissions are allowed by BNSF, those measures were not analyzed in this EIS and would require additional environmental review. For trains that will not have surfactant applied at the BNSF surfactant facility in Pasco, before beginning operations, the Applicant will work with rail companies to implement advanced technology for application of surfactants along the rail routes for Proposed Action-related trains.

MM CDUST-4. Provide Information to the Columbia River Gorge Commission.

To address statewide and regional public interests and concern of coal dust emissions, the Applicant will attend at least one Columbia River Gorge Commission public meeting per year and be available to present information on coal dust emissions and rail traffic related to the Proposed Action and discuss concerns.

5.7.7.3 Other Measures to be Considered

The following measure could be implemented to mitigate impacts related to coal dust.

- BNSF should conduct a dust monitoring study along BNSF main line in Cowlitz County to evaluate coal dust emissions from coal trains, and if necessary, take further actions to reduce such emissions.

5.7.8 Unavoidable and Significant Adverse Environmental Effects

Compliance with laws and implementation of the mitigation measures described above would reduce impacts related to coal dust. There would be no unavoidable and significant adverse environmental impacts from coal dust.

5.8 Greenhouse Gas Emissions and Climate Change

This section provides two different evaluations. The first evaluation describes the estimated greenhouse gas emissions that would result from construction and operation of the Proposed Action (Section 5.8.1, *Greenhouse Gas Emissions*). The second evaluation assesses the potential impacts on the Proposed Action that may occur from future changes in climate such as increased severe flooding or changes in precipitation (Section 5.8.2, *Climate Change Impacts on the Proposed Action*).

5.8.1 Greenhouse Gas Emissions

Greenhouse gases are air pollutants that trap solar energy in the atmosphere and contribute to global warming and climate change. Greenhouse gases are emitted from natural sources and are removed from the atmosphere by natural processes. Greenhouse gases are also emitted from human processes, which are now outpacing the natural processes that remove greenhouse gases from the atmosphere. Identifying and reducing excess greenhouse gas emissions from human processes are critical to reducing climate change. Greenhouse gases are global, rather than local, air pollutants with worldwide impacts.

5.8.1.1 Greenhouse Effect

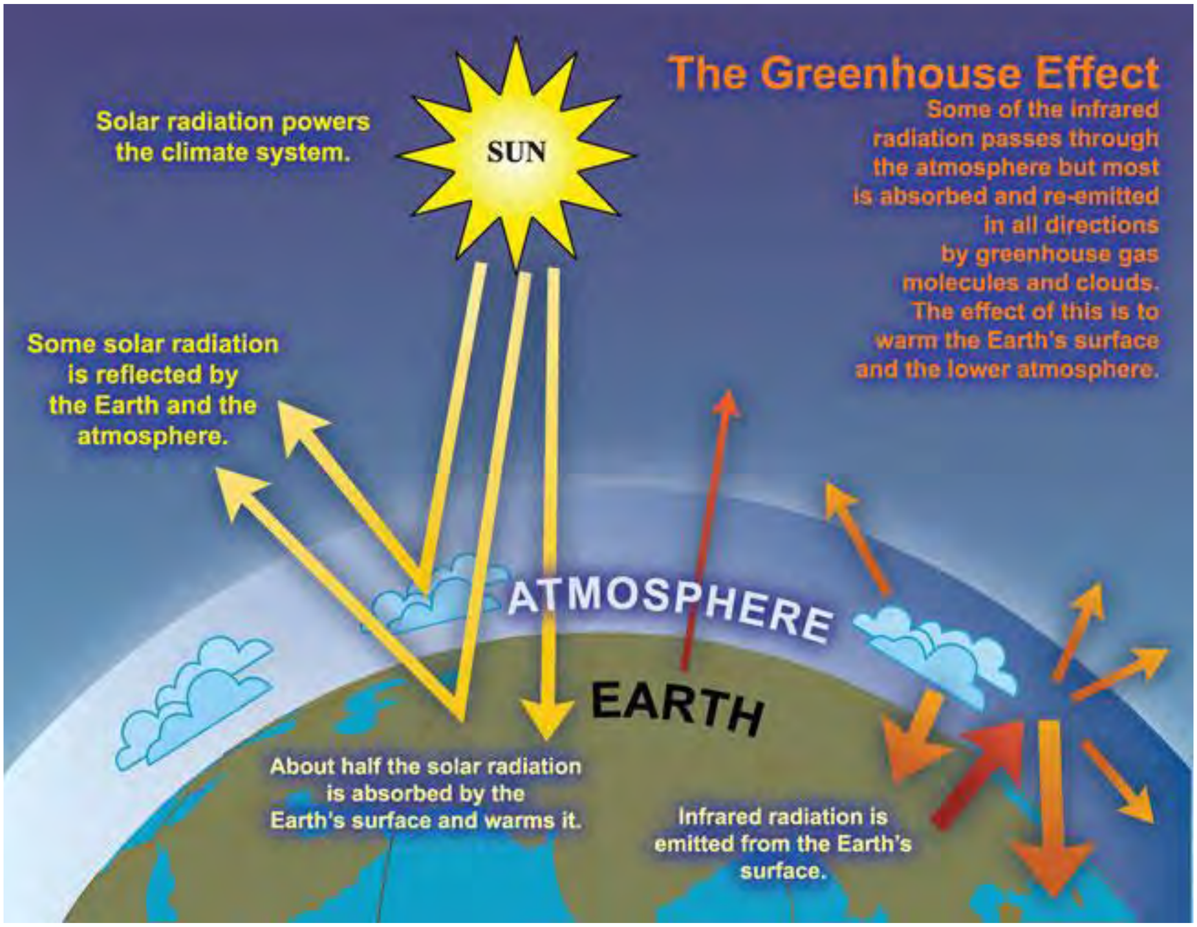
The Earth retains outgoing thermal energy and incoming solar energy in the atmosphere, thus maintaining temperatures suitable for biological life. This retention of energy by the atmosphere is known as the greenhouse effect.[1] When solar radiation reaches the Earth, most of the solar radiation is absorbed by the Earth's surface, reflected by the Earth's surface and atmosphere, or—to a lesser degree—absorbed by the Earth's atmosphere. Simultaneously, the Earth radiates its own heat and energy out into the Earth's atmosphere and space. Factors such as the reflectivity of the Earth's surface, the abundance of water vapor, or the extent of cloud cover affects the degree to which solar radiation may be absorbed and reflected. Figure 5.8-1 shows how the energy flows to and from Earth and the role that the greenhouse effect plays in maintaining heat in the atmosphere.

The composition of gases in the Earth's atmosphere determines the amount of energy absorbed and reemitted by the atmosphere or simply reflected back into space. The predominant gases in the Earth's atmosphere, nitrogen and oxygen (which together account for nearly 90% of the atmosphere), exert little to no greenhouse effect. Some naturally occurring gases, such as carbon dioxide (CO_2), methane, and nitrous oxide trap outgoing energy and contribute to the greenhouse effect. Additionally, manufactured pollutants, such as hydrofluorocarbons, can contribute to the

[1] The Intergovernmental Panel on Climate Change (2013) defines the greenhouse effect as follows:
The infrared radiative effect of all infrared-absorbing constituents in the atmosphere. Greenhouse gases, clouds, and (to a small extent) aerosols absorb terrestrial radiation emitted by the Earth's surface and elsewhere in the atmosphere. These substances emit infrared radiation in all directions, but, everything else being equal, the net amount emitted to space is normally less than would have been emitted in the absence of these absorbers because of the decline of temperature with altitude in the troposphere and the consequent weakening of emission. An increase in the concentration of greenhouse gases increases the magnitude of this effect; the difference is sometimes called the enhanced greenhouse effect. The change in a greenhouse gas concentration because of anthropogenic emissions contributes to an instantaneous radiative forcing. Surface temperature and troposphere warm in response to this forcing, gradually restoring the radiative balance at the top of the atmosphere.

greenhouse effect. Unlike most air pollutants (e.g., sulfur dioxide and particulate matter) that have only a local impact on air quality, greenhouse gases affect the atmosphere equally, regardless of where they are emitted, and thus they are truly global pollutants. A ton of CO_2 emissions in Asia affects the global atmosphere to the same degree as a ton of CO_2 emissions in the United States.

Figure 5.8-1. Model of the Natural Greenhouse Effect



Source: Intergovernmental Panel on Climate Change 2007

The extent to which a given greenhouse gas traps energy in the atmosphere and contributes to the overall greenhouse effect is characterized by its global-warming potential. Some gases are more effective at trapping heat, while others may be longer-lived in the atmosphere. The reference gas against which others are compared is carbon dioxide, and global warming potential is thus expressed in terms of carbon dioxide equivalent (CO_2e). The unit CO_2e represents both a gas's ability to trap heat and the rate at which it breaks down in the atmosphere. Most analyses use 100 years as the period of reference for global warming potential. For example, 1 unit of carbon dioxide has a 100-year global warming potential of 1, whereas an equivalent amount of methane has a global warming potential of 25. For this analysis, a 100-year period is used. Table 5.8-1 presents the

100-year global warming potentials from the IPCC Fourth Assessment Report for the greenhouse gases included in the analysis.[2]

Table 5.8-1. Global Warming Potentials

Greenhouse Gas	IPCC Fourth Assessment Report 100-Year Global Warming Potential
Carbon dioxide	1
Methane	25
Nitrous oxide	298

Source: Intergovernmental Panel on Climate Change 2007

Greenhouse gas emissions occur from both natural as well as human (anthropogenic) sources. Natural sources include decomposition of organic matter and aerobic respiration. Anthropogenic greenhouse gas emissions are predominantly from the combustion of fossil fuels, although industrial processes, land-use change, agriculture, and waste management are also contributors.

Atmospheric concentrations of greenhouse gases have increased since the Industrial Revolution, but the natural processes that remove those greenhouse gases from the atmosphere have not increased proportionally. Additionally, concentrations of long-lived manufactured pollutants such as hydrofluorocarbons have increased in recent decades. As the atmospheric concentrations of greenhouse gases increase, the atmosphere's ability to retain heat increases as well. Since the instrumental record began in 1895, the average temperature in the United States has risen by approximately 1.3 to 1.9 degrees Fahrenheit (°F) (U.S. Global Change Research Program 2014). Furthermore, these average temperatures are expected to increase at a faster pace in the 21st century, by 2.5°F to 11°F above preindustrial levels by 2100 (U.S. Global Change Research Program 2014).

The increase of greenhouse gas emissions in the atmosphere has been determined to pose risks to human and natural systems (Intergovernmental Panel on Climate Change 2014). Higher global surface temperatures cause widespread changes in the Earth's climate system. These changes may adversely affect weather patterns, biodiversity, human health, and infrastructure. A discussion of projected climate change in Cowlitz County and Washington State is provided in Section 5.8.2.4, *Existing and Future Conditions*.

5.8.1.2 Regulatory Setting

Laws and regulations relevant to greenhouse gases are summarized in Table 5.8-2.

[2] While additional greenhouse gases (HFCs, PFCs, SF_6) were considered for this analysis as per the Council on Environmental Quality (2016) guidance, carbon dioxide, methane, and nitrous oxide are the greenhouse gases emitted from the fossil fuel combustion and vegetation and wetland activities considered in the analysis.

Table 5.8-2. Regulations, Statutes, and Guidelines for Greenhouse Gases

Regulation, Statute, Guideline	Description
Federal	
Clean Air Act of 1963 (42 USC 7401) as amended	In 2007, the U.S. Supreme Court ruled that greenhouse gases are air pollutants under the Clean Air Act.
Carbon Pollution Emissions Guidelines for Existing Stationary Sources: Electric Utility Generating Units	In 2015, under the Clean Power Plan, EPA set state-specific target emissions reductions to reduce carbon dioxide emissions in the power sector by 32% below 2005 levels by 2030 (80 FR 64661).
United States Submittal to the United Nations Framework on Climate Change	U.S. and other nations submitted INDC to the United Nations in 2015.
State	
Limiting Greenhouse Gas Emissions (RCW 70.235)	Requires state to reduce overall greenhouse gas emissions as compared to a 1990 baseline and report emissions to the governor biannually. Specific goals include achieving 1990 greenhouse gas emissions levels by 2020; 25% below 1990 levels by 2035; and 50% below 1990 levels by 2050 or 70% below the State's expected emissions that year.
Washington Clean Air Act (RCW 70.94)	Establishes rules regarding preservation of air quality and penalties for violations. Carbon dioxide mitigation fees are evaluated as part of the permit required by the Clean Air Act (RCW 70.94.892) to reflect requirements from RCW 80.70. RCW 70.94.151 states that the department will be responsible for adopting rules requiring reporting of emissions defined by 70.235.010 from facility, source, site, or fossil fuel supplier that meet or exceed 10,000 metric tons of CO_2e annually.
Washington Carbon Pollution and Clean Energy Action (Executive Order 14-04, 2014)	In April 2014, Governor Inslee established the Governor's Carbon Emissions Reduction Taskforce to provide recommendations to the 2015 legislative session on the design and implementation of carbon emissions limits and market mechanisms program for Washington State. The task force delivered its findings in November 2014, noting that a harmonized, comprehensive emissions-based or price-based policy approach would add unique features to an overall carbon emissions reduction policy framework.
Washington Clean Air Rule (WAC 173-442)	Establishes requirements to cap and reduce greenhouse gas emissions. Parties covered under the Clean Air Rule are required to reduce their covered greenhouse gas emissions along an emissions reduction pathway by reducing their emissions or by obtaining emission reductions from other covered parties, in-state emissions reduction projects, or out-of-state emissions market (cap & trade) programs. The Clean Air Rule covers two-thirds of Washington's greenhouse gas emissions.

Regulation, Statute, Guideline	Description
Washington's Leadership on Climate Change (Executive Order 09-05, 2009)	In 2009, Governor Gregoire ordered the state to assess the effectiveness of various greenhouse gas reduction strategies by estimating emissions, quantifying necessary reductions, and identifying strategies and actions that could be used to meet the 2020 target. Assessments were done across multiple sectors and sources of emissions, including industrial facilities, the electricity sector, low-carbon fuel standards, vehicle miles traveled, coal plants, and forestry.
Path to a Low-Carbon Economy: An Interim Plan to Address Washington's Greenhouse Gas Emissions (2010)	The second Climate Comprehensive Plan report to the Governor and State Legislature outlines a plan to achieve emissions reductions to 1990 levels by 2020, as required by RCW 70.235.
Local	
No local laws or regulations apply to greenhouse gas emissions.	

Notes:
[a] Executive Office of the President 2013
USC = United States Code; EPA = U.S. Environmental Protection Agency; INDC = Intended Nationally Determined Contribution; FR = *Federal Register*; CO_2e = carbon dioxide equivalent; RCW = Revised Code of Washington

5.8.1.3 Study Area

The study area for greenhouse gas emissions for Cowlitz County, as a SEPA co-lead agency, is defined as Cowlitz County. For the Washington State Department of Ecology (Ecology) as a SEPA co-lead agency, greenhouse gas emissions were studied based on the expected transportation routes and emissions from the combustion of coal. While the study areas for the co-lead agencies are different, the analysis used the same approach to calculate greenhouse gas emissions attributable to the Proposed Action.

5.8.1.4 Methods

This section describes the sources of information and methods used to evaluate the greenhouse gas emissions associated with the construction and operation of the Proposed Action and the No-Action Alternative. The *SEPA Greenhouse Gas Emissions Technical Report* (ICF 2017a) provides detailed descriptions of the methods summarized below.

Information Sources

The following sources of information were used to identify the existing conditions relevant to greenhouse gas emissions in the study areas.

- *SEPA Coal Market Assessment Technical Report* (ICF 2017b) and emissions data used to evaluate the greenhouse gas emissions.
- *SEPA Air Quality Technical Report* (ICF 2017c)
- *SEPA Energy and Natural Resources Technical Report* (ICF 2017d)
- *SEPA Rail Transportation Technical Report* (ICF and Hellerworx 2017)
- *SEPA Vessel Transportation Technical Report* (ICF 2017f)

- *SEPA Vegetation Technical Report* (ICF 2017g)
- *SEPA Vehicle Transportation Technical Report* (ICF and DKS Associates 2017h)

To estimate the greenhouse gases emitted as a result of the activities and processes described in the above reports, the greenhouse gas analysis combined those reports' estimates of fuel consumption and vehicle operation with greenhouse gas emission factors to estimate greenhouse gas emissions for construction and operation aspects of the Proposed Action. The greenhouse gas emission factors were drawn from the following sources.

- *Appendix D: Emissions Estimation Methodology for Ocean-Going Vessels* (California Air Resources Board 2011)
- *Global Maritime Trade Lane Emissions Factors* (Clean Cargo Working Group 2014)
- *CO_2 Emission Factors for Coal Study for International Coals* (Energy Information Agency 1994)
- AP-42, Section 3.4, *Large Stationary Diesel and All Stationary Dual-fuel Engines* (U.S. Environmental Protection Agency 1996)
- *NONROAD Model (Non-road engines, equipment, and vehicles)* (U.S. Environmental Protection Agency 2009a)
- *Emission Factors for Locomotives* (U.S. Environmental Protection Agency 2009b)
- *MOVES (Motor Vehicle Emission Simulator)* (U.S. Environmental Protection Agency 2014)
- *U.S. Greenhouse Gas Inventory Report: 1990–2013* (U.S. Environmental Protection Agency 2015)
- *U.S. Greenhouse Gas Inventory Report: 1990–2014* (U.S. Environmental Protection Agency 2016b)
- *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (Intergovernmental Panel on Climate Change 2006)
- *Coal Mine Methane Country Profiles* (Global Methane Initiative 2015)
- *International Energy Statistics* (Energy Information Agency 2017)

Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and the No-Action Alternative on greenhouse gas emissions. This section also describes the method for estimating the greenhouse gas emissions associated with each emissions source.

Scope of the Analysis

The Proposed Action would emit greenhouse gases during construction and operation. Emissions in Cowlitz County would come predominantly from the combustion of fossil fuels for construction and operation of the Proposed Action. Emissions outside of Cowlitz County would also result from the changes due to rail and vessel transportation and combustion of coal, both domestically and internationally, related to the Proposed Action. This analysis includes activity data from the reports identified in Section 5.8.1.4, *Methods,* to estimate emissions in and outside of Cowlitz County. Additionally, this greenhouse gas analysis evaluates emissions scenarios based on the flow of coal to and through the coal export terminal.

Geographically, the analysis of greenhouse gas emissions from the Proposed Action includes emissions from the transport of Powder River Basin and Uinta Basin coals from mines to the coal export terminal in Cowlitz County, final transport to Asia, and the end-use combustion of coal in Asia. The analysis also considers changes in coal combustion and emissions elsewhere that could occur when imported coal from the Proposed Action substitutes other coal. The substitution of natural gas for coal in the United States because of an increase in domestic coal prices is also evaluated. The greenhouse gas emissions analysis considers the following elements.

- **Analysis period.** To be consistent with activity data from the other technical reports prepared for the Proposed Action, this analysis considers construction, operation, rail and vessel transport, and fossil fuel combustion emissions from 2018 through 2038.
- **Emissions in Cowlitz County.** Greenhouse gas emissions in Cowlitz County are estimated for the construction and operation of the Proposed Action. These are described in *Method for Impact Analysis*, *Sources of Emissions in Cowlitz County*. Greenhouse gas emissions are measured in CO_2e, which is based on the global warming potential factors consistent with the Intergovernmental Panel on Climate Change Fourth Assessment Report (2007) for carbon dioxide, methane, and nitrous oxide.[3]
- **Emissions outside of Cowlitz County.** Greenhouse gas emissions from the Proposed Action outside of Cowlitz County are estimated. These are described below in *Method for Impact Analysis*, *Emissions Outside of Cowlitz County*. Greenhouse gas emissions calculations are characterized in terms of CO_2e.
- **Induced demand for energy.** This analysis addresses coal combustion in Asia that would result from the increased supply of coal related to the Proposed Action. As described in the *SEPA Coal Market Assessment Technical Report*, the addition of 44 million metric tons of coal to the Asian market would increase supply and lower international coal prices. Asian coal markets would respond to lower prices by consuming more coal overall. This additional demand for coal that would result from more supply and lower prices is referred to as induced demand.
- **Displacement of other energy sources.** Coal transported through the coal export terminal could displace other energy sources, nationally and internationally. Depending on the scenario, coal transported through the terminal could affect coal production in Australia, China, Canada, India, Indonesia, Russia, and South Africa, and could affect coal consumption throughout Asia. Conversely, in the United States, natural gas could be used as a substitute for coal combustion. The analysis of greenhouse gas emissions considers this displacement.
- **Coal market assessment scenarios.** Each coal market assessment scenario represents a range of greenhouse gas emissions estimates, based on economic and policy projections through 2040. For each scenario, the greenhouse gas emissions from Asian coal combustion, U.S. coal combustion, and U.S. natural gas combustion are influenced by factors such as coal prices, transportation costs, demand for thermal coal, U.S. and international climate policies, and competing energy sources. Estimates of coal transport, coal consumption, and natural gas substitution are informed by projections in the *SEPA Coal Market Assessment Technical Report*, which considers four scenarios based on economic and policy projections through 2040. The scenarios represent a range of greenhouse gas emissions estimates determined using a

[3] The U.S. Greenhouse Gas Emissions Inventory covers six greenhouse gases; however, since the Proposed Action does not include refrigeration or other actions that would influence fluorinated gases, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride were not included in the estimate of greenhouse gas emissions.

multidimensional model. The four scenarios and their key concepts are described below. The four scenarios were compared against a baseline representing conditions where the Proposed Action would not be built.

- **2015 U.S. and International Energy Policy Scenario.** The 2015 U.S. and International Energy Policy scenario includes U.S. and international climate policies as the defining feature of this scenario. The U.S. climate policy is modeled using a representation of the Clean Power Plan. The final Clean Power Plan was released in August 2015.[4] The international climate policy is modeled by using the international coal demand in the International Energy Agency's 2015 World Energy Outlook New Policies scenario.[5] This scenario more accurately reflects current global conditions compared to the other scenarios and is the preferred scenario for the co-lead agencies for purposes of this analysis.
- **No Clean Power Plan Scenario.** The No Clean Power Plan scenario represents the state of the energy markets as of 2016. It does not include implementation of the Clean Power Plan. The No Clean Power Plan scenario uses the base set of assumptions and assumes that no additional national or international climate policies will be enacted beyond those implemented by mid-2015.
- **Lower Bound Scenario.** The Lower Bound scenario represents a plausible low estimate of global CO_2 emissions from coal combustion. This scenario is designed to be a plausible and reasonable lower bound of global CO_2 emissions and does not attempt to model an absolute lowest bound of CO_2 emissions. The energy markets under the Lower Bound scenario could reflect a large component of renewable energy resulting in reduced demand for coal combustion.
- **Upper Bound Scenario.** The Upper Bound scenario represents an upper bound estimate of global CO_2 emissions from coal combustion and uses assumptions that could maximize the amount of induced demand from the Proposed Action. International coal plant construction and thus coal demand is assumed higher in this scenario than in all the other scenarios. This higher demand causes both international coal consumption and prices to increase. This scenario does not attempt to model an absolute upper bound of global CO_2 emissions or CO_2 emissions that would result from the Proposed Action.[6]

Table 5.8-3 summarizes the characteristics of the four scenarios. For each scenario, the table provides the following information.

- **Purpose:** the characteristics that the scenario is intended to represent.
- **U.S. coal markets:** the domestic coal market reaction to changes in supply and pricing.
- **Asian coal markets:** the international coal market reaction to changes in supply and pricing.
- **Coal prices:** the increases and decreases in coal production and transportation costs relative to the No Clean Power Plan scenario. Coal prices are modeled relative to the No Clean Power Plan

[4] On August 3, 2015, EPA released the final Clean Power Plan, which regulates CO_2 emissions from existing fossil fuel generation sources under Section 111(d) of the Clean Air Act.

[5] The 2015 World Energy Outlook New Policies scenario incorporates the policies and measures that affect energy markets that had been adopted by non-U.S. countries as of mid-2015 and other relevant intentions that have been announced, even when the precise implementing measures have not been fully defined.

[6] Due to uncertainty over future coal consumption trends, the coal market assessment constructed the Upper and Lower Bound scenarios to illustrate a broad range of outcomes but not the most extreme possibilities.

scenario rather than the other scenarios because it uses the base set of assumptions without modifications.

- **Climate policy:** climate policy considered for each scenario.

Method for Assembling an Emissions Time Series

Because greenhouse gases accumulate in the atmosphere, this assessment characterizes greenhouse gases over the full analysis period (2018 through 2038) for each year as well as for each scenario. The analysis assumes construction of the coal export terminal would occur between 2018 and 2020. The analysis assumes the coal export terminal would become fully operational in 2021, and reach full capacity by 2028. The time series was estimated from existing data and assembled as follows.

- **Coal market assessment.** The greenhouse gas analysis uses modeling performed in multiple year increments including 2025, 2030, and 2040 provided by the *SEPA Coal Market Assessment Technical Report*. Therefore, since 2028 is not modeled, 2025 is initially modeled to include all 44 million metric tons of coal in 2025, and is scaled down proportionately. The years between 2025 and 2030 are then interpolated to develop annual greenhouse gas emissions from activity data for transport and greenhouse gas emissions from coal and natural gas combustion.
- **Activity data.** The activity data that characterize coal export terminal operations represent conditions in 2028, when the coal export terminal is expected to be fully operational. These data do not reflect the coal export terminal startup, in which the coal throughput increases from zero immediately after construction in 2020 to full capacity of 44 million metric tons of coal by 2028. Emissions estimates are proportional to throughput and can be expressed as emissions per unit of coal throughput.

Table 5.8-3. Coal Market Assessment Scenarios Definitions in Relation to the Baseline Assumptions

Scenario	Purpose	U.S. Coal Market Conditions (Relative to Base Assumptions)	Asian Coal Market Conditions (Relative to Base Assumptions)	Coal Prices (Relative to Base Assumptions)	Climate Policy
2015 U.S. and International Energy Policy	Represents impacts of an international climate policy on the coal market as proposed by mid-2015 and the Clean Power Plan	Coal consumption in the United States is lower due to implementation of the Clean Power Plan	Coal consumption is lower due to the implementation of greenhouse gas reduction policies	Both domestic and international coal prices are lower due to the lower overall coal demand	Climate policy resembling implementation of the Clean Power Plan and implementation of international greenhouse gas reduction policies proposed as of mid-2015
No Clean Power Plan	Represents the state of energy markets in the absence of new climate policies	No change from base assumptions	No change from base assumptions	No change from base assumptions	No climate policy implemented in the United States and only those international policies that have been fully implemented by mid-2015
Lower Bound	Represents energy markets where renewable penetration is high and international coal prices and demand are low, making domestic coal exports less attractive to international markets	Coal consumption in the United States is lower due to implementation of the Clean Power Plan and higher assumed Powder River Basin and Uinta Basin coal prices and rail transportation costs	• Lower assumed coal demand due to increased renewables • Lower coal prices due to lower demand	• Higher Powder River Basin and Uinta Basin coal prices due to assumed higher production costs • Lower international coal prices, due to assumed lower production costs	Climate policy resembling implementation of the Clean Power Plan and implementation of international greenhouse gas reduction policies announced as of mid-2015
Upper Bound	Represents energy markets where coal consumption is high, leading to high international demand and prices, making domestic coal exports more attractive to international markets	Higher coal demand due to lower Powder River Basin and Uinta Basin coal prices	Higher coal demand resulting in higher coal prices	• Lower Powder River Basin and Uinta Basin coal prices due to assumed lower production costs • Higher international coal prices due to increased demand and assumed higher production costs	No climate policy

5.8.1.5 Existing Conditions

This section describes the existing environmental conditions in the study areas related to greenhouse gas emissions that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

As discussed in Section 5.8.1.1, *Greenhouse Effect,* greenhouse gas emissions trap heat in the atmosphere and increase surface temperatures on the Earth, which contribute to global warming and climate change. The climate impacts of global warming include sea-level rise, changes in precipitation and snowpack patterns, ocean acidification, wildfire seasons, and fluctuations in surface temperatures.

In 2012, Washington State was responsible for contributing 92.0 million metric tons of CO_2e. Of that 2012 total for Washington State, 42.5 million metric tons of CO_2e (46.2%) are attributable to the transportation sector, and 12.1 million metric tons of CO_2e (13.2%) are attributable to coal combustion in the electricity sector (Washington State Department of Ecology 2016).

Near the project area, greenhouse gas emission sources include locomotives for rail traffic along the BNSF Spur (approximately seven trains per day), Reynolds Lead (approximately two trains per day), vehicular traffic on area roadways, ongoing operations of the existing bulk product terminal in the Applicant's leased area, and other industrial uses along the Columbia River. The *SEPA Greenhouse Gas Technical Report* provides estimates of selected greenhouse gas emissions near the project area.

Method for Impact Analysis

This section provides an overview of the method for calculating greenhouse gas emissions in the study areas for each source. More information about each method is described in the *SEPA Greenhouse Gas Emissions Technical Report*.

Sources of Emissions in Cowlitz County

As previously described, greenhouse gas emissions were estimated from construction, operation, and transportation in Cowlitz County. Changes in greenhouse gas emissions in Cowlitz County were calculated from the following activities related to the Proposed Action.

- **Upland and wetland land-cover change.** The Proposed Action during construction would clear vegetation and remove surface soil, both of which sequester carbon dioxide (remove carbon dioxide from the atmosphere).
- **Dock dredging during terminal construction and operations—sediment carbon.** Dock dredging operations during the construction and operations phase of the Proposed Action would release sediment carbon.
- **Coal export terminal construction.** The Proposed Action during construction would generate greenhouse gas emissions from operation of construction equipment and transport of employees and construction materials to the project area. Energy use from dock dredging during construction is also included in this category.
- **Employee commuting.** The Proposed Action during construction and operations would generate greenhouse gas emissions from construction workers commuting to and from the project area, and during operations, daily employee commuting to and from the project area.

- **Rail transport.** The Proposed Action during operations would require rail transport of coal in Cowlitz County and in the project area.
  - Rail transport in Cowlitz County to and from the coal export terminal on the BNSF Railway Company (BNSF) main line, BNSF Spur, and Reynolds Lead.
  - Rail operations in the project area, including emissions from movement, switching, and idling on site.
- **Vehicle-crossing delay.** The Proposed Action during operations would increase vehicle delay at at-grade rail crossings. Engine idling would generate greenhouse gas emissions.
- **Coal export terminal operation.** The Proposed Action during operations would generate greenhouse gas emissions from equipment such as loaders, maintenance vehicles, and cranes. Energy use from maintenance dock dredging during operations is also included.
- **Vessel idling and tugboat use at the coal export terminal.** The Proposed Action during operations would generate greenhouse gas emissions from vessel maneuvering into and then idling at the loading area. Additionally, tugboats assisting in vessel maneuvering would generate greenhouse gas emissions.
- **Vessel transport.** The Proposed Action during operations would generate greenhouse gas emissions from vessels transporting coal in Cowlitz County from the project area down the Columbia River to the border of Cowlitz County, and vessels traveling up the Columbia River to the project area.

Sources of Emissions Outside of Cowlitz County

To assess broader potential impacts on Washington State, changes in greenhouse gas emissions outside Cowlitz County were calculated from the following activities related to the Proposed Action.

- **Materials for coal export terminal construction.** Emissions associated with the production of materials used in the initial construction of the coal export terminal.
- **Rail transport.** The Proposed Action during operations would require rail transport from mines in the Powder River Basin in Montana and Wyoming and the Uinta Basin in Utah and Colorado to the project area (see Section 5.1, *Rail Transportation*, for expected routes for Proposed Action-related trains). Relative rail traffic by coal market scenario and year was determined based on the *SEPA Coal Market Assessment Technical Report*.
- **Coal export terminal electricity consumption.** The Proposed Action during operations would consume electricity, generating greenhouse gas emissions from fuel combustion emissions at off-site power plants.
- **Helicopter and pilot boat trips.** The Proposed Action during operations would generate greenhouse gas emissions from helicopter and pilot boat transfers along the Columbia River outside of Cowlitz County.
- **Vessel transport.** The Proposed Action during operations would generate greenhouse gas emissions from vessels transporting coal outside of Cowlitz County.
  - Vessel transport of coal in Washington State beyond Cowlitz County to 3 nautical miles past the mouth of the Columbia River.

- Vessel transport of coal in international waters to markets in China, Hong Kong, Japan, South Korea, and Taiwan and the estimated 40% of returning vessels with only ballast water based on an analysis of Automatic Identified System (AIS) data from 2016.

- **Market effects on coal combustion in Asia and the United States.** The Proposed Action would generate greenhouse gas emissions from Proposed Action-related coal combustion in the United States and the Pacific Basin.
- **Induced natural gas consumption in the United States.** The Proposed Action during operations would change greenhouse gas emissions due to changes in the coal market. As coal prices increase due to the increased demand for coal to export, natural gas consumption in the United States is expected to increase. While greenhouse gas emissions from coal combustion would decrease, emissions from natural gas combustion would increase.

5.8.1.6 Impacts

This section describes the greenhouse gas emissions that would result from construction and operation of the Proposed Action and the No-Action Alternative. Detailed emissions by scenario are available in the *SEPA Greenhouse Gas Emissions Technical Report* and *SEPA Coal Market Assessment Technical Report*.

Proposed Action

This section describes the greenhouse gas emissions that could occur in the study areas as a result of construction and operation of the Proposed Action.

Greenhouse gas emissions are presented as 2028 emissions (the assumed first year of full export capacity operation for the coal export terminal) and total net emissions over the 2018 through 2038 analysis period. The total net emissions are the sum of emissions for the total analysis period, including construction beginning in 2018 and operation of the Proposed Action through 2038.

This section presents the aggregated results for each of the emissions sources described in Section 5.8.1.4, *Methods*. Details of the emissions associated with each source are available in the *SEPA Greenhouse Gas Emissions Technical Report.*

Construction—Cowlitz County

Construction-related activities associated with the Proposed Action would result in greenhouse gas emissions of 27,812 metric tons of CO_2e in Cowlitz County for all scenarios as described below. As explained in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

Initial construction was assumed to occur over an 18-month period (2018 to 2020). Consequently, except for upland and wetland land-cover change and emissions from dock dredging, the total greenhouse gas construction-related emissions from 2018 to 2020 are 1.5 times the initial 12-month period (Table 5.8-4). For construction emissions from lost sequestration related to upland and wetland land-cover change, the emissions occur in the first year, while dock-dredging emissions are split evenly over 2 years. Construction-related greenhouse gas emissions would be the same across all four scenarios.

Table 5.8-4. Construction Greenhouse Gas Emissions within Cowlitz County (metric tons of CO_2e)[a]

Source	Scenario			
	2015 U.S. and International Energy Policy	Lower Bound	Upper Bound	No Clean Power Plan
Upland and Wetland Land-Cover Change ($MtCO_2e$)[b]				
Emissions During 12 Months of Construction Period	11,771	11,771	11,771	11,771
Total Emissions 2018–2020	11,821	11,821	11,821	11,821
Dock Dredging—Sediment Carbon ($MtCO_2e$)				
Emissions During 12 Months of Construction Period	1,919	1,919	1,919	1,919
Total Emissions 2018–2020[c]	3,838	3,838	3,838	3,838
Construction Equipment ($MtCO_2e$)				
Emissions During 12 Months of Construction Period	5,538	5,538	5,538	5,538
Total Emissions 2018–2020[c,d]	8,401	8,401	8,401	8,401
Construction Worker Commuting ($MtCO_2e$)				
Emissions During 12 Months of Construction Period	465	465	465	465
Total Emissions 2018–2020[d]	698	698	698	698
Construction Trucks ($MtCO_2e$)				
Emissions During 12 Months of Construction Period	1,081	1,081	1,081	1,081
Total Emissions 2018–2020[d]	1,621	1,621	1,621	1,621
Construction Barges ($MtCO_2e$)				
Emissions During 12 Months of Construction Period	955	955	955	955
Total Emissions 2018–2020[d]	1,433	1,433	1,433	1,433
Subtotal Construction Emissions ($MtCO_2e$)				
Emissions During 12 Months of Construction Period	21,729	21,729	21,729	21,729
Total Emissions, 2018–2020[d]	27,812	27,812	27,812	27,812

Notes:

[a] Greenhouse gas emissions are shown as metric tons of CO_2e because emissions within Cowlitz County are relatively small compared to emissions outside of Cowlitz County.

[b] Loss of accumulated carbon stocks during construction plus the loss of ongoing carbon sequestration.

[c] According to the Applicant, dredging during the construction period is expected to occur over two annual approved work periods to coincide with fish protection during the construction phase. Therefore, emissions during 12-month construction period are assumed to be half of the total emissions during the entire construction period from 2018–2020.

[d] Construction emissions occur over an 18-month period prior to the operation of the coal export terminal; therefore, emissions from 2021 through 2038 are zero. Given the 18-month period for construction, total construction emissions are those for the 12-month period multiplied by 1.5. Construction equipment also includes energy use from dredging; the apportioning methodology is detailed in note "c" above.

$MtCO_2e$ = metric tons of carbon dioxide equivalent

Construction—Outside of Cowlitz County

Construction-related activities associated with the Proposed Action would result in greenhouse gas emissions outside of Cowlitz County of 0.19 million metric tons of CO_2e for all scenarios. Construction-related activities outside of Cowlitz County include embedded greenhouse gas emissions from the materials used to construct the bulk export terminal.

Initial construction was assumed to occur over an 18-month period (2018 to 2020). Emissions from embedded greenhouse gas emissions in construction materials are apportioned throughout the construction period. Consequently, the total construction-related greenhouse gas emissions from 2018 to 2020 are 1.5 times the initial 12-month period (Table 5.8-5).

Construction greenhouse gas emissions would be the same across all four scenarios.

Table 5.8-5. Construction Greenhouse Gas Emissions Outside of Cowlitz County (million metric tons of CO_2e)

Source	Scenario			
	2015 U.S. and International Energy Policy	**Lower Bound**	**Upper Bound**	**No Clean Power Plan**
Materials for Coal Export Terminal Construction ($MMTCO_2e$)				
Emissions During 12 Months of Construction Period	0.12	0.12	0.12	0.12
Total Emissions 2018–2020[a]	0.19	0.19	0.19	0.19
Subtotal—Construction Emissions Outside of Cowlitz County ($MMTCO_2e$)				
Emissions During 12 Months of Construction Period	0.12	0.12	0.12	0.12
Total Emissions, 2018–2020[a]	0.19	0.19	0.19	0.19

Notes:
[a] Construction emissions occur over an 18-month period prior to the operation of the coal export terminal; therefore, emissions from 2021 through 2038 are zero. Given the 18-month period for construction, total construction emissions are those for the 12-month period multiplied by 1.5.
$MMtCO_2e$ = million metric tons of carbon dioxide equivalent

Operations—Cowlitz County

Operation of the Proposed Action would result in annual greenhouse gas emissions of between 39,628 and 39,640 metric tons of CO_2e in Cowlitz County for all scenarios. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

Greenhouse gas emissions in Cowlitz County during operations are primarily driven by rail transport of coal, vessel idling and tugboat use at the coal export terminal, and vessel transport of coal (Table 5.8-6). The greenhouse gas emissions are presented in terms of the 2028 emissions (the assumed first year of full export capacity operation for the coal export terminal) and total net emissions from 2021 (when export operation begins) to 2038. Greenhouse gas emissions in Cowlitz County would be the same across all four scenarios.

Table 5.8-6. Operations—Cowlitz County Greenhouse Gas Emissions (metric tons of CO_2e)[a]

	Scenario			
Source	**2015 U.S. and International Energy Policy**	**Lower Bound**	**Upper Bound**	**No Clean Power Plan**
Vegetation and Soil Removal ($MtCO_2e$)				
Annual Emissions, 2028	17	17	17	17
Total Emissions, 2021–2038	300	300	300	300
Dock Dredging—Sediment Carbon ($MtCO_2e$)				
Emissions During 12 Months of Construction Period	768	768	768	768
Total Emissions 2018–2020[a]	13,816	13,816	13,816	13,816
Rail Transport ($MtCO_2e$)				
Annual Emissions, 2028	21,862	21,862	21,850	21,862
Total Emissions, 2021–2038	311,811	312,023	311,506	312,023
Vehicle-Crossing Delay ($MtCO_2e$)				
Annual Emissions, 2028	171	171	171	171
Total Emissions, 2021–2038	2,439	2,439	2,439	2,439
Coal Export Terminal Equipment Operation ($MtCO_2e$)				
Annual Emissions, 2028	983	983	983	983
Total Emissions, 2021–2038	14,332	14,332	14,332	14,332
Vessel Idling and Tugboat Use at the Coal Export Terminal ($MtCO_2e$)				
Annual Emissions, 2028	7,338	7,338	7,338	7,338
Total Emissions, 2021–2038	104,740	104,740	104,740	104,740
Vessel Transport ($MtCO_2e$)				
Annual Emissions, 2028	8,227	8,227	8,227	8,227
Total Emissions, 2021–2038	117,417	117,417	117,417	117,417
Employee Commuting ($MtCO_2e$)				
Annual Emissions, 2028	275	275	275	275
Total Emissions, 2021–2038	3,922	3,922	3,922	3,922
Subtotal—Cowlitz County Emissions ($MtCO_2e$)				
Annual Emissions, 2028	39,640	39,640	39,628	39,640
Total Emissions, 2021–2038	568,778	568,990	568,472	568,990

Notes:

[a] Greenhouse gas emissions are shown as metric tons of CO_2e because emissions within Cowlitz County are relatively small compared to emissions outside of Cowlitz County.

$MtCO_2e$ = metric tons of carbon dioxide equivalent

Operations—Outside of Cowlitz County

For full coal export terminal operations in 2028, the Proposed Action would result in an annual increase in greenhouse gas emissions outside of Cowlitz County of 1.15 million metric tons of CO_2e for the preferred 2015 U.S. and International Energy Policy scenario. Operations-related activities are described in Chapter 2, *Project Objectives, Proposed Action*, *and Alternatives*.

Greenhouse gas emissions outside of Cowlitz County during operations are primarily driven by coal combustion in Asia and the United States, while international vessel transportation and domestic rail transportation are also large drivers of emissions (Table 5.8-7). The greenhouse gas emissions are presented in terms of the 2028 emissions (the first year of full export capacity operation for the coal export terminal) and total net emissions from 2021 (when export operation begins) to 2038.

Table 5.8-7. Operations—Emissions Outside of Cowlitz County (million metric tons of CO_2e)[a]

	Scenario			
Source	**2015 U.S. and International Energy Policy**	**Lower Bound**	**Upper Bound**	**No Clean Power Plan**
Rail Transport ($MMTCO_2e$)				
Annual Emissions, 2028	0.99	1.07	0.95	0.95
Total Emissions, 2021–2038	13.92	15.25	13.41	13.58
Coal Export Terminal Electricity Consumption ($MMTCO_2e$)				
Annual Emissions, 2028	<0.005	<0.005	<0.005	<0.005
Total Emissions, 2021–2038	<0.005	<0.005	<0.005	<0.005
Helicopter and Pilot Boat Trips ($MMTCO_2e$)				
Annual Emissions, 2028	<0.005	<0.005	<0.005	<0.005
Total Emissions, 2021–2038	0.01	0.01	0.01	0.01
Vessel Transport ($MMTCO_2e$)[b]				
Annual Emissions, 2028	1.02	1.14	1.13	0.94
Total Emissions, 2021–2038	15.31	16.31	17.01	13.47
Coal Combustion in Asia and the United States ($MMTCO_2e$)[b]				
Annual Emissions, 2028	-0.93	-8.48	52.92	1.83
Total Emissions, 2021–2038	-8.55	-101.44	749.46	23.91
Induced Natural Gas Consumption in the United States ($MMTCO_2e$)[b]				
Annual Emissions, 2028	0.07	2.42	-0.02	<0.005
Total Emissions, 2021–2038	0.89	27.78	-0.24	<0.005
Subtotal—Emissions Outside of Cowlitz County ($MMTCO_2e$)				
Annual Emissions, 2028	**1.15**	**-3.84**	**54.97**	**3.72**
Total Emissions, 2021–2038	**21.58**	**-42.09**	**779.64**	**50.97**

Notes:

[a] Emissions outside of Cowlitz County include U.S. domestic emissions and international emissions.

[b] Emissions for these sources are presented as net emissions. Net greenhouse emissions represent the difference between the Proposed Action and the no-action for each scenario as defined in the *SEPA Coal Market Assessment Technical Report*.

$MMTCO_2e$ = million metric tons of carbon dioxide equivalent

Total Greenhouse Gas Emissions

This section presents the aggregate results of each of the emissions sources described previously. The total emissions are the sum of emissions for the total analysis period, including construction beginning in 2018 and operation through 2038.

Table 5.8-8 shows the greenhouse gas emissions in Cowlitz County from construction and operation of the Proposed Action (Table 5.8-8) as 0.60 million metric tons of CO_2e over the analysis period. These emissions are approximately the same for each of the four scenarios, as they are emitted in proportion to throughput and are only influenced by outside economic factors. The largest contributors to the emissions are transportation-related emissions, including locomotive operation and vessel transport in Cowlitz County. Together, these two sources contribute about 72% of the emissions generated in Cowlitz County.

Table 5.8-8. Total Greenhouse Gas Emissions in Cowlitz County (million metric tons of CO_2e)

	Scenario			
Period	**2015 U.S. and International Energy Policy**	**Lower Bound**	**Upper Bound**	**No Clean Power Plan**
Annual Emissions, 2028 ($MMTCO_2e$)	0.04	0.04	0.04	0.04
Total Emissions, 2018–2038 ($MMTCO_2e$)	0.60	0.60	0.60	0.60

Notes:
$MMTCO_2e$ = million metric tons of carbon dioxide equivalent

Table 5.8-9 shows the annual greenhouse gas emissions in Washington State (not including Cowlitz County) in 2028 from transportation for the preferred 2015 U.S. and International Energy Policy scenario is 0.33 million metric tons of CO_2e. Emissions in Washington State (outside of Cowlitz County) are approximately nine times as high as emissions in Cowlitz County, largely driven by the greater distances traveled by trains and vessels outside of Cowlitz County. Rail transport constitutes about 97% of the emissions generated within Washington State and outside of Cowlitz County (Table 5.8-9).

Table 5.8-9. Total Greenhouse Gas Emissions in Washington State, Excluding Cowlitz County (million metric tons of CO_2e)

	Scenario			
Period	**2015 U.S. and International Energy Policy**	**Lower Bound**	**Upper Bound**	**No Clean Power Plan**
Annual Emissions, 2028	0.33	0.33	0.32	0.33
Total Emissions, 2018–2038	4.57	4.77	4.27	4.77

$MMTCO_2e$ = million metric tons of carbon dioxide equivalent

Table 5.8-10 summarizes the total *net*[7] greenhouse gas emissions for each scenario compared to the base conditions for each scenario. The net annual greenhouse gas emissions for the preferred 2015 U.S. and International Energy Policy scenario in analysis year 2028 are 1.19 million metric tons of CO_2e. The total net emissions for the preferred 2015 U.S. and International Energy Policy scenario during construction, initial operations, and full operations is described in more detail in the *Assessing Significance* subsection (Table 5.8-11).

Table 5.8-10. Total Net Emissions (million metric tons of CO_2e)[a]

	Scenario			
Period	**2015 U.S. and International Energy Policy**	**Lower Bound**	**Upper Bound**	**No Clean Power Plan**
Net Annual Emissions, 2028[b]	1.19	-3.80	55.01	3.76
Total Net Emissions, 2018–2038[b]	22.36	-41.31	780.42	51.75

Notes:

[a] Net greenhouse gas emissions represent the difference between each Proposed Action scenario and the no-action specific to each scenario in the *SEPA Coal Market Assessment Technical Report*.

[b] Scenarios where net emissions are negative are due to domestic coal displacement. For scenarios with positive net emissions, increases in emissions from Asian coal substitution, induced demand, domestic rail transportation, and international vessel transportation outweigh decreases in emissions from domestic coal displacement.

$MMTCO_2e$ = million metric tons of carbon dioxide equivalent

The uncertainty associated with estimating coal extraction emissions is high compared to other sources of emissions included in the analysis. Coal extraction emissions are driven by methane emissions from mining and post-mining operations (e.g., transportation and handling), where estimates can vary by as much as +/- 300% depending on the mining method (i.e., surface or underground), computation method, and data availability. Information on extraction emissions is disclosed in the *SEPA Greenhouse Gas Emissions Technical Report*.

[7] Net greenhouse gas emissions represent the difference between each Proposed Action scenario and the No-Action specific to each scenario in the *SEPA Coal Market Assessment Technical Report*.

Assessing Significance

The scenarios described in the *SEPA Coal Market Assessment Technical Report* identify a range of net emissions attributable to the Proposed Action. The 2015 U.S. and International Energy Policy scenario is intended to represent existing conditions under which the Proposed Action would operate. The 2015 U.S. and International Energy Policy is the most representative of current U.S. policy of the scenarios modeled, and consequently is the preferred scenario for the analysis (Table 5.8-11). The average net annual emissions during full operations for this scenario is an increase of 1.99 million metric tons CO_2e.

Table 5.8-11. Greenhouse Gas Emissions for the 2015 U.S. and International Energy Policy Scenario (million metric tons of CO_2e)

Phase	Years	Greenhouse Gas Emissions	Average Annual Emissions
Construction Emissions	2018–2020	0.21	0.07
Total Net Emissions for Initial Operation	2021–2027	0.30	0.04
Total Net Emissions for Full Operations	2028–2038	21.85	1.99
Total Emissions	**2018–2038**	**22.36**	

Notes:
$MMTCO_2e$ = million metric tons of carbon dioxide equivalent

The average annual amount of emissions for operations in Table 5.8-11 exceeds various intensity considerations that are proposed in federal and state regulations and guidance. For example, the Washington State Clean Air Rule establishes an initial compliance threshold for greenhouse gas emissions of 100,000 metric tons of CO_2e per year. Similarly, the EPA Tailoring Rule, 40 CFR Parts 51, 52, 70 et al. applies to sources that emit more than 75,000 short tons of CO_2e per year.

These standards provide guidance on assessing the significance of various levels of greenhouse gas emissions. Since the net greenhouse gas emissions attributable to the Proposed Action in the preferred scenario exceed these standards, the emissions are considered significant impacts. The climate change impacts resulting from this increase to greenhouse gases would persist for a long period, beyond the analysis period, and are considered permanent and, while global in nature, would affect Washington State. Based on these considerations, emissions attributable to operations of the Proposed Action under the 2015 U.S. and International Energy Policy scenario are considered adverse and significant.

Under the Proposed Action, 44 million metric tons of coal would pass through the coal export terminal at full operation. Downstream combustion emissions from this coal would be approximately 90 million tons of CO_2e per year. However, not all of the emissions are attributable to the Proposed Action because some of the coal being shipped from the coal export terminal could displace other coal shipped from other areas and change transportation pathways. According to model results for the preferred 2015 U.S. and International Energy Policy scenario, average annual net emissions from the Proposed Action at full operation would be approximately 2.2% (i.e., 1.99 million metric tons of CO_2e) of the combustion emissions from the coal that passes through the coal export terminal.

Market Effects on Coal Combustion and Emissions

The Applicant proposes to export up to 44 million metric tons of coal each year. Modeling was done to identify the changes in the coal markets and the resulting changes in potential greenhouse gas emissions that could be attributed to the Proposed Action. The changes in the market, transportation pathways, use of natural gas to replace coal, and other factors described previously and in the *SEPA Coal Market Assessment Technical Report*, will result in net changes of global greenhouse gas emissions.

The purpose of the coal market assessment is to identify how changes in the domestic and international coal prices affect the resulting net greenhouse gas emissions for each scenario. In summary, the Proposed Action would have the following market impacts, regardless of scenario.

- It would increase coal supplied to international markets.
- The increase in supply would decrease international coal prices.
- The decrease in international coal prices would increase the international demand for U.S. coal.
- The increase in international demand would increase U.S. coal prices.
- The increase in U.S. coal prices would reduce domestic coal demand.

Impacts on Coal and Natural Gas Combustion Relative to the No Clean Power Plan Scenario

The table below compares how coal and natural gas combustion change in response to market and policy conditions. The No Clean Power Plan scenario compares the emissions relative to the no-action, whereas the rest of the scenarios indicate whether emissions have increased or decreased relative to the no-action and then indicate whether the magnitude of this increase or decrease is greater than or less than the increase or decrease from the No Clean Power Plan scenario.

Scenario	U.S. Coal Combustion	Asian Coal Combustion	U.S. Natural Gas Combustion
No Clean Power Plan	Decrease in domestic coal emissions compared to the no-action due to slight decrease in coal consumption.	Increase in Asian coal emissions compared to the no-action due to the change in the mix of coal consumed.	Increase in domestic natural gas emissions compared to the no-action due to the slight decrease in coal consumption.
2015 U.S. and International Energy Policy	Decrease in domestic coal emissions compared to the no-action.	Increase in Asian coal emissions compared to the no-action.	Increase in domestic natural gas emissions compared to the no-action.
	Magnitude of decrease is greater than of the No Clean Power Plan due to greater sensitivity to coal price changes due to overall lower electric demand.	Magnitude of increase is less than that of the No Clean Power Plan due to a different mix of coals consumed.	Magnitude of increase is greater than that of the No Clean Power Plan due to the greater decrease in coal consumption.
Lower Bound	Decrease in domestic coal emissions compared to the no-action.	Decrease in Asian coal emissions compared to the no-action.	Increase in domestic natural gas emissions compared to the no-action.
	Magnitude of the decrease is greater than that of the No Clean Power Plan due to the higher assumed production costs in the Powder River Basin that result in higher coal prices in the Proposed Action that results in greater reduction of domestic coal consumption.	Magnitude of the decrease is less than in the No Clean Power Plan. In both scenarios the changes in Asian coal combustion emissions are due only to changes in the mix of coal consumed.	Magnitude of the increase in natural gas emissions is greater than in the No Clean Power Plan due to the greater reduction in coal consumption.
Upper Bound	Increase in domestic coal emissions compared to the no-action.	Increase in Asian coal emissions compared to the no-action.	Decrease in domestic natural gas emissions compared to the no-action.
	Magnitude of the decrease is greater than in the No Clean Power Plan scenario due to the higher overall demand for coal	Magnitude of the increase is greater than in the No Clean Power Plan scenario because the higher assumed production costs of international coal producers results in greater induced demand.	Magnitude of decrease is greater than in the No Clean Power Plan scenario because of the greater change in domestic coal consumption.

The largest contributor to net emissions is the extent to which coal and natural gas combustion are influenced in Asia and the United States. In the No Clean Power Plan and Lower Bound scenarios, the largest contributor to the net emissions is the displacement of coal combustion in the United States, driven by an increase in coal prices in response to the Proposed Action. Coal displacement results in a reduction of greenhouse gas emissions. In the Upper Bound scenario, the emissions induced demand from lower coal prices in Asia in response to the Proposed Action outweighs the emissions from domestic coal displacement, resulting in positive net emissions. For additional information on the impacts on the coal market and emissions across the four scenarios, see the *SEPA Greenhouse Gas Emissions Technical Report*.

No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

Alternative uses of the project area, as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*, would be expected to result in an estimated annual increase of 0.0012 million metric tons of CO_2e relative to current conditions in Cowlitz County for locomotive combustion, vessel combustion, and truck transport (Table 5.8-12).

Table 5.8-12. No-Action Alternative Annual Average Emissions from Rail, Vessel, and Haul Trucks Operating within Cowlitz County

Source	Maximum Annual Average Emissions (million metric tons of CO_2e)
Locomotive Combustion	0.0005
Vessel Combustion	0.0004
Haul Trucks	0.0002
Total	**0.0012**

5.8.1.7 Required Permits

No permits related to greenhouse gas emissions would be required for the Proposed Action.

5.8.1.8 Proposed Mitigation Measures

This section describes the mitigation measures that would reduce greenhouse gas emissions from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action and described below.

Applicant Mitigation

The Applicant will implement the following measures to mitigate greenhouse gas emissions.

MM GHG-1. Provide Fuel Efficiency Training to Equipment Operators.

To reduce greenhouse gas emissions from construction equipment, the Applicant will provide a fuel efficiency training program to locomotive, vessel, and construction equipment operators.

MM GHG-2. Implement an Anti-Idling Policy.

To reduce emissions from vessel and locomotive idling in the project area, the Applicant will implement an anti-idling policy.

MM GHG-3. Reduce Emissions from Cars.

The Applicant will evaluate the use of electric cars for company cars, incentivize the use of electric vehicles by providing charging stations, and develop an incentive program for carpooling.

MM GHG-4. Mitigate for Impacts on Washington State from Net Greenhouse Gas Emissions Attributable to the Proposed Action.

Under the 2015 U.S. and International Energy Policy scenario, which best reflects the current policy requirements and conditions, the average net greenhouse gas emissions for operations from 2028 to 2038 would be 1.99 million metric tons of CO_2e per year.

To address the potential impacts of greenhouse gas emissions attributable to the Proposed Action, the Applicant will prepare a greenhouse gas mitigation plan that mitigates for 100% of the greenhouse gas emissions identified in the 2015 U.S. and International Energy Policy scenario. For operations at maximum capacity this is 1.99 million metric tons CO_2e per year from 2028 through 2038. The plan must be approved by the Washington State Department of Ecology. For mitigation that occurs in Cowlitz County, the plan will be approved by Cowlitz County and Ecology. The plan must be ready to implement prior to the start of full operations. The measures described in the plan may include a range of mitigation options. The measures must achieve emissions reductions that are real, permanent, enforceable, verifiable, and additional. The emissions reductions may occur in Washington State or outside of Washington State but must be demonstrated to meet all five criteria (e.g., using internationally recognized protocols). For example, carbon credits could be purchased through existing carbon markets, or through on-site reductions achieved through efficiency measures or changes in technology.

5.8.1.9 Unavoidable and Significant Adverse Environmental Impacts

Implementation of the proposed mitigation measures described above would reduce impacts from greenhouse gas emissions and there would be no unavoidable and significant adverse environmental impacts from greenhouse gas emissions.

5.8.2 Climate Change Impacts on the Proposed Action

This section summarizes potential impacts *on* the study area that may occur from changes in climate such as increased flooding or changes in low water.[8] The impacts are evaluated in two categories: the potential impacts of climate change on the Proposed Action (e.g., impact of increased precipitation on the Proposed Action), and the impact of climate change on other resource areas to determine if it may modify the impacts of the Proposed Action. The study area includes the project area, access roads, and rail leading to the project area. The international scientific community is in agreement that human activities have contributed—and continue to contribute—to climate change. One of the primary causes of climate change is the emissions of greenhouse gases, which trap heat in the atmosphere. As discussed above, the Proposed Action would contribute to worldwide greenhouse gas emissions. Analysis of greenhouse gas emissions related to the Proposed Action and proposed mitigation measures from greenhouse emissions are discussed in Section 5.8.1, *Greenhouse Gas Emissions*. Studies have found, in general, that climate change could result in changes in precipitation, temperature, ocean acidification, and storm intensity and could increase risks of damage from flooding, drought, heat waves, winds, and storm surge. This section discusses existing and future conditions.

The changing climate could affect the Proposed Action and resources within the study area. This section describes potential climate change impacts in the study area related to the construction and operation of the Proposed Action and No-Action Alternative.

Greenhouse gases affect the atmosphere equally, regardless of where they are emitted, and thus they are global pollutants. A ton of CO_2 emissions in Asia affects the global atmosphere to the same degree as a ton of CO_2 emissions in the United States. The increase of greenhouse gas emissions in the atmosphere has been determined to pose risks to human and natural systems (Intergovernmental Panel on Climate Change 2014). Higher global surface temperatures cause widespread changes in the Earth's climate system. These changes may adversely affect weather patterns, biodiversity, human health, and infrastructure. The risk of increased impacts from natural variation is predicted to be incrementally magnified by climate change.

The 2016 CEQ greenhouse gas guidance stated, "It is now well established that rising global atmospheric greenhouse gas emissions concentrations are significantly affecting the Earth's climate." The guidance recommended agencies use projected greenhouse gas emissions as a proxy for assessing potential climate change effects for environmental reviews. It also recommended agencies quantify projected "direct and indirect GHG emissions, taking into account available data and GHG quantification tools that are suitable."

The net increase in greenhouse gas emissions under the preferred scenario identified in Section 5.8.1, *Greenhouse Gas Emissions,* would increase the risk and magnitude of projected climate change impacts. The potential climate change impacts from global climate change that would affect Cowlitz County and Washington State are described in this section.

[8] See Sections 5.8.1.3 through 5.8.1.6 for examination of greenhouse gas emissions from the Proposed Action.

5.8.2.1 Regulatory Setting

Laws and regulations relevant to climate change are summarized in Table 5.8-13.

Table 5.8-13. Regulations, Statutes, and Guidelines for Climate Change

Regulation, Statute, Guideline	Description
Federal	
Clean Air Act of 1963 (42 USC 7401)	Directs the control of air pollutants nationally. The U.S. Supreme Court in 2007 established that greenhouse gases are air pollutants, and are therefore covered under this Act.
State	
Requirements of Strategy—Initial Climate Change Response Strategy (RCW 43.21M.020)	Directs state agencies to develop an integrated climate change response strategy to enable state, tribal, and local governments and public and private organizations to prepare for and adapt to the impacts of changing climate conditions. Outlines strategies for protecting human health, safeguarding infrastructure and transportation systems, improving water management, reducing losses to agriculture and forestry, protecting sensitive and vulnerable species, and supporting communities by involving the public.
Washington State Growth Management Act (WAC 365-195-920, RCW 36.70A)	Requires state and local governments to use "best available science" when developing policies and development regulations. Suggests using adaptive management as an interim approach for managing scientific uncertainty.
Local	
No local laws or regulations apply to climate change.	

Notes:
USC = United States Code; RCW = Revised Code of Washington; WAC = Washington Administrative Code

5.8.2.2 Study Area

The study area for potential impacts from climate change effects is defined as the project area for the Proposed Action and the access roads and rail leading to the project area. The study area is the same as the study areas set for other specific resource areas.

5.8.2.3 Methods

This section describes the sources of information and methods used to identify projected changes in climate and to evaluate the impacts of climate change on the construction and operation of the Proposed Action and No-Action Alternative.

Information Sources

The following sources provided information on historical climate and projected changes in climate for southwestern Washington State.

- **National Climate Change Viewer.** The U.S. Geological Survey (USGS) National Climate Change Viewer (U.S. Geological Survey 2014a) contains historical and future climate projections at watershed, state, and county levels for the continental United States.

  The viewer contains multimodel ensemble data (mean model), combining the results from 30 independent climate models developed by researchers around the world under the coordination of the Fifth Coupled Model Intercomparison Project (CMIP5).[9] Multimodel data increase the robustness of projections and provide information on the level of uncertainty in the direction and magnitude of future climate trends. Climate information in the viewer has been *downscaled*, or processed using statistical analysis to provide projections with higher geographic resolution of temperature, precipitation, and snowfall. Historical values and future projections of temperature were examined for Cowlitz County where the Proposed Action would be located. Historical values and future projections of precipitation and snowfall were examined for the Lower Columbia River Basin.

- **2014 National Climate Assessment.** The 2014 National Climate Assessment was conducted by the U.S. Global Change Research Program (2014). This assessment summarizes the current and future impacts of climate change in the United States. Its findings, which have undergone extensive public and expert peer review, were compiled by a team of more than 300 experts guided by the 60-member Federal Advisory Committee of the National Academy of Sciences. The report uses multimodel ensemble projections developed under CMIP5, supplemented by information from an earlier phase of the project, CMIP3, where necessary.

Information on the potential impacts of climate change on resource areas was drawn from a diverse set of scientific literature, with reliance on two primary information sources:

- **2014 National Climate Assessment**. In addition to providing information on climate change projections, the National Climate Assessment also provides a summary of the potential impacts of climate change on a wide range of resource areas.
- **Climate Change Impacts and Adaptation in Washington State**. In 2013 the University of Washington produced a summary State of the Knowledge report on the likely effects of climate change on Washington State (University of Washington 2013). The report provides technical summaries detailing observed and projected changes for Washington's climate, water resources, forests, species and ecosystems, coasts and ocean, infrastructure, agriculture, and human health. The report draws from major international, United States, and Pacific Northwest assessment reports.

[9] CMIP5 is the fifth phase of the World Climate Research Programme's Coupled Model Intercomparison Project, which has established a standard set of simulations for coordinated climate experiments among international climate modeling groups. CMIP5 data are accessible over the internet and have been used in the Intergovernmental Panel on Climate Change's Fifth Assessment Report, an internationally vetted and authoritative report on global climate change. A list of the climate models can be found in Appendix 5 of the National Climate Change Viewer Tutorial (U.S. Geological Survey 2014b).

Impact Analysis

The following methods were used to evaluate the potential impacts of climate change on the Proposed Action.

For each potential climate change impact, this analysis determined how changes in climate could affect the Proposed Action or No-Action Alternative by comparing climate change projections against the following data.

- Historical records of relevant events or climate hazards.
- Current maps and risk or hazard indices (e.g., flood rate insurance maps, wildfire hazard maps).
- Established temperature or precipitation thresholds at which climate impacts are expected to become more severe.
- Information on engineering, design, and operational characteristics of the coal export terminal.

To evaluate how climate change may modify the impacts of the Proposed Action on the other resource areas, scientific literature on how climate change may impact resource areas (see key sources above) was coupled with information in the technical reports on the Proposed Action's impact on resource areas. Based on this information, a qualitative description of how climate change may exacerbate or alleviate the Proposed Action was developed.

5.8.2.4 Existing and Future Conditions

Temperatures have increased across the Pacific Northwest by 1.3 degrees Fahrenheit (°F) since 1895. Precipitation has increased but these increases are small and vary by location within the region. Under the changing climate, temperatures could rise by as much as 9.7°F by the end of the century. Future trends in average precipitation are uncertain and could increase or decrease, but summer precipitation is projected to decrease by as much as 30% by 2100.

The average snowpack over the Cascade Mountains has declined by about 20% since 1950. In the future, snowpack is expected to continue its downward trend, causing declines in snowmelt. Glaciers in the Cascades and Olympic Mountains are decreasing. According to Elsner et al. (2010), the snow water equivalent on April 1 could decline by almost half (46%) by the 2040s and virtually disappear by the 2080s, greatly reducing streamflow in some areas.

The incidence of extreme precipitation may have increased over time, but it has not yet been demonstrated to be statistically significant. It varies with location within the region. Under the changing climate in the Pacific Northwest, the number of days with daily rainfall greater than 1 inch could increase by 13% between 2041 and 2070.

Sea levels are rising but uplift of the land in parts of the Pacific Northwest mitigates possible impacts from sea-level rise. By contrast, areas around Puget Sound are subsiding and causing larger-than-average increases in sea levels. For the Pacific Northwest, sea-level rise is expected to be as little as 5 inches or less to greater than 4 feet by the end of the century. The impacts of the El Niño South Oscillation phenomenon on climate variability can be significant. During El Niño years, regional sea levels can increase by 4 to 12 inches and last for many months.

Climatic changes in precipitation could have far-reaching effects for the Pacific Northwest. Reduced summer rainfall and reductions in snowmelt could result in reduced streamflow. Increases in extreme precipitation could lead to increased flooding, especially in basins that derive their water from both rainfall and snowfall. Rising sea levels could also lead to flooding. Increasing temperatures and reduced precipitation could lead to an increase in wildfires, which are driven, in part, by water deficits. By the 2080s, the median area burned annually in the Pacific Northwest could quadruple compared to the 1916-to-2007 period (Mote et al. 2014).

Ocean acidification is the decrease of pH of ocean water over an extended period caused by the uptake of carbon dioxide from the atmosphere. This results in changes in seawater carbonate chemistry that can affect marine organisms such as shellfish. Biological impacts from ocean acidification are expected to vary but could be significant.

This section describes the historical and projected climate conditions in the study area that include changes in temperature, precipitation, and snowfall.

Historical and Projected Changes in Temperature

One of the most notable characteristics of climate change is the increase in temperatures over time.

Historical Temperatures

Washington State has a varied climate with significant differences in temperature and precipitation on the east and west sides of the Cascade Mountains. Temperatures across the Pacific Northwest have increased from 1895 to 2011 by 1.3°F (Mote et al. 2014). West of the Cascades, where the study area is located, the climate is characterized by mild temperatures and heavy annual precipitation. From 1950 to 2005, the highest monthly average temperatures in Cowlitz County were more than 75°F, cooler than Washington State as a whole (77.5°F) but warmer than the lower Columbia River Basin of which it is part (73.4°F). The highest monthly average temperature in Cowlitz County over this period was 77.2°F (August) (U.S. Geological Survey 2014a). In general, the lowest monthly average temperatures in Cowlitz County during winter were below 31.6°F from 1950 to 2005. The area has experienced a warming trend in the past 50 years; the annual average maximum temperatures have increased by 0.9°F (U.S. Geological Survey 2014a).

Projected Temperatures—Near-Term Future

In the near-term future (2025 to 2049), seasonal temperatures in the study area are projected to increase. In Cowlitz County, hot summer temperatures could rise by as much as 4.3°F in the high greenhouse gas emissions scenario from 2025 to 2049,[10] compared to baseline (U.S. Geological Survey 2014a). Cold winter temperatures are projected to increase by 2.4 to 3.0°F in moderate and high greenhouse gas emissions scenarios over this period.

Projected Temperatures—Midterm Future

The warming trend continues into the midterm future (2050 to 2075), when hot summer temperatures in Cowlitz County are projected to increase by 5.4 to 7.2°F. Coldest temperatures are expected to increase by as much as 5.2°F. These increases will likely bring the coldest temperatures near to or above the freezing point. While some models project higher or lower increases in temperature, all 30 models agree that temperatures will increase in Cowlitz County. Table 5.8-14 summarizes these historical and projected changes in temperature.

[10] Greenhouse gas scenarios are based on the flow of coal from mines through transport to export terminals, distribution to local and global markets, and combustion. Section 5.8.1, *Greenhouse Gas Emissions*, provides a discussion of these scenarios.

Table 5.8-14. Historical and Projected Changes in Temperature in Cowlitz County, Washington

Historical Climate and Observed Changes (1950–2005)	Near-Term Projected Changes (2025–2049 Compared to 1950–2005)	Midterm Projected Changes (2050–2075 Compared to 1950–2005)	Level of Certainty in Projections
The average monthly summer and winter temperatures (approximately 75°F and 32°F, respectively) reflect the moderate climate of the area.	Summer and winter temperature extremes are projected to increase.	Summer and winter temperature extremes are projected to increase.	There is excellent agreement across models on the direction of change.
Highest average monthly summer temperatures (top 10%, or 90th percentile) were above 75.0°F. Max monthly average temperature for August was 77.2°F.	90th percentile temperature is projected to increase by 3.8 to 4.3°F under moderate and high emissions scenarios.	90th percentile temperature is projected to increase by 5.4 to 7.2°F under moderate and high emissions scenarios.	Monthly average temperature is projected to increase in all months across all models compared to 1950–2005.
Lowest monthly average winter temperatures (10th percentile) were below 31.6°F.	10th percentile temperature is projected to increase by 2.4 to 3.0°F under moderate and high emissions scenarios.	10th percentile temperature is projected to increase by 4.0 to 5.2°F under moderate and high emissions.	Monthly average temperature is projected to increase in all months across all models compared to 1950–2005.

Historical and Projected Changes in Precipitation

Precipitation in the Pacific Northwest affects Columbia River water levels. The Columbia River is the fourth largest river in North America. It is influenced by multiple river basins from multiple states and British Columbia, Canada. The geographic and hydrologic characteristics of the river, which drains an approximately 259,000-square-mile basin, are suited to beneficial multipurpose storage development. Since the 1930s, numerous dams, both federal and private, have been built to store water for flood control, to generate hydroelectric power, and for other purposes. Total storage capacity of these dams is about 25% of the 156-million-acre-foot average annual runoff volume for the Columbia River at the mouth of the river at the Pacific Ocean. Federal projects in the basin have 19,900 megawatts of existing hydroelectric capacity, and non-federal projects add 10,700 megawatts (U.S. Army Corps of Engineers 2015).

The primary concerns about precipitation are whether there is enough precipitation (e.g., drought conditions), when it occurs (winter snowpack levels), and whether the precipitation is delivered in extreme events, which can cause significant damage.

Washington State defines drought as 75% of normal water conditions (Revised Code of Washington [RCW] 43.83B.400). In the past century, drought occurred from 1928 to 1932, 1992 to 1994, and 1996 to 1997, and most recently in 2015. Drought has caused shipping costs to rise, sometimes requiring wheat growers to move their product by rail or truck instead of barge transport. Washington State estimates that it will experience severe or extreme drought 5% of the time in the future and more frequently east of the Cascade Mountains (Washington State Emergency

Management Division 2012). The 2015 drought emergency affected all of Washington State (Washington State Department of Ecology 2015).

Extreme precipitation, especially during the winter, has frequently led to flooding events in the Pacific Northwest. Major flooding in western Washington in January 2009 closed Interstate 5, heavily damaged the Howard Hanson Dam, and put tens of thousands of people at risk. (Warner et al. 2012). A key driver of these precipitation events is the phenomenon of atmospheric rivers that form in the Pacific Ocean and move eastward toward the Pacific Northwest. In December 2015, an atmospheric river formed and made landfall along the Washington coast, resulting in approximately 16 inches of precipitation over 3 days across Oregon, Washington, and British Columbia. Although future trends in average precipitation are very uncertain and could increase or decrease, summer precipitation is projected to decrease significantly.

The incidence of extreme precipitation events may have increased over time, but it has not yet been demonstrated to be statistically significant. It varies with location within the region. Under the changing climate in the Pacific Northwest, the number of days with daily rainfall of more than 1 inch could increase by 13% from 2041 to 2070.

Historical Precipitation

According to the National Climate Assessment (Mote et al. 2014), the anticipated change in annual precipitation in the Pacific Northwest (2030 to 2059) ranges from decreases (-11%) to increases (+12%) for scenarios ranging from low to high greenhouse gas emissions (Intergovernmental Panel on Climate Change 2000). This variability makes the analysis of potential impacts problematic. Typically, average monthly precipitation is greatest in winter (December through February) and least in summer (June through August) (U.S. Geological Survey 2014a). From 1950 to 2005, precipitation in the lower Columbia River Basin averaged 0.40 inch per day in winter (U.S. Geological Survey 2014a) and about half that in spring (0.22 inch) and fall (0.25 inch). By contrast, only 0.07 inch per day fell during the summer months.

Projected Precipitation—Near-Term Future

In the near term, the model indicates slight increases in the winter, spring, and fall compared to the 1950 to 2005 average. The largest increase in precipitation is projected to occur in fall (4.1 to 2.1%) and winter (2.3 to 4.8%). Very little increase is projected for the spring (0 to 1%) (U.S. Geological Survey 2014a). By contrast, summers in the near-term future are projected to become drier by 10 to 12%, although some climate models disagree and instead project that summer precipitation will remain the same or increase (U.S. Geological Survey 2014a). Overall, model agreement on precipitation is not strong. For example, in some cases, 19 models project decreases in June precipitation and 11 indicate increases for the near-term future. Agreement for the month of August, however, was closer, with 26 models showing decreases and only four demonstrating increases.

Projected Precipitation—Midterm Future

Similar changes are projected to continue in the midterm future: the winter, spring, and fall seasons could become wetter, while summers could become drier. In the lower Columbia River Basin, winter and fall precipitation levels are projected to increase by 4.9 to 7.1% and 3.6 to 1.5%, respectively, while spring levels remain relatively constant (0 to 1.8% increase) in moderate and high greenhouse gas emissions scenarios compared to the 1950 to 2005 average. Extreme precipitation events could increase by 5.0 to 6.1% in the near-term future and 6.1 to 8.0% in the midterm future (U.S.

Geological Survey 2014a), but studies of past trends in observed changes in extreme precipitation have yielded ambiguous results (Mote et al. 2014). Model discrepancies are similar with most models showing increases and others showing decreases. Table 5.8-15Table 5.8-15 summarizes these historical and projected changes in precipitation.

Table 5.8-15. Historical and Projected Changes in Precipitation in the Lower Columbia River Basin

Historical Climate and Observed Changes (1950–2005)	Near-Term Projected Changes (2025–2049 Compared to 1950–2005)	Midterm Projected Changes (2050–2075 Compared to 1950–2005)	Level of Certainty in Projections
Average annual precipitation was 0.24 inch/day.	Wetter winter, spring, and fall seasons; possible drier summers.	Wetter winter, spring, and fall seasons; possible drier summers.	Some models show increases in precipitation while others show decreases. Incidence of extreme precipitation is more likely to increase.
The highest (90th percentile) monthly average precipitation was 0.43 inch/day.	Change in average precipitation by season under moderate and high emissions scenarios. Winter: +2 to 5% Spring: 0 to +1% Summer: -10 to -12% Fall: +4 to +2%	Change in average precipitation by under moderate and high emissions scenarios Winter: +5 to +7% Spring: +0 to +2% Summer: -10 to -16% Fall: +4 to +2%	A majority of models (18 to 26 of 30, depending on the scenario and timeframe) project that precipitation will decrease in the summer.
The lowest (10th percentile) monthly average precipitation was 0.06 inch/day.	Intensity of extreme precipitation could increase. 90th percentile precipitation is projected to increase by 5 to 6% under moderate and high emissions scenarios	Intensity of extreme precipitation could increase. 90th percentile precipitation is projected to increase by 6 to 8% under moderate and high emissions scenarios	Most models (20 of 30) project an increase in extreme precipitation.

Historical and Projected Changes in Snowpack

Melting snowpack from the Canadian Rockies and the Cascade Mountains provides much of the water flowing in the Columbia River. In contrast to the variable projections in overall precipitation, the anticipated changes in snowfall and snowpack are large and model agreement is very high. Significant projected declines in snowpack could greatly reduce stream flow in some areas.

Historical Snowfall

Average annual snowfall was 5.6 inches per month from 1950 to 2005. Average winter and spring snowfall, when virtually all snowfall occurs, was about 29.7 and 33.3 inches, respectively. However, since 1950, snowpack in the Pacific Northwest has declined by about 20%.

Projected Snowfall—Near-Term Future

Annual snowfall is expected to decline by 39 to 45% in the near-term future for the moderate and high greenhouse gas emissions scenarios. This substantial decrease is projected to occur within relatively narrow bands (winter: 33 to 40%; spring: 41 to 47%). All models indicate decreases in annual, winter, and spring snowfall (U.S. Geological Survey 2014a).

Projected Snowfall—Midterm Future

In the midterm future, declining snowfall is expected to intensify. Winter snowfall could decline by as much as 62% (ranging from 49 to 62% under the moderate and high emissions scenarios); spring snowfall could decrease by as much as 75% under the moderate emissions scenario and 68% under the high emissions scenario. All models agree that snowfall will decline over time. Table 5.8-16 summarizes these historical and projected changes in snowfall.

Table 5.8-16. Historical and Projected Changes in Snow in the Lower Columbia River Basin

Historical Climate and Observed Changes (1950–2005)	Near-Term Projected Changes (2025–2049 Compared to 1950–2005)	Midterm Projected Changes (2050–2075 Compared to 1950–2005)	Level of Certainty in Projections
Heaviest snowfall occurs in the winter and spring leading to high average annual snowfall totals	Average annual, winter, and spring snowfall will likely decline under the moderate and high emissions scenarios in the near term	Average annual, winter and spring snowfall will likely decline under the moderate and high emissions scenarios in the mid-term	All models agree on the direction of change
Average annual snowfall was 5.6 inches/month	Change in average monthly snowfall could decline by 39 to 45%	Change in average monthly snowfall could decline by 54 to 66%	All models agree on the direction of the change
Average winter and spring snowfall was 29.7 and 33.3 inches, respectively	Change in average winter and spring snowfall under moderate and high emissions scenarios • Winter: -33 to -40% • Spring: -41 to -47%	Change in average winter and spring snowfall under moderate and high emissions scenarios • Winter: -49 to -62% • Spring: -75 to -68%	All models agree that snowfall will decline in the winter and spring in near– and midterms

Sea-Level Rise

Sea levels are rising. However, some areas of the Pacific Northwest are experiencing uplift; by contrast, areas around Puget Sound are subsiding and experiencing larger-than-average impacts from rising sea levels. Sea-level rise along shorelines in the Pacific Northwest is expected to be as little as 5 inches or less to more than 4 feet by the end of the century. The impacts of the El Niño Southern Oscillation phenomenon on climate variability can be significant. During El Niño years, regional sea levels can increase by 4 to 12 inches and last for many months.

5.8.2.5 Impacts

This section describes the potential impacts related to climate change that could (1) affect construction and operation of the Proposed Action or No-Action Alternative in the study area (e.g., low water levels affecting ship movement) and (2) exacerbate or alleviate impacts to the surrounding area from the Proposed Action's construction and operations (e.g., warming temperatures will drive secondary aerosol formation, which when coupled with increased fossil fuel combustion from Proposed Action equipment use, will create greater air pollutant concentrations).

Proposed Action

This section describes the potential impacts of climate change on the construction and operation of the Proposed Action that could occur within the study area.

Cause Possible Service Disruptions from Low Water Levels

Changes to precipitation could have far-reaching effects for the Pacific Northwest. Reduced summer rainfall and reductions in snowmelt will probably result in reduced stream flow. This trend could cause tradeoffs among the many water uses, including transport, agriculture, recreation, and others. Decreased snowfall in the Lower Columbia River Basin, especially in the winter and spring, coupled with potential declines in rainfall in the summer could lead to abnormally low levels of water in the Columbia River. Low water levels could impede the passage of large ships to and from the docks at the project area.

Proposed Action-related Panamax ships would berth at two docks (Docks 2 and 3) to receive coal shipments. Panamax ships are midsized cargo ships, the largest that could fit through the Panama Canal prior to expansion. They have a capacity of 60,000- to 100,000-deadweight tonnage and require a draft of 42 to 49 feet. The depth of the Columbia River at the project area varies by season. If precipitation from snow and rain cause Columbia River water levels to decline, shipping could be restricted or more dredging could be required more frequently.

The Columbia River at the project area experiences tidal fluctuation, although less than at the mouth of the river. Tidal forces could replace some or all of the water needed for ship passage in the event of low runoff from reduced snowmelt and rainfall. The potential for low water disruptions could also be reduced by future sea-level rise. However, because the project area is approximately 50 miles inland from the Columbia River estuary and protected by levees, the impact of sea-level rise at the project area is expected to be minimal. The Columbia River is also highly managed to provide water for multiple competing uses. For example, low water levels upstream of the project area have constrained recreational boating at times.

Cause Possible Damage and Service Disruptions from Flooding

Potential precipitation increases and intense downpours could cause flooding in basins that derive their water from both rainfall and snowfall, such as the Cowlitz River or Columbia River. Rising sea levels could also lead to flooding of public and private property, roads, and railways.

Water levels in the Columbia River vary by season and year, depending on the snow mass in the upper watershed. Historic crests on the Columbia River range from 13 to 24 feet with flood stage at 13.5 feet. Historic crests on the Cowlitz River range from 21 to 29.5 feet and have been recorded well above flood stage (21 feet). Above 28.5 feet, major flooding is expected. This flood stage could overtop the levee and increase erosion (ICF 2017). The project area is on the Columbia River, about 5 miles from the confluence of the Columbia and Cowlitz Rivers (ICF 2017). The study area is protected from flooding by a levee maintained by the Consolidated Diking Improvement District (CDID) #1, which is 34 feet above the Columbia River Datum. It is also protected by a system of sloughs, ditches, and drains. The Federal Emergency Management Agency classifies the project area as Zone B in its Flood Insurance Rate Map, meaning the area has a 0.2% chance of flooding in any given year.

Under current conditions, flooding is expected to be minimal at the project area (ICF 2017). In the future, flooding could be of concern, particularly from the Cowlitz River. In August 2014, the U.S. Army Corps of Engineers found that sediment buildup on the Cowlitz River was increasing the potential for flooding. Without further action, the flood risk level on the river (0.6%) would be exceeded by 2018 (U.S. Army Corps of Engineers 2014). While future precipitation is somewhat uncertain, the mean model indicates increases in fall and winter precipitation for both the near and midterm futures, which could increase flood risk. Because the project area is approximately 50 miles inland from the Columbia River estuary, the main impact of sea-level rise at the project area is expected to be minimal, but sea-level rise could exacerbate the potential for flooding at discrete locations.

Additionally, wetlands provide an important buffer for absorbing increased runoff and river overflow during severe precipitation events. The project area currently includes almost 27 acres of natural wetland habitat. Under the Proposed Action, 24.10 acres would be permanently filled. The loss of these wetlands would cause a reduction in flood mitigation and stormwater treatment capacity.

The BNSF Spur and Reynolds Lead that would carry Proposed Action-related trains to the project area could be subjected to flooding. The rail line crosses the Cowlitz River near the confluence with the Columbia River and runs near the rivers for the 5 miles to the project area. Because historical and recent crests have been reported on the Cowlitz River, flood risk from sedimentation is increasing, and future precipitation could increase, flooding of the Reynolds Lead is possible. Cowlitz River flooding at this location would likely disrupt rail and terminal operations, and ballast supporting the rail line could be dislodged. Therefore, Proposed Action-related trains could be affected by a Cowlitz River flood.

Cause Possible Service Disruptions from Wildfires

Wildfire is a threat in Washington State. Cowlitz County is considered a high-risk area (Washington State Emergency Planning Division 2012c). A wildfire could affect the project area from the undeveloped areas adjacent to the project area or a Proposed Action-related train in the study area. Wildfires in Cowlitz County numbered more than 350 from 2004 to 2013, burning more than 561 acres. In late summer and early fall, dry easterly winds can produce extreme fire conditions. This threat has increased over time because of four climate-related factors: earlier snowmelt, higher summer temperatures, longer fire season, and an expanded vulnerable area of high-elevation forests (Washington State Emergency Planning Division 2012c). Increasing temperatures, extreme heat events, and drought could have an effect on fire regimes in Washington State by influencing the length of the fire season and contributing to drier conditions and the availability of readily combustible fuel for fires (Mote et al. 2014). By the 2080s, the median area burned annually in the Pacific Northwest could quadruple compared to the 1916 to 2007 period (Mote et al. 2014).

Maximum temperatures are predicted to increase while summer precipitation is predicted to decrease in the study area, although there is some disagreement among the models, and some indicate that summers could become slightly wetter. Hotter and drier summers would increase the likelihood of wildfires.

The impacts from construction and operations of the Proposed Action could be compounded by climate change. The following subsections qualitatively examine climate change effects on other resource areas to determine instances where the environment could be modified by the effects of climate change.

Potential for Increased Risk of Strain on Fire Protection Services

As described in Chapter 3, Section 3.2, *Social and Community Resources*, construction and operation of the Proposed Action would place new demand on Cowlitz Fire & Rescue protection services. This demand could be compounded by the increasing risk of wildfires from warmer, drier conditions induced by climate change (University of Washington 2013). These conditions are specifically due to projected increases in global and regional average temperatures and reductions in summer precipitation volumes. However, fire risk in the project area would be addressed because the Applicant would be required to install fire and life safety systems in the project area according to fire code standards. These systems would be regularly inspected and maintained. The Applicant would also maintain a surface water storage pond with a reserve of 0.36 million gallons for fire suppression.

Potential for Increased Risk of Flooding to Cultural Resources

Potential climate change impacts associated with construction and operations of the Proposed Action could affect the CDID #1 levee, which is historically significant.

Climate change is expected to increase the frequency of heavy rainfall events throughout the Pacific Northwest, where the number of days with precipitation greater than 1 inch is expected to increase 13% by 2050 (University of Washington 2013). The Proposed Action would fill existing wetlands with impervious surfaces, reducing the area's natural capacity to control stormwater. The combination of projected increases in heavy precipitation events and the expansion of impervious surfaces has the potential to increase the amount of stormwater generated which would be collected, treated, stored, or discharged to the Columbia River. The Proposed Action would construct a new on-site stormwater capture and treatment system. The Applicant would operate the terminal under a National Pollutant Discharge Elimination System (NPDES) Industrial Stormwater Permit that would need to be issued for the Proposed Action. The NPDES permit would outline specific terms and conditions, and would be required to adhere to the terms and conditions of that permit, which would reduce the risk of impacts from climate change affecting the proposed export terminal, the Columbia River, or the CDID #1 levee.

Potential for Increased Risk of Erosion and Landslides

Climate change could affect geology and soils. For example, increases in the frequency of heavy precipitation events could result in high river flows and flooding and generate greater risks for riverside erosion and landslides. Sea-level rise could also increase the likelihood for flooding and erosion in the project area since the location is a tidally influenced segment of the river. However, the project area is within a federally designated diking district. Warming temperatures that create greater rainfall in place of typical snowfall upstream could alter the timing of seasonal flow conditions, such as the timing of spring high-flow events or summer low-flow periods (University of Washington 2013). Decreased rainfall in the spring and summer may increase the likelihood of wind-driven erosion of soils, due to changes in soil moisture content (U.S. Global Change Research Program 2014).

As described in Chapter 4, Section 4.1, *Geology and Soils*, the topography in the project area is relatively flat, minimizing the risk of landslides. While soils along the river have a high to moderate capacity for erosion, there is a slight risk for erosion on-site due to protective shoreline armoring, and the combination of a levee with a flat gradient. After construction is complete, the project area would be approximately 90% impervious surfaces, essentially eliminating any risk of erosion within the project area. The project area is near an active deep-seated landslide on the south flank of Mount Solo, but is more than 50 feet from its edge, which is the minimum distance required by the Cowlitz County Critical Areas Ordinance for landslide hazards. While periods of prolonged and intense rainfall (including multiyear periods) could activate this landslide, the extent to which climate change could potentially affect any shift in the landslide in terms of distances traveled or shifts in the leading edge of the landslide toward the project area cannot be predicted.

Potential for Increased Risk of Negative Water Quality Impacts

Climate change-induced impacts to local water quality from the Proposed Action would be associated with increased precipitation, combined with a decrease in local wetlands. Surface and groundwater resources could be affected by intense and sustained precipitation events that could overwhelm the stormwater facilities and inadvertently discharge untreated stormwater that could carry pollutants and debris, including coal dust, from the project area. Pollution that entered these local resources could degrade local water quality, which could affect aquatic and terrestrial species and aquatic habitats.

With reduced wetlands to capture and filter stormwater flows, and coal terminal operations producing potential contaminants, surface and groundwater resources could be vulnerable to greater pollution during flood events or periods of sustained precipitation. If not treated, polluted stormwater runoff could seep into the groundwater or discharge to surface waters and degrade water quality. However, the local soils have low permeability for both shallow and deep aquifers, which reduces the risk of polluted water reaching the groundwater table, as described in Chapter 4, Section 4.4, *Groundwater*. Further, stormwater generated within the project area would be collected, treated, and either stored on-site for re-use or discharged to the Columbia River. Stormwater discharged to the Columbia River would be treated to meet the NPDES permit requirements. The Applicant would be required to update the NPDES discharge permit every 5 years which would address future changes in stormwater and discharges.

Potential for Increased Risk of Invasive or Noxious Weed Proliferation

As described in Chapter 4, Section 4.6, *Vegetation*, construction of the Proposed Action would remove over 26 acres of non-wetland vegetation. Operations of the Proposed Action could result in the introduction of invasive or noxious weeds from trains or vessels calling to the project area, which could increase the risk of impacts to native vegetation in and directly adjacent to the project area. Further, climate change could result in conditions favorable to the growth of unwanted invasive or noxious weeds, which are adapted to the changing climate and may be well suited to colonizing highly disturbed areas.

Climate change can support the colonization of invasive species or noxious weeds, where changes in local conditions, such as variations in precipitation events and/or temperature, are more suitable to nonnative plants, which may have a greater adaptive capacity (Bradley et al. 2010). This combination of climate change and Proposed Action impacts could threaten native vegetation populations in and near the project area. However, even if climate change compounds the colonization of invasive species or noxious weeds, the Applicant would monitor for noxious weeds on disturbed land during construction and operations, which would limit the potential for noxious weeds to colonize the project area and disturbed areas adjacent to the project area. In addition, the Applicant would be required to prevent the potential establishment and spread of noxious weeds per Washington State noxious weed regulations (RCW 17.10).

Potential for Increased Strain on Fish Populations and Tribal Resources

As described in Chapter 4, Section 4.7, *Fish,* local fish populations are dependent on a sustained level of water quality, specific temperatures, specific habitat, and other environmental conditions, which may be at risk as climate change impacts are coupled with changes resulting from the Proposed Action. As described in Chapter 3, Section 3.5, *Tribal Resources*, tribal resources are also centered on local fish populations and the habitats that sustain them. Stress from the Proposed Action to fish populations, particularly salmonids, could be also be compounded by warming freshwater temperatures, and downstream ocean acidification effects that reduce salmonid prey, and could hinder growth and survival of native fish populations (University of Washington 2015).

Potential for Increased Risk of Wildlife Habitat Disruption and Population Strain

As described in Chapter 4, Section 4.8, *Wildlife*, the Proposed Action could disrupt local wildlife habitats during operations, which could be compounded by stressors to wildlife populations from climate change. Wildlife includes common species of birds, rodents, mammals, amphibians, reptiles, and invertebrates. Climate change could promote the proliferation of invasive wildlife species that have a higher adaptive capacity in Washington State and the Columbia River (University of Washington 2013).

Construction activities would alter or permanently remove 59 acres of aquatic habitat, and permanently remove 24.10 acres of wetland and 26.26 acres of upland terrestrial habitats. These impacts could disrupt normal wildlife behavior patterns. Climate change could further alter habitat conditions and wildlife species' life-cycle events through changes in seasonal weather patterns (i.e., changes in seasonal air and water temperatures, seasonal precipitation patterns) (U.S. Global Change Research Program 2014). Combined Proposed Action and potential climate change impacts may threaten native wildlife populations while promoting climatic shifts in weather and subsequent changes in habitat conditions that provide more suitable conditions to the proliferation of invasive species, which could have a greater capacity for adapting to these changed and variable conditions.

Potential for Increased Strain on Energy and Natural Resources

As described in Chapter 4, Section 4.9, *Energy and Natural Resources*, the coal export terminal would consume 6,624,000 kilowatt hours annually during operations, which represents an average of 4% of Cowlitz Public Utility District's (PUD's) electricity demand. Cowlitz PUD currently sources 82.5% of electricity from hydropower sources (Cowlitz Public Utility District 2016). Climate change is projected to intensify summer droughts in the Northwest through longer dry periods and increasing temperatures (U.S. Global Change Research Program 2014), which will reduce summer streamflows and limit the output of hydropower facilities (Seattle City Light 2015). Climate change will also reduce snowpack upstream of hydropower facilities and the project area due to higher average temperatures, creating greater risks for surface water shortages and reduced summer flows (University of Washington 2013).

Washington State depends heavily on hydropower for electricity. Approximately 75% of its electricity comes from hydropower generated by its systems of rivers and dams. The rivers also supply water for irrigation, municipalities, and industry. Drought-induced loss of hydropower could raise costs. As the supply of locally generated hydropower is reduced, utilities must seek additional sources of electricity, which could drive up electricity prices for construction and operation of the Proposed Action (Washington State Emergency Management Division 2012). As described in Chapter 4, Sections 4.2, *Surface Water and Floodplains,* and 4.4, *Groundwater*, the Proposed Action would increase on-site water demands. Total annual consumption of water is estimated at 3,387 acre-feet, where 89% would be sourced from existing groundwater wells and 11% from stormwater reuse facilities on-site; there would be no need for new wells. The existing groundwater wells draw from a deep aquifer with low permeability, reducing the capacity for natural recharge.

Climate change could induce longer, drier summers, which coupled with a decreasing snowpack may reduce river water levels during droughts, forcing local services to rely more on groundwater resources. Historically, the low permeability of the local aquifers and unaffected recharge from the Columbia River would make any groundwater recharge impacts from the Proposed Action negligible; however, the projected increase in the frequency and severity of droughts due to climate change could affect groundwater recharge. If groundwater recharge were to diminish due to an increase in the frequency and severity of droughts, any subsequent increased reliance on groundwater during times of drought could create greater risks for overdraft conditions, where groundwater is being withdrawn faster than it can be recharged. However, Proposed Action operations would withdraw groundwater under a state-approved water right which would avoid or limit such an impact from occurring. If climate change were to affect groundwater supply in the project area, the water rights adjudication process would likely address this issue. The adjudication process is key to resolving and preventing water conflicts of increasing water demands and water supply impacts of climate change.

Potential to Exacerbate Air Quality Impacts

As described in Section 5.6, *Air Quality*, air quality impacts reflect air pollutant emissions from the Proposed Action. Recent research has shown secondary aerosols are primarily driven by increasing temperatures and humidity (Hessberg et al. 2009). With rising average temperatures due to climate change, secondary organic aerosol formation could be accelerated. Secondary aerosols generate particulate matter concentrations from volatile organic compounds (VOCs).

During Proposed Action operations, increased VOC emissions will come from fossil fuel combustion due to equipment and vehicle use on-site. Warming temperatures from climate change could drive secondary aerosol formation, and when combined with greater local VOC emissions, could create increased air quality risks within and near the project area. Higher temperatures can also lead to increased ground level ozone formation, where VOCs and nitrous oxide emissions from equipment and vehicle use are precursors to this reaction (Union of Concerned Scientists 2011).

Prolonged summer droughts from climate change could create risks for wind erosion, which are a source of particulate matter. These droughts can also create greater risks of regional wildfires, which can affect air quality in the surrounding area through spiked particulate matter emissions. Drought effects may compound the air quality impacts associated with greater fossil fuel combustion from operations.

No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal and potential climate change impacts related to construction and operation of the Proposed Action would not occur. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses, including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

Ongoing and expanded operations in the project area would be affected by climate change as described for the Proposed Action. These impacts could include possible service disruptions from low water levels, flooding, and wildfires, as well as impacts to local resource areas.

5.8.2.6 Required Permits

No permits related to climate change would be required for the Proposed Action.

5.8.2.7 Proposed Mitigation Measures

Potential impacts on the Proposed Action project area from changes in climate, such as increased flooding or changes in precipitation are not considered significant and would not necessitate mitigation.[11] Proposed mitigation related to greenhouse gas emissions resulting from the Proposed Action are discussed in Section 5.8.1.8, *Proposed Mitigation Measures*.

5.8.2.8 Unavoidable and Significant Adverse Environmental Impacts

There would be no unavoidable and significant adverse environmental impacts on the Proposed Action project area from climate change.

[11] See Section 5.8.1.8, *Proposed Mitigation Measures*, for proposed mitigation measures to reduce impacts from greenhouse gas emissions attributable to the Proposed Action.

Chapter 6
Cumulative Impacts

6.1 Introduction

Cumulative impacts are impacts that would result from the incremental addition of the Proposed Action to the impacts from past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions that occur over time. The purpose of the cumulative impacts analysis is to ensure that decision-makers consider the full range of consequences for the Proposed Action, including the Proposed Action's incremental contribution to cumulative impacts on the environment.

This chapter describes the scope of the cumulative impacts analysis, including the regulatory setting and analysis methods. The reasonably foreseeable future actions considered are identified. The chapter then describes cumulative impacts that could result from construction and operation of the Proposed Action in combination with the reasonably foreseeable future actions. The contribution of the Proposed Action to potential cumulative impacts is summarized for each resource area examined in Chapters 3, 4, and 5 of this Final Environmental Impact Statement (Final EIS).

6.2 Scope of Cumulative Impacts Analysis

This section provides an overview of the regulatory setting; methods; study area; and past, present, and reasonably foreseeable future actions.

6.2.1 Regulatory Setting

This cumulative impacts analysis is prepared in accordance with the Washington State Environmental Policy Act (SEPA) (Chapter 43.21C Revised Code of Washington [RCW]), the SEPA Rules (Chapter 197-11-060 Washington Administrative Code [WAC]), and the *State Environmental Policy Act Handbook* (Washington State Department of Ecology 1998).

Additional guidance developed by the Council on Environmental Quality (CEQ) in the handbook entitled *Considering Cumulative Effects under the National Environmental Policy Act* (1997) was also considered where SEPA requirements are consistent with requirements of the National Environmental Policy Act (NEPA).

6.2.2 Methods

This analysis follows the guidance developed by CEQ for assessing cumulative effects. Based on CEQ guidance, the following guidelines were used to evaluate the cumulative impacts of construction and operation of the Proposed Action.

- Identify the resources with the potential to be adversely affected by the Proposed Action, as discussed in Chapters 3, 4, and 5 of this Final EIS.

- Consider other actions in relation to the geographic scope of the Proposed Action (i.e., those actions that would have effects in the same area as the Proposed Action).
- Consider other actions in relation to the temporal period of the Proposed Action (i.e., those actions that would have effects during the same time as the Proposed Action).
- Rely on the best available data at the time of analysis.

The cumulative impacts analysis year is 2038. This was selected as the analysis year because it is 20 years after the assumed start date for construction of the Proposed Action (2018) and 10 years after the Proposed Action would reach full operation (with a throughput of up to 44 million metric tons of coal per year). In addition, this analysis year conservatively accounts for future actions that may only be in the planning stages now but that can reasonably be expected to be operational in the future.

This cumulative analysis considers the impacts on the environment in 2038 resulting from the incremental impacts of the Proposed Action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal, state, local) or person (private citizen, nongovernment organization, corporation) undertakes the other actions. If the Proposed Action would not result in adverse impacts in a particular resource area, then it would not have the potential to contribute to cumulative impacts in that resource area and no cumulative analysis for the resource area is warranted.

Table 6-1 identifies the resource areas studied in this EIS, whether the Proposed Action would result in adverse impacts on the resource area and potentially contribute to cumulative impacts, and whether a qualitative or quantitative assessment of cumulative impacts was conducted for each resource area. The resource areas where the Proposed Action could contribute to cumulative impacts are assessed in Section 6.3, *Cumulative Impacts by Resource Area*.

Table 6-1. Resources Where the Proposed Action Potentially Contributes to Cumulative Impacts

Section	Environmental Resource Area	Adverse Impacts Resulting from Proposed Action and Potential for Cumulative Impacts?	Qualitative or Quantitative Analysis?
Chapter 3: Built Environment			
3.1	Land and Shoreline Use	Yes	Qualitative
3.2	Social and Community Resources	Yes	Qualitative
3.3	Aesthetics, Light, and Glare	Yes	Qualitative
3.4	Cultural Resources	Yes	Qualitative
3.5	Tribal Resources	Yes	Qualitative
3.6	Hazardous Materials	Yes	Qualitative
Chapter 4: Natural Environment			
4.1	Geology and Soils	Yes	Qualitative
4.2	Surface Water and Floodplains	Yes	Qualitative
4.3	Wetlands	Yes	Qualitative
4.4	Groundwater	No	Not Applicable[a]
4.5	Water Quality	Yes	Qualitative

Section	Environmental Resource Area	Adverse Impacts Resulting from Proposed Action and Potential for Cumulative Impacts?	Qualitative or Quantitative Analysis?
4.6	Vegetation	Yes	Qualitative
4.7	Fish	Yes	Qualitative
4.8	Wildlife	Yes	Qualitative
4.9	Energy and Natural Resources	Yes	Qualitative
Chapter 5: Operations			
5.1	Rail Transportation	Yes	Quantitative
5.2	Rail Safety	Yes	Quantitative
5.3	Vehicle Transportation	Yes	Quantitative
5.4	Vessel Transportation	Yes	Quantitative
5.5	Noise and Vibration	Yes	Quantitative
5.6	Air Quality	Yes	Quantitative
5.7	Coal Dust	Yes	Quantitative
5.8	Greenhouse Gas Emissions and Climate Change[b]	Yes	Quantitative

Notes:

[a] The Proposed Action would not result in adverse impacts on groundwater and would not have the potential to contribute to cumulative groundwater impacts.

[b] The climate change analysis presented in Chapter 5, Section 5.8.2, *Climate Change*, is a cumulative analysis of the impacts of climate change on the Proposed Action.

The resource-specific methods and assumptions described in the respective sections of Chapters 3, 4, and 5 of this EIS were used for the cumulative impacts analysis. A discussion of specific methods is provided for each of the resource areas where a quantitative assessment was conducted.

6.2.2.1 Study Area

The cumulative impacts study area is defined for each resource that would be affected by construction and operation of the Proposed Action. The cumulative impacts study area for each resource is defined in each resource section. The study areas are defined for each of the resources to identify potential cumulative impacts related to activities in the project area, and activities beyond the project area such as rail transportation, and vessel transportation to the extent these activities are within the study area.

6.2.2.2 Past and Present Actions

Past and present actions have contributed to the existing condition of resources at the project area, in the surrounding region, in the Columbia River, and along the rail route serving the project area. Past and present actions include prior industrial development in the project area, Applicant's leased area, and along the lower Columbia River, including the industrial facilities adjacent to the Applicant's leased area, developments at the Port of Longview, ongoing development at the Mint Farm Industrial Park, and changes to container shipping in the lower Columbia River. Other past and present actions include the development of transportation infrastructure, including the BNSF Railway Company (BNSF) main line, Reynolds Lead and BNSF Spur, Interstate 5 (I-5), State Route (SR) 432 (Industrial Way), and dredging of the Columbia River navigation channel, as well as the ongoing maintenance of this infrastructure. The relevant past and present actions are described in the existing conditions discussion for each respective resource section of Chapters 3, 4, and 5 of this Final EIS and accounted for in the impacts analyses.

6.2.2.3 Reasonably Foreseeable Future Actions

An inventory of reasonably foreseeable future actions that could contribute to cumulative impacts on resources analyzed for the Proposed Action (Figure 6-1 and Table 6-2) was developed. These actions are organized by the following types of projects.

- Potential bulk product export projects (excluding coal) that would introduce rail traffic and vessel traffic.[1]
- Potential coal export projects that would introduce rail traffic and vessel traffic.[1]
- Potential crude oil-by-rail projects that would introduce rail traffic and vessel traffic.[1]
- Potential projects that would result in local construction and operation activities in Cowlitz County, the City of Longview, and the City of Kelso.
- Potential projects that would modify existing railroad infrastructure expected to be used by Proposed Action-related trains (Reynolds Lead, BNSF Spur, and the BNSF main line routes in Washington State).

The locations of these projects are shown in Figure 6-1. These projects are referred to as the cumulative projects in this chapter.[2]

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[1] Rail traffic on the routes expected to be used by Proposed Action-related trains. Vessel traffic on the Columbia River between the project area and 3 nautical miles offshore.

[2] The cumulative projects were identified and analyzed for this Final EIS in December 2016.

Figure 6-1. Cumulative Project Locations

ID	Project Name
1	Contanda (Formerly Westway Expansion Project)
2	Renewable Energy Group Expansion Project
3	Vancouver Energy Project
4	Kalama Manufacturing and Marine Export Facility
5	Northwest Innovation Works, LLC
6	Vancouver Transportation Logistic Improvement Project
7	Columbia Pacific Bio-Refinery
8	Woodland Marine Terminal
9	Gateway Pacific Terminal
10	Fraser Surrey Docks
11	Westshore Expansion
12	TransAlta Coal Plant
13	Boardman Coal Plant
14	Barlow Point Master Plan
15	Kelso Martin's Bluff Rail Improvement Projects
16	Amtrak Cascades Passenger Rail Program
17	BNSF Main Line Improvement
18	SR 432 Rail Realignment and Highway Improvement Project
19	Reynolds Lead and BNSF Spur Improvements

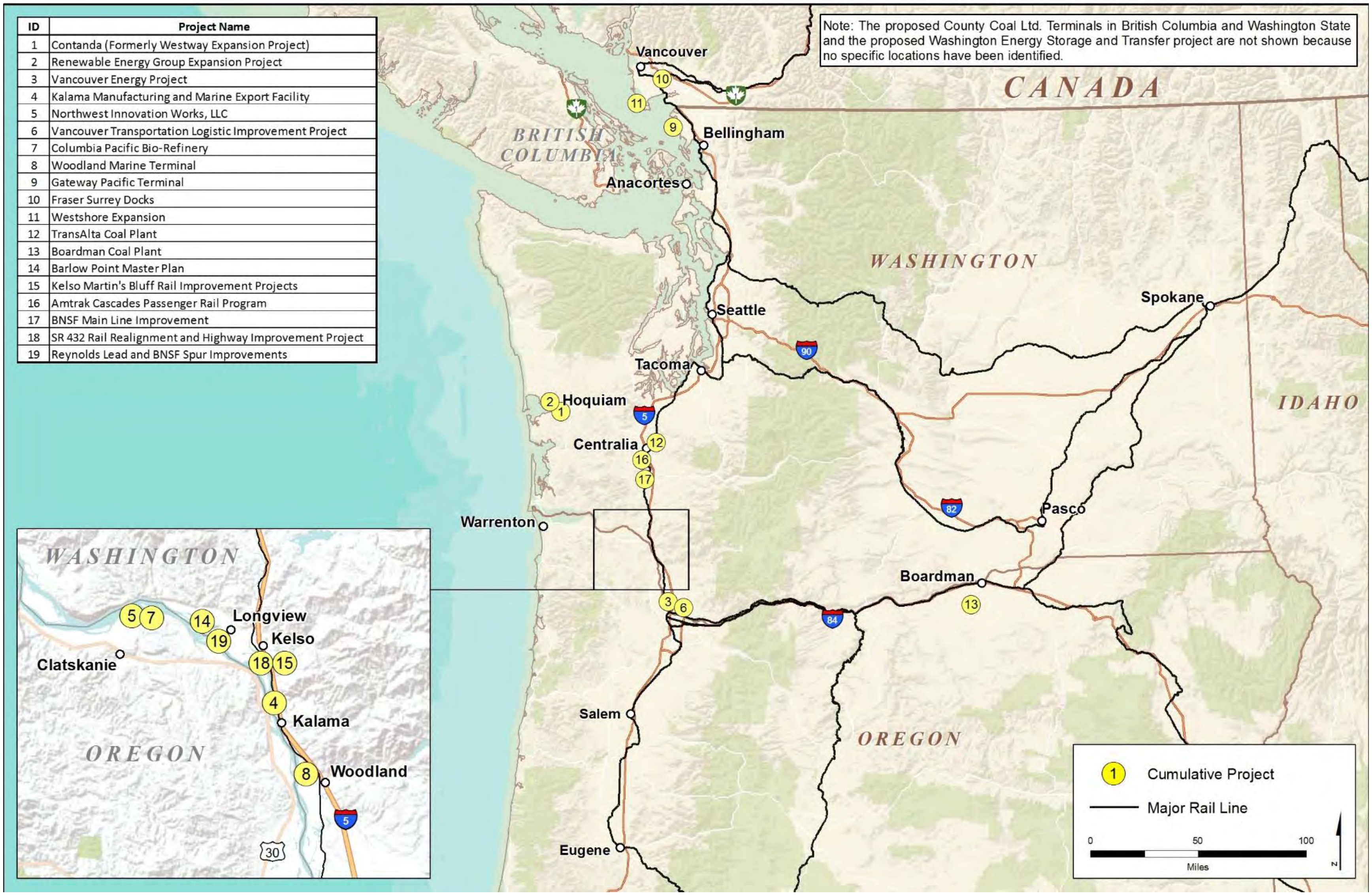


Table 6-2. Reasonably Foreseeable Future Actions (Cumulative Projects)

Project	Proponent	Location	Description	Contributing Activity[a]	Schedule/Status
Potential Bulk Product Projects: Rail Traffic (BNSF Main Line) and Vessel Traffic (Columbia River)					
1. Contanda (formerly Westway) Expansion Project	Contanda, LLC	Port of Grays Harbor, Terminal 1	Proposed expansion of existing bulk liquids terminal to handle and store crude oil. The proposed action would involve constructing additional storage tanks and expanding rail unloading capacity and vessel loading capacity on the site.	Proposed action would increase BNSF main line rail traffic in Washington State by an average of 1.25 train trips (loaded and unloaded) per day (458 train trips per year). No change to Columbia River vessel traffic.	Final EIS released in September 2016. Construction is anticipated to start in 2017 if permits are issued.
2. Renewable Energy Group Expansion Project (formerly Imperium Expansion Project)	Renewable Energy Group (REG)	Port of Grays Harbor, Terminal 1	Proposed expansion of existing bulk liquids terminal to handle and store ethanol, naphtha, gasoline, vacuum gas oil, jet fuel, no. 2 fuel oil, no. 6 fuel oil, kerosene, renewable jet fuel, renewable diesel, used cooking oil, and animal fat, in addition to currently permitted liquids, including biodiesel, petroleum diesel, vegetable oil, and methanol. The proposed action would involve constructing additional storage tanks and expanding rail unloading capacity and vessel loading capacity on the site.	Proposed action would increase BNSF main line rail traffic in Washington State by an average of 2 train trips (loaded and unloaded) per day (730 train trips per year). No change to Columbia River vessel traffic.	Draft EIS released in August 2015. REG is discussing changes to the proposal that may affect the number of train trips and project schedule.

Project	Proponent	Location	Description	Contributing Activity[a]	Schedule/Status
3. Vancouver Energy Project	Tesoro Savage Petroleum, LLC	Port of Vancouver, WA Berths 13 and 14	Proposed construction and operation of a crude-by-rail terminal capable of receiving an average of 360,000 barrels of crude oil per day, storing it, and loading it onto marine vessels.	Proposed action would increase BNSF main line rail traffic in Washington State by an average of 8 train trips (loaded and unloaded) per day (2,920 train trips per year) and vessel traffic in the Columbia River by 290 vessels (580 one-way transits) per year.	Draft EIS released in November 2015.
4. Kalama Manufacturing and Marine Export Facility	Northwest Innovation Works, LLC	Port of Kalama, WA	Proposed construction and operation of a natural gas-to-methanol production facility. Facility would manufacture, store, and ship methanol by vessel to global markets. Natural gas would be delivered via a pipeline lateral. The Port would construct a dock and would dredge to create a deep draft marine terminal on the Columbia River. Anticipated full operation would produce 3.6 million metric tons of methanol per year.	Proposed action would increase vessel traffic in the Columbia River by 36 to 72 vessels (72 to 144 one-way transits) per year.	Final EIS released September 2016. Construction is anticipated to begin in 2017 if permits are issued.

Project	Proponent	Location	Description	Contributing Activity[a]	Schedule/Status
5. Northwest Innovation Works Methanol Facility[b]	Northwest Innovation Works, LLC	Port Westward in Clatskanie, OR	Proposed construction and operation of a natural gas-to-methanol production facility on approximately 90 acres. Facility would manufacture, store, and ship methanol by vessel to global markets. Natural gas would be delivered to plant via transmission pipeline lateral. Port would construct a dock and dredge to create a deep draft marine terminal on the Columbia River. Anticipated full operation would produce 3.6 million metric tons of methanol per year.	Proposed action would increase vessel traffic in the Columbia River by 36 to 72 vessels (72 to 144 one-way transits) per year.	In permitting process.
6. Vancouver Transportation Logistic Improvement Project	NuStar Energy LP	Port of Vancouver, WA	Proposed retrofit of part of existing bulk product terminal to become a crude-by-rail or ethanol terminal, with an average throughput of up to 22,000 barrels of product per day. Facility would receive product by rail, then transfer it to marine vessels on the Columbia River.	Proposed action would increase BNSF main line rail traffic in Washington State by an average of 0.6 train trips (loaded and unloaded) per day and vessel traffic in the Columbia River by 18 vessels (36 one-way transits) per year.	In permitting process.
7. Columbia Pacific Bio-Refinery	Global Partners LP	Port Westward in Clatskanie, OR	Facility to transport crude oil and biofuel by rail, barges, or ships.	Operations would increase BNSF main line rail traffic in Washington State by an average of 0.6 train trip (loaded and unloaded) per day and vessel traffic in the Columbia River by 108 vessels (216 one-way transits) per year.	Permits issued and facility is operating.

Project	Proponent	Location	Description	Contributing Activity[a]	Schedule/Status
8. Woodland Marine Terminal	Columbia River Carbonates	Woodland, WA	Proposed construction and operation of a marine off-loading facility. Barges would transport raw calcium carbonate stone to facility where the stone would be stored and then hauled via truck to an existing CRC processing facility in Woodland, WA.	Proposed action would increase vessel traffic in the Columbia River by 24 vessels (48 one-way transits) per year.	Cowlitz County issued SEPA Mitigated Determination of Non-Significance (MDNS) on January 9, 2014, and SEPA Revised MDNS June 16, 2015. Construction is anticipated to start in 2018 if permits are issued.
Potential Coal Terminal Projects: Rail Traffic (BNSF Main Line in Washington State) and Vessel Traffic (Columbia River)					
9. Gateway Pacific Terminal	SSA Marine and BNSF	Cherry Point, WA	Proposed construction and operation of a deep-water marine terminal that would handle and export up to 54 million dry metric tons per year of bulk commodities, including 48 million metric tons of coal.	Proposed action would increase BNSF main line rail traffic in Washington State by an average of 18 train trips (loaded and unloaded) per day. No change to Columbia River vessel traffic.	Application withdrawn on February 7, 2017. Application was active when the cumulative analysis was completed.
10. Fraser Surrey Docks	Fraser Surrey Docks	Surrey, BC, Canada	Proposed change to existing terminal to handle coal, a new commodity, within its existing footprint. Proposal is for 4 million metric tons of coal annually, with potential for up to 8 million metric tons annually.	Proposed action would increase BNSF main line rail traffic in Washington State by an average of 6 train trips (loaded and unloaded) per day. No change to Columbia River vessel traffic.	Port Metro Vancouver issued permit on August 21, 2014. Amendment to permit issued on November 30, 2015, does not change volume of coal handled by terminal.
11. Westshore Terminals Expansion	Westshore Terminals Ltd.	Delta, BC, Canada	Proposed expansion of existing coal export facility to increase throughput by 3 million metric tons per year (from 33 million to 36 million).	Proposed action would increase BNSF main line rail traffic in Washington State by an average of 6 train trips (loaded and unloaded) per day. No change to Columbia River vessel traffic.	Renovations began in 2014, anticipated to be complete by 2018.

Project	Proponent	Location	Description	Contributing Activity[a]	Schedule/Status
12. TransAlta Coal Plant	Existing	Lewis County, WA	Closure of existing coal power plant. Currently receives coal from trains on the BNSF main line in Washington State.	Proposed action would remove trains on BNSF main line in Washington State by an average of 2.8 train trips (loaded and unloaded) per day. No change to Columbia River vessel traffic.	Reduced coal train traffic starting 2020; no coal trains in 2025.
13. Boardman Coal Plant	Existing	Morrow County, OR	Closure or conversion of existing coal power plant. Currently receives coal from trains that travel on the BNSF main line in Washington State.	Proposed action would remove coal trains on BNSF main line in Washington State and reduce BNSF main line rail traffic by an average of 2 train trips (loaded and unloaded) per day. No change to Columbia River vessel traffic.	Closure of the coal power plant scheduled for the end of 2020.
Potential Projects: City of Longview, City of Kelso, and Cowlitz County					
14. Barlow Point Master Plan Project	Port of Longview	Longview, WA	Master plan identifying high-level concepts of facilities, rail configuration, waterfront development, etc. for 280-acre site on Columbia River. Development concepts include multiuse, dry-bulk cargo loading, wharf improvements, storage areas, auto import/export, LNG terminals, biofuel import/blending/ processing/transfer, etc. Proposal to change comprehensive plan land use designation for Barlow Point from Mixed Use Residential/Commercial to Heavy Industry.	Local construction and operation. Potential for increased rail traffic. Potential for increased vessel traffic.	Longview City Council postponed action on land use designation proposal until the comprehensive plan update is completed.

Project	Proponent	Location	Description	Contributing Activity[a]	Schedule/Status
Potential Projects: BNSF Main Line Rail Infrastructure or Other Rail Infrastructure					
15. Kelso Martin's Bluff Rail Improvement Projects	Washington State Department of Transportation	Rail line between Kalama and Kelso/ Longview, WA	Project to improve reliability, efficiency, and frequency of service by reducing passenger rail scheduling conflicts with freight trains. Improvements include Task 5 improvements in Kalama (construct 4.1 miles of a third main line track; install high-speed turnouts; modify and upgrades signals) and Task 6 improvements from Kelso to Longview Junction (construct 3.7 miles of a third main line track; construct new bridge over Coweeman River; upgrade existing track with new higher-speed turnouts).	Improve freight and passenger rail operations on the BNSF main line between Kalama and Kelso/Longview.	In construction. Fall 2017 projected completion.
16. Amtrak Cascades Passenger Rail Program	Washington State Department of Transportation	Passenger rail route from Eugene, OR to Vancouver, BC. On the BNSF main line in southwest Washington.	Program of 20 projects to increase reliability, frequency, and speed of passenger rail on Amtrak Cascades. Improvements include: • New bypass and siding tracks to ease congestion • Multiple upgrades to existing track • Upgrades to advanced warning signal systems and safety-related projects • Station upgrades and expansions • Eight new locomotives	Potential for increased passenger rail traffic on BNSF main line (planned 8 additional round trips between Seattle and Portland; 2 round trips are funded).	Construction has begun for 12 projects and completed for 7 projects. Full completion of all projects in 2017.

Project	Proponent	Location	Description	Contributing Activity[a]	Schedule/Status
17. BNSF Main Line Improvements	BNSF	Statewide	Various rail improvements along BNSF main line routes in Washington State	Increased safety and capacity for rail traffic on BNSF main line routes in Washington State.	Work anticipated over the next 5 years.
18. SR 432 Rail Realignment and Highway Improvement Project	Cowlitz County, Cowlitz-Wahkiakum Council of Governments support from WSDOT, FHWA, BNSF, etc.	SR 432 and rail routes from I-5 to Barlow Point property (Port of Longview).	Proposed improvement of rail and highway systems along SR 432 to accommodate projected rail and vehicle growth. Improvements seek to address safety, traffic congestion, mobility, and capacity concerns. Tier 1 Priority improvement is to grade separate SR 432/SR 433 (Industrial Way/Oregon Way intersection).	Local construction and operation. May result in delays or disruption in vehicle travel during construction. Upon completion, would accommodate increased vehicle traffic.	NEPA EIS in process for Industrial Way/Oregon Way intersection.
19. Reynolds Lead and BNSF Spur Improvements	Longview Switching Company (LVSW)	Reynolds Lead and BNSF Spur	Project to improve Reynolds Lead and BNSF Spur if warranted by increased traffic. Project would include adding ballast, and replacing ties to improve safety and rail speed. LVSW would also install signals and upgrade the traffic control system and add an electric, remotely operated switch from the BNSF Spur to the Reynolds Lead to increase capacity on the line.	Increased safety, speed, and capacity for rail traffic.	Unknown

Project	Proponent	Location	Description	Contributing Activity[a]	Schedule/Status
Potential Projects: No Specific Proposal or Location					
20. County Coal Ltd. Terminals, BC[c]	County Coal Limited	British Columbia, Canada	Potential coal export terminal at undetermined location.	No anticipated contributing activity because there is no specific location or program for the proposal. If the proposed action proceeds, it could increase rail traffic on the BNSF main line in Washington State.	Unknown
21. County Coal Ltd. Terminals, WA[c]	County Coal Limited	Southwest Washington or northwest Oregon	Potential coal export terminal at undetermined location. Facility may also handle other commodities such as grain, potash, and LNG.	No anticipated contributing activity because there is no specific location or program for the proposal. If the proposed action proceeds, it could increase traffic on the BNSF main line in Washington State.	Unknown
22. Washington Energy Storage & Transfer[c]	Waterside Energy, LLC	Southwest Washington or northwest Oregon	Proposed construction and operation of liquefied petroleum gas (propane and butane) export facility.	No anticipated contributing activity because there is no specific location or program for the proposal. If the proposed action proceeds, it could increase traffic on the BNSF main line in Washington State.	Unknown

Notes:

[a] The terms *train trip* and *vessel transit* refer to a one-way trip (either inbound or outbound). Each train may make a loaded inbound trip and an unloaded outbound trip. A single vessel call to a marine terminal includes one inbound and one outbound transit.

[b] Northwest Innovation Works, LLC has proposed a project at Port Westward. The facility at this site is assumed similar in size and scope to the Kalama Manufacturing and Marine Export Facility.

[c] This project is included for informational purposes but is not assessed in the cumulative analysis because there is no specific location and/or proposal.

Sources: BNSF Railway 2014; City of Hoquiam and Washington State Department of Ecology 2016; City of Hoquiam and Washington State Department of Ecology 2015; City of Longview 2015; County Coal Limited 2014; Cowlitz County Department of Building and Planning 2015; Cowlitz-Wahkiakum Council of Governments 2014; Energy Facility Site Evaluation Council 2015; Environ International Corporation 2012; Florip 2015; Fraser Surrey Docks LP 2015; ICF 2017a; ICF and Hellerworx 2017; KPFF Consulting Engineers 2014; Learn 2011; Northwest Innovation Works 2016; Port of Kalama and Cowlitz County 2016; Vancouver Energy 2014; Vaughn 2016; Washington State Department of Ecology 2010; Washington State Department of Transportation 2015 and 2016; Whatcom County Planning and Development Services 2014.

SR = State Route

Tables 6-3 and 6-4 summarize the rail[3] and vessel traffic associated with the cumulative projects. Table 6-4 also provides the 2038 projected baseline vessel traffic in the Columbia River.

Table 6-3. Rail Traffic for the Cumulative Projects[a]

	Train Trips		
Project	**Daily**	**Weekly**	**Annual**
Contanda (formerly Westway Expansion Project)	1.25	8.75	458
REG Expansion Project	2	14	730
Vancouver Energy Project	8	56	2,920
Vancouver Transportation Logistic Improvement Project	0.6	4.2	219
Columbia Pacific Bio-Refinery	0.6	4.2	219
Gateway Pacific Terminal	18	126	6,570
Fraser Surrey Docks	6	42	2,190
Westshore Terminals Expansion	6	42	2,190
TransAlta Coal Plant	-2.8	-19.6	-1,022
Boardman Coal Plant	-2	-14	-730
Amtrak Cascades Passenger Rail Program	16	112	5,840
Total Rail Trips (rounded)	**54**	**376**	**19,584**

Notes:
This table does not include Proposed Action-related rail traffic.
[a] Train trips include loaded and unloaded trips. This table presents rail traffic for the cumulative projects only. It does not account for projected increases in rail traffic estimated in the *Washington State Rail Plan* (Washington State Department of Transportation 2014).

Table 6-4. Vessel Traffic for the Cumulative Projects[a]

Project	**Annual Vessel Calls[b]**	**Annual Vessel Transits[b]**
Vancouver Energy Project	290	580
Kalama Manufacturing and Marine Export Facility	54	108
Northwest Innovation Works Methanol Facility	54	108
Vancouver Transportation Logistic Improvement Project	18	36
Columbia Pacific Bio-Refinery	108	216
Woodland Marine Terminal	24	48
Total Cumulative Project Vessel Trips	**548**	**1,096**

Notes:
This table does not include Proposed Action-related vessel traffic.
[a] This table only includes future actions that would add vessel traffic to the Columbia River. Future actions that would add traffic to other waterways, such as Grays Harbor, are not relevant to this cumulative impacts analysis and are not summarized in the table.
[b] The maximum anticipated number of vessel calls and vessel transits is presented.

[3] It was assumed that all rail traffic for the cumulative projects was not included in the 2035 *Washington State Rail Plan* (Washington State Department of Transportation 2014) baseline estimates.

6.3 Cumulative Impacts by Resource Area

The following sections present potential cumulative impacts for the built environment, natural environment, and operations resources. The analysis discusses the potential impacts from the Proposed Action that could contribute to cumulative impacts.

6.3.1 Built Environment

This section presents potential cumulative impacts on the built environment resources.

6.3.1.1 Land and Shoreline Use

This section discusses potential cumulative impacts on land and shoreline use.

As discussed in Chapter 3, Section 3.1, *Land and Shoreline Use*, the Proposed Action would not result in direct or indirect land use impacts on parks and recreation facilities or agricultural uses. Therefore, the Proposed Action would not contribute to cumulative impacts on these resources and no cumulative impacts analysis is necessary.

Study Area

The cumulative impacts study area for land and shoreline use is the Longview-Kelso urban area and nearby unincorporated areas of Cowlitz County.[4]

The following cumulative projects are located in this study area: Barlow Point Master Plan Project, SR 432 Rail Realignment and Highway Improvement Project, Reynolds Lead and BNSF Spur Improvements, and the Kelso Martin's Bluff Rail Improvement Project.

Cumulative Impacts

Operation of the Proposed Action would result in a new industrial use that would be consistent with the land use character of the project area and the surrounding vicinity. Projects associated with the Barlow Point Master Plan Project would change the land use of the site to more intensive industrial uses or would provide transportation improvements to support industrial uses. Projects associated with the Barlow Point Master Plan Project would be accounted for in local land use planning through an amendment to the comprehensive plan land use designation for the site. Therefore, the Proposed Action and cumulative project would not contribute to cumulative impacts on land use.

The Proposed Action would result in new development in the shoreline area regulated by the Cowlitz County Shoreline Management Master Program (SMP). Projects associated with the Barlow Point Master Plan Project would be expected to result in new development in shoreline areas regulated by the Cowlitz County or City of Longview SMPs. The Proposed Action, in combination with this cumulative project, would contribute to cumulative impacts on shoreline use due to the development of new structures and uses in the shoreline area. These impacts would be permanent but would represent a small portion of the Columbia River shoreline area in the study area. The Proposed Action, in combination with this cumulative project, would be required to demonstrate

[4] This study area is the Longview-Kelso urban area as defined in the 2010 U.S. Census and adjusted to include the unincorporated areas of Cowlitz County adjacent to the project area, which are not part of the Census-defined urban area.

consistency with the policies and use regulations of the applicable local SMP and would require Shoreline Substantial Development Permits and, potentially, Conditional Use Permits.

6.3.1.2 Social and Community Resources

This section discusses potential cumulative impacts on social and community resources including impacts on social and community cohesion and public services, utilities, and minority and low-income populations.

Study Area

The cumulative impacts study area for social and community resources is Cowlitz County.

The following cumulative projects are located in this study area: Barlow Point Master Plan Project, the Kalama Manufacturing and Marine Export Facility, Woodland Marine Terminal, SR 432 Rail Realignment and Highway Improvement Project, Reynolds Lead and BNSF Spur Improvements, and the Kelso Martin's Bluff Rail Improvement Project.

Cumulative Impacts

The following section discusses each element of social and community resources and potential impacts from the Proposed Action and cumulative projects.

Social and Community Cohesion and Public Services

As discussed in Chapter 3, Section 3.2, *Social and Community Resources*, the Proposed Action would result in direct and indirect impacts on social and community cohesion and public services by placing new demands on fire protection services, affecting accessibility to community resources and public services, and increasing noise levels in Archie Anderson Park, Highlands Trail, and Gerhart Gardens Park.

The cumulative projects would not add rail traffic to the BNSF main line and BNSF Spur. Therefore, the cumulative impact of accessibility on community resources and public services from rail traffic on the Reynolds Lead and BNSF Spur would be the same as presented in Chapter 3, Section 3.2, *Social and Community Resources*. The cumulative projects would also not contribute to cumulative impacts on pedestrian or bicycle travel.

LVSW proposes improvements to the Reynolds Lead and BNSF Spur should it be warranted by increased rail traffic resulting from existing and future customers (Reynolds Lead and BNSF Spur Improvements Project). This project would increase train speeds on the Reynolds Lead and a portion of the BNSF Spur, which would decrease vehicle delay at the at-grade crossings. Decreased vehicle delay would contribute to a beneficial cumulative impact on social and community cohesion compared to the Reynolds Lead and BNSF Spur without improvements. Chapter 5, Section 5.3, *Vehicle Transportation*, addresses the vehicle delay at the crossings along the Reynolds Lead and BNSF Spur with and without improvements to the Reynolds Lead and BNSF Spur in 2028.

As discussed in Chapter 3, Section 3.2, *Social and Community Resources*, Proposed Action-related trains would increase rail traffic-related average daily noise levels in Archie Anderson Park, Highlands Trail, and Gerhart Gardens Park, all of which are located near the Reynolds Lead or BNSF Spur. As discussed in Section 6.3.3.5, *Noise and Vibration*, the cumulative projects would not increase average daily noise levels along the Reynolds Lead and BNSF Spur. Therefore, the cumulative projects would not contribute to cumulative noise impacts on Archie Anderson Park or Gerhart Gardens Park.

The Proposed Action would place new demands for fire protection services on Cowlitz 2 Fire & Rescue. It is expected that the cumulative projects in Cowlitz County would be served by other fire departments, such as the City of Longview Fire Department and Cowlitz County Fire District 5. Therefore, there would be a low potential for the Proposed Action to contribute to cumulative impacts on fire protection services.

The Proposed Action in combination with the cumulative projects would generate additional employment opportunities in Cowlitz County, which could increase the demand for housing and public services. According to U.S. Census Bureau 2009–2013 estimates, Cowlitz County has more than 3,500 vacant housing units, and employees of the Proposed Action and cumulative projects could reside anywhere in Cowlitz, Clark, Columbia, or Lewis Counties, based on current commute patterns. Some employees of the Proposed Action and cumulative projects would be drawn from existing residents in the area, and new demands for housing and public services would be distributed across a wide area. Therefore, there would be low potential for cumulative impacts related to increased demand for housing and public services.

Utilities

Operation of the Proposed Action would create new sanitary sewage flows to the Three Rivers Regional Wastewater Treatment Plant and result in a small increase in demand for potable water from the City of Longview water system. Construction and operation of the cumulative projects would also create new sanitary sewage flows and demands for potable water. It is expected that the cumulative projects would use the Three Rivers Regional Wastewater Treatment Plant and the City of Longview water system. As noted in Chapter 3, Section 3.2, *Social and Community Resources*, the Three Rivers Regional Wastewater Treatment Plant has a design capacity of 26.0 million gallons per day, compared to an average wet weather flow (typically the highest flow rate) of 3.04 million gallons per day, and with anticipated demand by 2038, would have sufficient capacity to treat additional wastewater flows. The cumulative projects would be required to obtain the applicable wastewater discharge permit from the Three Rivers Regional Wastewater Authority. This permit would include effluent limits, best management practices, and pretreatment standards to ensure that the Three Rivers Regional Wastewater Authority remains in compliance with its National Pollutant Discharge Elimination System (NPDES) permit. The cumulative projects would also be required to obtain the applicable utility service permit for water service from the City of Longview, which would allow the City of Longview to determine whether there is sufficient capacity to provide service. The City of Longview water supply has been designed to meet the service area's projected water demand through 2059. Therefore, while the Proposed Action and the cumulative projects would contribute to cumulative impacts related to increased demand for water and sewage utility services, these impacts would be minor because existing utility services are expected to be able to accommodate the increased demand.

Minority and Low-Income Populations

The analysis of environmental justice concluded the Proposed Action would result in disproportionately high and adverse effects on minority and low-income populations. Impacts would be related to horn noise from Proposed Action-related trains on the Reynolds Lead, vehicle delay along the Reynolds Lead, and diesel particulate matter inhalation risk from coal export terminal operations and Proposed Action-related trains along the Reynolds Lead. The cumulative projects would not add rail traffic to the Reynolds Lead, and would not contribute to increased rail traffic noise levels, increased vehicle delay from rail traffic, or diesel particulate matter from locomotive emissions. Therefore, rail traffic associated with the cumulative projects would not contribute to a cumulative impact on minority and low-income communities.

6.3.1.3 Aesthetics, Light, and Glare

This section discusses potential cumulative impacts on aesthetics, light, and glare.

Study Area

The cumulative impacts study area for aesthetics, light, and glare is the project area viewshed, as defined in Chapter 3, Section 3.3, *Aesthetics, Light, and Glare*.

The following cumulative projects are located in this study area: Barlow Point Master Plan Project, SR 432 Rail Realignment and Highway Improvement Project, Reynolds Lead and BNSF Spur Improvements, and the Kelso Martin's Bluff Rail Improvement Project.

Cumulative Impacts

The Proposed Action would result in impacts related to aesthetics, light, and glare by introducing new visual features and sources of light and glare to the project area that would be visible to viewers at urban and industrial, rural and residential, and natural viewpoints. Viewers at viewpoints 1, 2, 3, 4, 5, 9, and 11 (as described in Chapter 3, Section 3.3, *Aesthetics, Light, and Glare*) would be unlikely to experience views that would include both the Proposed Action and one or more cumulative projects. Therefore, the cumulative projects would not contribute to cumulative impacts on visual resources from these viewpoints.

Viewers at certain rural, residential, and natural viewpoints (viewpoints 6, 7, 8, and 10 described in Chapter 3, Section 3.3, *Aesthetics, Light, and Glare*) on the Oregon side of the Columbia River could experience views of the Proposed Action and the cumulative projects. In these views, the Proposed Action and cumulative projects would introduce new industrial facilities and structures and new sources of light and glare in an industrial, transportation, and utility corridor along the Columbia River. The Proposed Action and cumulative projects would generally be visually consistent with existing industrial facilities along the Columbia River. Overall, the Proposed Action, in combination with the cumulative projects, could contribute to cumulative impacts related to aesthetics, light, and glare by adding to the concentration of industrial features along the Columbia River visible to viewers at rural, residential, and natural viewpoints.

6.3.1.4 Cultural Resources

This section discusses potential cumulative impacts on cultural resources.

Study Area

Cultural resources include historic resources (i.e., buildings and structures) and archaeological resources. The cumulative impacts study area for historic resources is the study area defined in Chapter 3, Section 3.4, *Cultural Resources*, which is the project area, areas of the Columbia River that would be directly affected by overwater structures and dredging, and a buffer surrounding the project area encompassing other areas that would be affected by construction of the Proposed Action).

The following cumulative projects are located in this study area: Barlow Point Master Plan Project, SR 432 Rail Realignment and Highway Improvement Project, and Reynolds Lead and BNSF Spur Improvements.

The cumulative impacts study area for archaeological resources is the Columbia River extending downstream from the project area to the mouth of the river. Any cumulative project that would introduce new vessel traffic to the Columbia River is in this study area (Table 6-4).

Cumulative Impacts

During construction, the Proposed Action's direct impacts would be limited to the Applicant's leased area. Specifically, the Proposed Action would directly affect the Reynolds Metals Reduction Plant Historic District and potential undocumented archaeological sites in the project area. The cumulative projects in the study area would not affect these resources and therefore would not contribute to cumulative impacts on historic resources during construction.

The Proposed Action's demolition of buildings and structures associated with the Reynolds Metals Reduction Plant Historic District would affect the historic value of the Consolidated Diking Improvement District #1 (CDID #1) levee and the Bonneville Power Administration (BPA) Longview Substation. As discussed in Chapter 3, Section 3.4, *Cultural Resources*, the CDID #1 levee and the BPA Longview Substation's integrity of setting and association would be diminished by the demolition of buildings and structures that contribute to the Reynolds Metals Reduction Plant Historic District. The cumulative projects in the historic resources study area would further alter the setting of these resources. Therefore, the Proposed Action, in combination with the cumulative projects, would contribute to cumulative impacts on the historic value of the CDID #1 levee and the BPA Longview Substation.

A shoreline analysis concluded impacts on archaeological sites along the lower Columbia River were not likely to result from an increase in Proposed Action-related vessel traffic. Therefore, the Proposed Action, in combination with vessel traffic associated with the cumulative projects (Table 6-4), would not be likely to contribute to cumulative impacts on archaeological resources related to shoreline erosion from vessel wakes.

6.3.1.5 Tribal Resources

This section discusses potential cumulative impacts on tribal resources.

Study Area

The study area for cumulative impacts on tribal resources due to rail traffic consists of tribal resources and access to those resources that could be affected during rail transport along the anticipated routes for Proposed Action-related trains on the BNSF main line in Washington State. Any cumulative project that would introduce new rail traffic is in this study area (Table 6-3).

The study area for cumulative impacts on tribal resources due to vessel traffic extends downstream from the project area to the mouth of the Columbia River. Any cumulative project that would introduce new vessel traffic to the Columbia River is in this study area (Table 6-4).

Cumulative Impacts

As noted in Chapter 3, Section 3.5, *Tribal Resources*, Proposed Action-related trains could result in delays to tribal fishers' access to traditional fishing sites and delivery of fish to buyers. The cumulative projects would add rail traffic to the BNSF main line including the Columbia River Gorge. Proposed Action-related rail traffic, in combination with the cumulative project-related rail traffic, could contribute to cumulative impacts on tribal resources by increasing delay to access to traditional fishing locations due to rail traffic. The greatest potential for additional delay would be at unmapped traditional fishing locations where tribal fishers use unimproved at-grade crossings.

The Proposed Action could result in impacts on tribal resources through Proposed Action-related activities causing physical or behavioral responses in fish and by affecting aquatic habitat. These impacts could reduce the number of fish surviving to adulthood and returning to Zone 6, and could affect the number of fish available for harvest by tribes. The cumulative projects would introduce vessel traffic and other activities that may cause physical or behavioral responses in fish or affect aquatic habitat. Fish stranding associated with wakes from Proposed Action-related vessels would likely occur, as discussed in Chapter 4, Section 4.7, *Fish*. Therefore, the Proposed Action, in combination with the cumulative projects, could contribute to cumulative impacts on tribal fish resources.

6.3.1.6 Hazardous Materials

This section discusses potential cumulative impacts related to hazardous materials.

Study Area

The cumulative impacts study area for hazardous materials is the project area and the area within 1 mile of the proposed docks (Docks 2 and 3). The Barlow Point Master Plan Project, SR 432 Rail Realignment and Highway Improvement Project, and Reynolds Lead and BNSF Spur Improvements are the cumulative projects located in this study area.

The study area for cumulative hazardous materials impacts from rail traffic is the BNSF main line routes in Washington State for Proposed Action-related trains. Any cumulative project that would introduce new rail traffic on these routes is in this study area (Table 6-3).

The study area for cumulative hazardous materials impacts due to vessel traffic is the Columbia River from the project area downstream to the mouth of the river. Any cumulative project that would introduce new vessel traffic to the Columbia River is in this study area (Table 6-4).

Cumulative Impacts

Construction and operation of the Proposed Action could introduce new sources of hazardous materials to the project area. The cumulative projects could also introduce new sources of hazardous materials such as fuels, solvents, paints, oils, concrete-curing compounds, and grease. The transport, use, storage, and disposal of hazardous materials must meet applicable federal, state, and local laws. The Proposed Action's hazardous material impacts would primarily affect the project area; Applicant's leased area; and road, rail, and vessel transportation routes. The cumulative projects would not be expected to result in hazardous materials impacts in the project area or Applicant's leased area, and it is unlikely that they would result in a release along the rail and vessel transportation routes at the same time as a Proposed Action-related train or vessel. Therefore, there is low potential for the Proposed Action to contribute to cumulative impacts related to the introduction of hazardous materials.

There is the potential for impacts related to the release of hazardous materials from a Proposed Action-related train accident, such as a collision or derailment. As noted, certain cumulative projects would also introduce additional rail traffic to the BNSF main line, which could also release hazardous materials. A greater number of trains in the study area could result in an increased potential for fuel spills. The Proposed Action, in combination with the cumulative projects, would contribute to cumulative impacts related to the potential release of hazardous materials during rail transport. However, locomotives and rail cars for Proposed Action-related trains and cumulative project-related trains are assumed to be maintained, and leaks would be repaired by the train and railroad operators, thereby avoiding and minimizing the potential for a leak. Cleanup of spills must comply with applicable local, state, and federal laws.

If a release of hazardous materials were to result from a collision or derailment of a Proposed Action-related train or cumulative project-related train, emergency response and cleanup measures would be implemented as required by federal and state law, including Washington State regulations under RCW 90.56, *Oil and Hazardous Substance Spill Prevention and Response*.

Operation of the Proposed Action could indirectly affect water quality by introducing contaminants from vessels. These impacts could arise from localized scour of the channel bottom and elevated turbidity and pollution associated with propeller wash, ballast water discharges, fuel spills from vessels. These potential cumulative impacts are addressed in Section 6.3.2.4, *Water Quality*.

6.3.2 Natural Environment

This section presents potential cumulative impacts for the natural environment resources.

6.3.2.1 Geology and Soils

This section discusses potential cumulative impacts related to geology and soils.

Study Area

The cumulative impacts study area for geology and soils is the project area and land in the immediate vicinity of the project area.

The following cumulative projects are in this study area: the Barlow Point Master Plan Project, SR 432 Rail Realignment and Highway Improvement Project, and Reynolds Lead and BNSF Spur Improvements.

Cumulative Impacts

The Proposed Action would result in a slight potential for soil erosion during construction and exposure to geologic hazards (e.g., seismic events and landslides) during operations. Impacts related to soil erosion during construction would be temporary and best management practices would avoid and minimize erosion impacts. The exposure of bare soil during construction activities for the cumulative projects in the immediate vicinity could also result in temporary impacts related to soil erosion. Soil erosion would have the potential for off-site transport of eroded soil materials to waterways such as the Columbia River. Therefore, the Proposed Action, in combination with the cumulative projects, could contribute to cumulative impacts related to soil erosion. Soil erosion impacts would be limited to a small, localized area and would only result in a cumulative impact if activities related to the Proposed Action and one or both cumulative projects occurred at the same time and in close proximity. Similar to the Proposed Action, the cumulative projects would likely be required to obtain an NPDES Construction Stormwater Permit and implement an erosion control plan to minimize the potential for erosion during construction activities. With these measures, the potential for cumulative erosion impacts from site-specific actions would be minimal. Geologic hazards could affect the Proposed Action and other cumulative projects in the region, but these impacts would not result from the cumulative projects.

6.3.2.2 Surface Water and Floodplains

This section discusses potential cumulative impacts on surface water and floodplains.

Study Area

The study area for cumulative impacts on surface water is the project area, shoreline and nearshore areas along the north bank of the Columbia River in the project area, the CDID #1 stormwater system drainage ditches adjacent to the project area, and the Columbia River extending 1 mile downstream from the project area. The Barlow Point Master Plan Project is the only cumulative project located in this study area.

The study area for cumulative impacts on floodplains is the 500-year floodplain for the Columbia River within Cowlitz County. The following cumulative projects are located in this study area: Barlow Point Master Plan, the Kalama Manufacturing and Marine Export Facility, Woodland Marine Terminal, SR 432 Rail Realignment and Highway Improvement Project, and the Reynolds Lead and BNSF Spur Improvements.

Cumulative Impacts

The Proposed Action could affect surface water during construction by temporarily altering the project area drainage patterns, which could result in localized flooding and increased erosion from redirected sheetflow. Cumulative impacts on drainage patterns during construction are not expected because it is unlikely that the Barlow Point Master Plan Project and the Proposed Action would be under construction at the same time, and both would be required to implement erosion and sediment control best management practices pursuant to an NPDES Construction Stormwater Permit. During operations, the Proposed Action would alter water collection and discharge patterns at the project area with the implementation of a new system to collect all stormwater and surface water from the project area. Projects associated with the Barlow Point Master Plan Project would be located on a parcel adjacent to the project area, and construction and operations activities could alter local drainage and water collection and discharge patterns. Cumulative impacts on water collection and discharge patterns during operations could occur if construction activities for both the Proposed Action and the Barlow Point Master Plan Project occur at the same time and in close proximity. However, the Proposed Action would avoid and minimize these potential impacts with the implementation of erosion and sediment control best management practices and the requirements of the NPDES Construction Stormwater Permit. It is expected that the projects associated with the Barlow Point Master Plan Project would also implement best management practices in accordance with an NPDES Construction Stormwater Permit.

The Proposed Action would result in less water discharged to the CDID #1 drainage ditches from the project area than under current conditions. This could result in a beneficial indirect impact on the

CDID #1 ditches. Therefore, the Proposed Action would not contribute to adverse cumulative impacts on the CDID #1 ditches.

Construction of the Proposed Action would also affect surface waters with the placement of piles in the Columbia River and shoreline area. Projects associated with the Barlow Point Master Plan Project would also likely result in new development along the shoreline and in the Columbia River in the surface water study area. Therefore, the Proposed Action, in combination with projects associated with the Barlow Point Master Plan Project, would contribute to cumulative impacts on surface waters and the shoreline area due to the construction of new in-water structures, which would permanently alter the Columbia River and benthic habitat with the placement of piles. The Proposed Action and any cumulative projects resulting in new development in the shoreline area are regulated by the Washington State Shoreline Management Act and the applicable local shoreline master program. Such projects require Shoreline Substantial Development Permits, and, potentially, Conditional Use Permits, which can require mitigation to protect shoreline environmental resources.

As discussed in Chapter 4, Section 4.2, *Surface Water and Floodplains*, the Proposed Action is within the Columbia River 500-year floodplain, but is protected from the 100-year flood event by a levee. Construction and operation of the Proposed Action and cumulative projects would be unlikely to have any measureable impact on floodplain function during a 500-year flood event due to the extent of floodplain inundation and level of development within this area. Thus, the Proposed Action and cumulative projects would not decrease flood storage in the 500-year floodplain.

6.3.2.3 Wetlands

This section discusses potential cumulative impacts on wetlands.

Study Area

The cumulative impacts study area for wetlands is the Washington State Water Resources Inventory Area 25, which is the Grays-Elochoman watershed.

The following cumulative projects are located in this study area: the Barlow Point Master Plan Project, Reynolds Lead and BNSF Spur Improvements, and the SR 432 Rail Realignment and Highway Improvement Project.

Cumulative Impacts

As discussed in Chapter 4, Section 4.3, *Wetlands*, construction of the Proposed Action would permanently fill 24.1 acres of wetlands, resulting in the total loss of wetland functions throughout this area. Projects associated with the Barlow Point Master Plan Project could also result in the loss of wetland functions; it is expected that projects associated with the Barlow Point Master Plan would fill a similar amount of wetland area as the Proposed Action. The Reynolds Lead and BNSF Spur Improvements and the SR 432 Rail Realignment and Highway Improvement Project may also result in permanent wetland fill, although an estimate of wetland fill area for these projects is not available at this time. Therefore, the Proposed Action, in combination with the cumulative projects, would contribute to cumulative impacts on wetlands related to the filling of wetlands and the permanent loss of wetland functions. The cumulative impacts would be part of an ongoing historical trend of filling wetlands along the Columbia River for development in and around the City of Longview.

For the Proposed Action, the Applicant would prepare a comprehensive mitigation plan in coordination with the U.S. Army Corps of Engineers (Corps), Washington State Department of Ecology (Ecology), and Cowlitz County to help offset the adverse impact on the aquatic ecosystem from permanently filling wetlands in the project area. Cumulative projects resulting in impacts on wetlands would also be required to prepare and implement comprehensive mitigation plans. In particular, the Port of Longview is currently in the process of permitting an advanced wetland mitigation site on 76 acres of Port of Longview-owned property, and may use this site to offset Barlow Point Master Plan Project wetland impacts (Port of Longview 2016). Stormwater runoff currently discharging into wetlands that would be impacted by the Proposed Action and cumulative projects is expected to be redirected to new stormwater facilities associated with the projects. Construction of the Proposed Action and cumulative projects would also be expected to remove habitat functions permanently in filled wetlands.

6.3.2.4 Water Quality

This section discusses potential cumulative impacts on water quality.

Study Area

The cumulative impacts study area for water quality includes the project area, the CDID #1 drainage ditches adjacent to the project area, the Columbia River downriver 1 mile from the project area, and the dredged material disposal sites. The Barlow Point Master Plan is the only cumulative project located in the study area.

The cumulative impacts study area for water quality impacts due to rail traffic is the Reynolds Lead rail line in the project area where surface waters are crossed by or adjacent to the rail line. Any cumulative project that would introduce new rail traffic on the Reynolds Lead in the project area is in this study area (Table 6-3).

The cumulative impacts study area for water quality impacts due to vessel traffic is the Columbia River up to 1 mile downstream of the project area. Any cumulative project that would introduce new vessel traffic to the Columbia River up to 1 mile downstream of the project area is in this study area (Table 6-4).

Cumulative Impacts

During construction, the Proposed Action could temporarily introduce pollutants due to equipment and material use. During operation, the Proposed Action could introduce coal and other contaminants such as diesel fuel, oils, and grease. Most operation-related impacts would result from spills of contaminants either directly into surface waters or in locations where they could be transported and discharged to surface water or groundwater.

Projects associated with the Barlow Point Master Plan could also introduce pollutants due to construction equipment and material use or because of releases during operations. However, the Proposed Action would be required to have a site-specific construction stormwater pollution prevention plan that would include best management practices for material handling and construction waste management to reduce the potential for water quality impacts from these sources (i.e., from spills of contaminants to locations where they would be conveyed to the Proposed Action's water management system). It is expected that similar measures would be required for the Barlow Point Master Plan, and the likelihood of concurrent releases of contaminants from both projects would be low. Therefore, the Proposed Action, in combination with the projects associated with the Barlow Point Master Plan, would be unlikely to contribute to cumulative impacts on water quality related to the potential release of contaminants. As discussed in Chapter 4, Section 4.5, *Water Quality*, coal dust from operations of the terminal is not expected to have a demonstrable effect on water quality, and thus would not contribute to cumulative water quality impacts.

Construction of the upland portions of the Proposed Action would not be expected to cause a measurable impact on water clarity, water quality, biological indicators, or designated beneficial uses because of soil disturbance or the introduction of hazardous materials during demolition of existing structures or construction of new structures and facilities. As discussed in Chapter 4, Section 4.5, *Water Quality*, the implementation of best management practices in compliance with the NPDES Construction Stormwater Permit that would be obtained for the Proposed Action would reduce the potential for demolition- and construction-related pollutants to enter and contaminate surface waters. Therefore, the Proposed Action would not contribute to cumulative impacts on water quality due to construction-related upland soil disturbance or structure and facility demolition and construction-related activities.

Construction of the Proposed Action could temporarily mobilize pollutants or increase turbidity from in-water work such as pile driving and removal, initial construction dredging and ongoing operations-related maintenance dredging, and flow lane disposal of dredge material. Projects associated with the Barlow Point Master Plan may involve dredging activities and potential flow lane disposal. The potential cumulative water quality impacts related to dredging and in-water construction would be limited because such activities would be temporary and would only be cumulative if they occur at the same time for both projects, which is not likely.

Projects that involve dredging are required to comply with the Washington's Dredged Material Management Program. Potential cumulative impacts on water quality from in-water and above-water work and dredging would be minimized with the preparation and implementation of a project-specific dredging and disposal quality control plan in compliance with the dredged material management program as required by state agencies (Ecology and Washington State Department of Natural Resources) and federal agencies (the Corps and the U.S. Environmental Protection Agency [EPA]). Authorization of flow lane disposal of dredged material on a project-specific basis requires a sediment suitability determination from the Dredged Material Management Office and a modeling analysis of total suspended solids by the Corps. Adhering to a plan developed in compliance with the dredged material management program would avoid and minimize water quality impacts by ensuring that dredged material is free of hazardous materials in toxic quantities and suitable for in-water disposal. This would ensure potential impacts of the Proposed Action and cumulative projects are limited to localized temporary increases in suspended sediment and turbidity.

Operation of the Proposed Action, including discharge of treated stormwater, is not expected to cause a measureable increase in chemical indicators in the Columbia River. Operations would not cause a measurable impact on water quality or biological indicators or affect designated beneficial uses due to contaminants from stormwater runoff. Therefore, the Proposed Action would not contribute to cumulative impacts on water quality related to stormwater.

Operation of the Proposed Action could indirectly affect water quality by introducing contaminants from vessel or rail transport. These impacts could arise from localized scour of the channel bottom and elevated turbidity or pollution associated with propeller wash, ballast water discharges, fuel spills from vessels, contaminant releases from day-to-day rail operations, and fuel spills from train collisions or derailment. Cumulative projects would introduce additional rail traffic on the Reynolds Lead within the project area and increase vessel traffic that would transit the Columbia River through the 1-mile study area. The additional rail and vessel traffic from the cumulative projects could result in similar impacts on water quality as the Proposed Action. In particular, a greater number of vessels and trains in the study area could increase the potential for fuel spills from vessels or from train collisions or derailment. Therefore, the Proposed Action, in combination with the cumulative projects, would contribute to cumulative impacts on water quality from vessel or rail transportation.

The potential cumulative impacts on water quality related to vessel or rail transportation would be temporary and localized. The cumulative projects would be required to adhere to local, state, and federal regulations intended to minimize potential long-term impacts for individual projects, which would minimize the cumulative impact. Additionally, state and federal regulations control the discharge and quality of ballast water. Large commercial vessels related to the Proposed Action, as well as cumulative project vessels, would be required to comply with such regulations, thereby minimizing potential cumulative impacts on water quality associated with the discharge of ballast water.

Spills of fuel or other hazardous materials from a vessel or train could affect water quality based on the location, material spilled, quantity spilled, and response actions taken. Increased rail and vessel traffic could contribute to cumulative impacts related to a spill. However, when, where, and what materials may potentially be spilled cannot be predicted. A spill could result in a relatively minor release that could be quickly contained and cleaned-up, or a relatively large release that could have long-term and potentially substantial impacts on water quality. Thus, there is a relatively broad range to the potential cumulative impact on water quality that could occur as a result of a spill or release, from either rail or vessel.

6.3.2.5 Vegetation

This section discusses potential cumulative impacts on vegetation.

Study Area

The study area for cumulative impacts to vegetation is the project area and land within 1 mile of the project area. The following cumulative projects are in this study area: the Barlow Point Master Plan Project, SR 432 Rail Realignment and Highway Improvement Project, and Reynolds Lead and BNSF Spur Improvements.

The cumulative impacts study area also includes the BNSF main line in Washington State to consider the effect of Proposed Action-related rail traffic on vegetation. Any cumulative project that would introduce new rail traffic to the BNSF main line in Washington State is in this study area (Table 6-3).

The cumulative impacts study area also includes the Columbia River from the project area downstream to the mouth of the river to account for potential shoreline vegetation impacts from vessel wakes. Any cumulative project that would introduce new vessel traffic to the Columbia River is in this study area (Table 6-4).

Cumulative Impacts

Construction and operation of the Proposed Action would permanently alter or remove 26.26 acres of upland vegetation; 24.1 acres of wetland vegetation; and 151.14 acres of previously developed land from the project area. The previously developed land consists of existing structures, disturbed vegetation, and weedy areas that generally do not support native plant species or provide suitable wildlife habitat. The cumulative projects would also permanently alter or remove vegetation from their respective project sites. It is assumed that projects associated with the Barlow Point Master Plan would alter or remove a similar area of vegetation as the Proposed Action. Impacts related to the removal of vegetation at Barlow Point could be mitigated by the Port of Longview's 76-acre advanced wetland mitigation site that is currently being permitted (see Section 6.3.2.3, *Wetlands*). The SR 432 Rail Realignment and Highway Improvement Project and Reynolds Lead and BNSF Spur Improvements may also remove vegetation, although vegetation along these transportation corridors is unlikely to provide suitable wildlife habitat. Therefore, the Proposed Action would contribute to a cumulative impact related to the permanent removal of vegetation within the study area. Among the cumulative projects, the projects associated with the Barlow Point Master Plan would contribute the largest removal of vegetation. The cumulative impacts would be part of a trend to remove vegetation for development in and around the City of Longview. There are no cumulative projects in the study area that would also involve coal. There would be potential for cumulative impacts on vegetation along the rail lines from coal dust deposition. Coal dust deposition along the rail lines could be greater than the coal dust deposition adjacent to the Proposed Action, which could have cumulative impacts on vegetation adjacent to the rail lines. Refer to Chapter 6, Section 6.3.3.7, *Coal Dust,* for further information.

Operation of the Proposed Action would result in indirect impacts on vegetation due to shoreline erosion from vessel wakes and disturbance of vegetation during rail and vessel transport. Vessel wakes and associated shoreline erosion on the Columbia River currently occurs due to existing vessel traffic; operation of the Proposed Action would increase vessel traffic and potentially increase or intensify the extent and/or rate of shoreline erosion and vegetation loss. As discussed in Chapter 4, Section 4.6, *Vegetation*, the location and extent of shoreline erosion by Proposed Action-related vessels would depend on various factors such as vessel design, hull shape, vessel weight and speed, angle of travel relative to the shoreline, proximity to the shoreline, currents and waves, tidal stage, and water depth. The potential for shoreline erosion can also be influenced by the slope and physical character of the shoreline (e.g., erodibility of soils) as well as the amount and type of vegetation occurring along the shoreline. Additional discussion of the shoreline erosion process and factors that influence the process is provided in Chapter 4, Section 4.6, *Vegetation*.

There may be potential for the Proposed Action to result in shoreline erosion on the thin strip of shoreline vegetation along the northern end of Lord Island, where large or perpendicular wakes would be more likely. There is also potential for Proposed Action-related impacts from vessel wakes on vegetation along the shoreline of the lower Columbia River. The cumulative projects listed in Table 6-2 (except the Woodland Marine Terminal, which uses barges) would introduce additional vessels that would contribute to shoreline erosion. Therefore, the Proposed Action, in combination with the cumulative projects, would contribute to shoreline erosion and disturbance of vegetation along the lower Columbia River. Measures that could be implemented to reduce shoreline erosion and impacts to vegetation could include actions outside the control of the Applicant and permitting agencies. These actions include, but are not limited to, soft beach armoring, planting of native vegetation, and bank armoring. In addition, vessel operations in the lower Columbia River are federally regulated with respect to ship size, speed, and navigation. The navigation channel and its maintenance are also managed and regulated at the federal level.

Vessel wake impacts on erosion and shoreline vegetation cannot be quantified or measurably attributed to project-related vessels. Similarly, the cumulative impacts associated with additional vessels transiting the Columbia River cannot be quantified or measurably attributed to cumulative projects. Large vessels transiting the Columbia River, such as those associated with the Proposed Action and the cumulative projects, are restricted to the navigation channel. Restriction of vessels to the navigation channel along with other restrictions such as vessel speed would help maintain the equilibrium relative to vessels' wakes and shoreline and vegetation in the lower Columbia River.

6.3.2.6 Fish

This section discusses potential cumulative impacts on fish.

Study Area

The cumulative impacts study area for impacts on fish due to on-site activities includes the project area and the area extending 300 feet from the dredging area and each dredged material disposal site. The study area also includes the main channel of the Columbia River 3.92 miles upstream and downstream of the project area (measured from the proposed docks) to account for potential cumulative impacts related to underwater noise, and the Columbia River from the project area to the mouth of the river, to account for potential cumulative impacts related to vessel traffic.

The following cumulative projects are in these study areas: the Barlow Point Master Plan Project and any cumulative project that would introduce new vessel traffic to the Columbia River (Table 6-2). Past, present, and future maintenance dredging activities in the Columbia River navigation channel and at nearly industrial sites in the City of Longview are also in the study area.

Cumulative Impacts

As discussed in Chapter 4, Section 4.7, *Fish*, construction and operation of the Proposed Action would result in the following potential impacts on fish and fish habitat: alteration and removal of aquatic habitat, entrainment during hydraulic dredging, elevated turbidity, increased underwater noise, increased shading of aquatic habitat, leaks and spills affecting water quality, stranding from vessel wakes, and deposition of coal dust in the aquatic environment.

Project Area Activities

During construction, the Proposed Action's potential impacts related to alteration and removal of aquatic habitat, entrainment during hydraulic dredging, elevated turbidity, shading, and leaks and spills would be localized to the project area, the proposed dredging area and dredged material disposal sites, and the area extending 300 feet downriver. Projects associated with the Barlow Point Master Plan Project and future maintenance dredging activities could result in similar impacts as the Proposed Action in this area. Therefore, cumulative impacts on fish from construction activities could occur if the Proposed Action and the Barlow Point Master Plan Project are under construction at the same time, or if future maintenance dredging activities occur at the same time as Proposed Action construction. The cumulative impacts at any given time would depend on which construction activities are occurring simultaneously and the proximity of those activities. The Proposed Action, cumulative projects, and future maintenance dredging activities would alter and remove aquatic habitat, and would, therefore, contribute to a cumulative impact on aquatic habitat.

Dredging activities for the Proposed Action, cumulative projects, and future maintenance dredging would alter benthic habitat and habitat that may be suitable for eulachon spawning, and would temporarily increase turbidity. However, recolonization of dredged areas by benthic organisms would be relatively rapid (30 to 45 days), and disturbed habitats would return to reference conditions following recolonization. The permitting process for the Proposed Action, cumulative projects, and maintenance dredging would impose timing restrictions on dredging activities to avoid and minimize impacts to spawning adult, egg, and larval eulachon. Elevated turbidity during dredging activities would be temporary and localized, and would only result in cumulative impacts if activities occurred at the same time and in close proximity.

Operation of the Proposed Action would result in direct impacts on fish related to increased shading and to potential leaks and spills from vehicles or equipment. Shading would not result in measurable impacts at the population scale. Appropriate training and implementation of prevention and control measures would reduce the potential for leaks and spills that could degrade water quality and thus reduce the potential for such incidents to affect fish and fish habitat. Nonetheless, the Proposed Action could contribute to cumulative impacts related to increased shading and accidental leaks and spills in combination with the Barlow Point Master Plan Project. The potential for spills and leaks would increase as a result of the cumulative projects. The potential impacts from increased overwater shading could result in localized reductions in primary productivity, changes in fish migration, predation, and foraging. The potential magnitude of these changes would depend on the aquatic habitat (i.e., shallow water or deep-water habitats). For example, juvenile salmonids tend to migrate along channel margins in shallow water. However, permits issued for the construction of docks tend to require that docks be located over deep-water habitat, or if located in shallow water habitat, provide features such as grating that allow penetration of ambient light or other measures to reduce potential impacts associated with shading such as reduced primary productivity or changes in fish migration, predation or foraging patterns. It is assumed that docks constructed for cumulative projects would meet similar conditions, thereby reducing the potential for substantial cumulative impacts associated with shading.

Coal dust would be generated by the Proposed Action through the movement of coal into and around the project area as well as during transfer onto vessels or from stockpiles in the project area. There are no cumulative projects in the study area that would also involve coal; therefore, there would be no potential for cumulative impacts on fish from coal dust deposition.

Underwater Noise

Underwater noise impacts during pile-driving activities would affect the main channel of the Columbia River 3.92 miles upstream and downstream of the project area. Projects associated with the Barlow Point Master Plan Project could also result in in-water pile driving activities in or near this area. At this time, it is not known whether these projects would require pile driving, but this analysis conservatively assumes they would. Impacts on fish from underwater pile-driving noise would only result in cumulative impacts if the Proposed Action and cumulative projects conducted such activities at the same time and in close proximity. Simultaneous pile driving from one or more of the cumulative projects could cumulatively have a negative effect on fish migration, foraging success, rearing, and residence in the Columbia River near these projects as fish avoid areas of elevated underwater noise resulting from pile driving.

The Proposed Action and the cumulative projects would comply with mitigation measures imposed through the local, state, and federal permitting process. For those cumulative projects that have a federal nexus, compliance with the federal Endangered Species Act Section 7 consultation process would also be required, which would identify avoidance and minimization measures that would reduce the potential impact on federally protected species. Consultation would also reduce the potential impact on species that are not federally protected, such as species identified by Washington State as threatened, endangered, species of concern, or other special-status species. Reasonable and prudent measures for actions that could adversely affect federally protected species would also be identified through the Section 7 consultation process. Mitigation requirements as well as avoidance and minimization measures would reduce potential impacts associated with underwater noise generated during pile driving; impacts associated with pile removal; and increased turbidity resulting from dredging, erosion, and sediment transport. Mitigation would also establish appropriate construction timing and general construction practices (e.g., spill containment). These requirements and measures would reduce the potential cumulative impacts of construction activities on fish and fish habitat.

Vessel Traffic

Operation of the Proposed Action would affect fish via increased underwater noise generated by project related vessels and fish stranding associated with wakes from project-related vessels. The cumulative projects listed in Table 6-2 (except the Woodland Marine Terminal, which would use barges) would introduce additional vessels that would produce wakes that would contribute to fish stranding. Increased vessel traffic associated with the cumulative projects could increase the potential for fish stranding caused by vessel wakes and behavioral responses to vessel noise. Therefore, the Proposed Action, in combination with the cumulative projects, could contribute to cumulative impacts related to fish stranding and vessel noise in the Columbia River.

6.3.2.7 Wildlife

This section discusses potential cumulative impacts on wildlife.

Study Area

The study area for cumulative impacts on terrestrial wildlife and habitats consists of the project area plus the area extending up to 0.5-mile beyond the project area. The following cumulative projects are in this study area: the Barlow Point Master Plan Project, SR 432 Rail Realignment and Highway Improvement Project, and Reynolds Lead and BNSF Spur Improvements.

The study area for cumulative impacts on terrestrial wildlife also includes the Proposed Action-related rail route in Washington State to account for potential impacts from Proposed Action-related train traffic. Any cumulative project that would introduce new rail traffic to Washington State is in this study area (Table 6-3).

The study area for cumulative impacts on aquatic wildlife for the Proposed Action is the main channel of the Columbia River and extends approximately 5.1 miles upstream and 2.1 miles downstream from the upstream and downstream ends of the proposed docks (Docks 2 and 3), respectively. The aquatic study area also includes the various surface and stormwater ditches, ponds, and wetlands found throughout the project area. The Barlow Point Master Plan Project is the only cumulative project in this study area.

The study area for cumulative impacts on aquatic wildlife also includes the Columbia River from the project area to the mouth of the river to account for potential impacts on marine mammals from increased vessel traffic. Any cumulative project that would introduce new vessel traffic to the Columbia River is in this study area (Table 6-4).

Cumulative Impacts

Terrestrial Wildlife

During construction, the Proposed Action would result in potential direct impacts on terrestrial wildlife related to the alteration and removal of habitat, temporary displacement or mortality of wildlife, disturbance from construction noise and human activities, and potential contamination from leaks and spills. Projects associated with the Barlow Point Master Plan Project and the SR 432 Rail Realignment and Highway Improvement Project would be developed and could result in similar impacts in the study area. Therefore, cumulative impacts on terrestrial wildlife from construction activities could occur if the Proposed Action and the cumulative projects are constructed at the same time. The cumulative impacts at any given time would depend on which construction activities are occurring simultaneously and the proximity of those activities. Wildlife in the project area and adjacent areas are likely habituated to current noise levels and activities associated with industrial areas and are generally mobile. The cumulative impacts of construction activities and construction-related noise could affect individuals of a species but are not anticipated to affect the overall fitness of a population.

The Proposed Action and projects associated with the Barlow Point Master Plan Project would both alter and remove terrestrial habitat, and would therefore contribute to an adverse cumulative impact on these habitats. The Proposed Action would permanently remove approximately 26 acres of upland habitat, 24 acres of wetland habitat, 5 acres of aquatic habitat (i.e., ponds and ditches), and 151 acres of developed and disturbed habitat. Projects associated with the Barlow Point Master Plan Project would remove 216.4 acres of habitat, of which 9 acres are currently developed: much of the rest has been altered or degraded by past recreational and agriculture activities. Impacts related to the removing wetland habitat used by terrestrial wildlife at Barlow Point could be mitigated by the Port of Longview's 76-acre advanced wetland mitigation site that is currently being permitted (see Section 6.3.2.3, *Wetlands*). The SR 432 Rail and Realignment and Highway Improvement Project may also result in permanent removal of terrestrial habitat, although an estimate of impact area for this project is not available at this time. Overall, much of the terrestrial habitat removed by the Proposed Action and cumulative projects would be currently developed land that does not provide suitable habitat for many species of wildlife or has already been altered by past activities.

The Proposed Action, in combination with the cumulative projects, would result in increased rail traffic in Washington State. Wildlife along the rail route could be injured or killed by a collision with a train. A greater number of trains in the study area could result in an increased potential for rail strikes of wildlife.

Coal dust would be generated by the Proposed Action by coal moving through the project area, from unloading coal from rail cars, storing coal on site, and transferring the coal to vessels. There would be no cumulative projects in the study area that would also involve coal; therefore, there would be no potential for cumulative impacts on wildlife from coal dust deposition.

Aquatic Wildlife

During construction, the Proposed Action would result in potential direct impacts on aquatic wildlife related to the alteration and removal of habitat, disturbance from underwater noise during pile driving, and potential contamination from leaks and spills. As noted, projects associated with the Barlow Point Master Plan Project could also result in in-water pile-driving activities in the aquatic wildlife cumulative impacts study area. At this time, it is not known whether these projects would require pile driving; this analysis conservatively assumes that they would. Impacts on aquatic wildlife from construction activities would only result in cumulative impacts if activities for the Proposed Action and cumulative projects occurred at the same time and in close proximity. Cumulative impacts on pinnipeds and diving birds from underwater pile-driving noise could occur if the Proposed Action is conducting pile-driving activities at the same time as one of the nearby cumulative projects. Pinnipeds and diving birds would likely exhibit behavioral shifts and avoidance of those areas where underwater noise from in-water pile driving would occur.

Operation of the Proposed Action and cumulative projects would increase vessel traffic in the Columbia River. This would increase the risk of vessel collisions with pinnipeds. Large vessels transiting the Columbia River generally travel at speeds between 8 and 12 knots. While the behavior of pinnipeds in the path of an approaching vessel is uncertain, it is likely that an individual would have the ability to avoid and swim away from the vessel, considering vessels' large size (i.e., Handymax and Panamax) and relatively slow speed (less than 14 knots). Additionally, pinnipeds in the Columbia River are likely habituated to vessel traffic and quite capable of avoiding vessels. Therefore, the potential risk for a vessel collision with a pinniped would be low for the Proposed Action and cumulative projects.

Cumulative impacts on pinnipeds from vessel noise could occur. By 2038, 7,678 vessel transits are projected in the Columbia River, including the 1,680 vessel transits associated with the Proposed Action and 1,096 associated with the cumulative projects. The peak hearing sensitivity frequencies of Steller sea lions, California sea lions, and harbor seals are generally outside of the noise frequencies generated by vessels, and these species would likely be habituated to vessel-generated noise levels in the Columbia River.

The Proposed Action and the cumulative projects would be required to comply with measures imposed through permit process and federal Endangered Species Act Section 7 consultation. Mitigation measures would address pile driving and removal, dredging and sediment control, construction timing, and general construction practices (e.g., spill containment), as appropriate. These measures would reduce potential cumulative impacts on terrestrial and aquatic wildlife and habitats during construction activities. Chapter 4, Section 4.8, *Wildlife,* identifies the proposed mitigation measures that would be implemented as part of the Proposed Action. It is likely that similar measures would be implemented for the cumulative projects, thus reducing the potential impacts in similar ways.

6.3.2.8 Energy and Natural Resources

This section discusses potential cumulative impacts on energy and natural resources.

Study Area

The cumulative impacts study area for energy and natural resources is the project area and the area within 0.25 mile of the project area.

The following cumulative projects are in this study area: the Barlow Point Master Plan Project, SR 432 Rail Realignment and Highway Improvement Project, and Reynolds Lead and BNSF Spur Improvements.

Cumulative Impacts

As discussed in Chapter 4, Section 4.9, *Energy and Natural Resources*, the Proposed Action would affect energy and natural resources by increasing energy use (in the form of electricity, gasoline, oil, propane, and diesel fuel) and increasing the use of natural resources (such as water, gravel, fill dirt, and wood). The cumulative projects in the energy and natural resources study area would also increase the use of energy and natural resources. Therefore, the Proposed Action, in combination with the cumulative projects, would contribute to cumulative impacts related to energy and natural resources. It is expected that the additional cumulative demand for energy would be minor compared to the current regional demand for electricity and other fuels and could be met by existing local and regional supplies. It is also expected that the quantities of natural resources to be used by the Proposed Action and cumulative projects would be met by existing local and regional supplies, considering the availability of these resources.

6.3.3 Operations

This section presents potential cumulative impacts for the operations resources.

6.3.3.1 Rail Transportation

This section discusses potential cumulative impacts on rail transportation.

Study Area

The study area for cumulative impacts on rail transportation is the project area and the rail routes expected to be used by Proposed Action-related trains between the Powder River Basin in Montana and Wyoming and Uinta Basin in Utah and Colorado and the project area. The assessment of potential rail transportation cumulative impacts focuses on the Reynolds Lead and BNSF Spur and the BNSF main line in Cowlitz County. An assessment along the BNSF main line in Washington State and to and from the Powder River Basin and the Uinta Basin outside Washington State is also presented.

Methods

Cumulative rail traffic in 2038 on the BNSF Spur and Reynolds Lead was projected by adding the rail traffic for the cumulative projects to the estimated 2038 baseline rail traffic. Cumulative baseline rail traffic beyond Longview Junction on BNSF main line routes in Washington State was projected from the *Washington State Rail Plan* (Washington State Department of Transportation 2014) using linear extrapolation of 2010 and 2035 projected train traffic provided in the plan to project 2038 rail traffic. The plan's rail traffic estimates are based on data collected between 2010 and 2013. The 2038 rail traffic estimates provided in this section are intended to provide a "snapshot" of estimated rail traffic volumes to identify potential cumulative impacts on rail traffic.

Rail traffic for the cumulative projects (Table 6-3) was added to the 2038 estimates for a conservative analysis and because rail traffic estimates provided in the *Washington State Rail Plan* do not include the rail traffic for proposed coal or crude oil projects in Washington State. Cumulative project rail routes for purposes of this analysis were based on existing BNSF operations. In 2012, BNSF changed its train operations protocol to enhance use of existing capacity using directional running. This directional running strategy routes all westbound-loaded unit trains from Pasco via the Columbia River Gorge to Vancouver, where they continue on the BNSF north-south main line to their final destinations. Empty unit bulk trains from north of Vancouver return to Pasco and to points east via Stampede Pass.

The cumulative rail transportation analysis considered two scenarios.

- **Cumulative No-Action scenario.** Represents cumulative rail traffic in 2038 without Proposed Action-related trains.
- **Cumulative Proposed Action scenario.** Represents cumulative rail traffic in 2038 with Proposed Action-related trains.

Capacity estimates for main line routes in Washington State were obtained from the *Washington State Rail Plan*. The capacity estimates involve estimating maximum practical capacity in number of trains per day, which is determined by signal type, number of tracks, and geometric limitations.

Cumulative Impacts

As discussed in Chapter 5, Section 5.1, *Rail Transportation*, the Proposed Action would have no direct impacts on rail transportation. The Proposed Action would have indirect impacts on rail transportation because 16 Proposed Action-related trains per day at full terminal operations would travel on the Reynolds Lead and BNSF Spur, BNSF main line in Cowlitz County, BNSF main line routes in Washington State beyond Cowlitz County, and BNSF and Union Pacific Railroad (UP) rail infrastructure beyond Washington State.

This section describes the cumulative impacts on rail transportation with and without Proposed Action-related trains in 2038.

Reynolds Lead and BNSF Spur

Cumulative rail transportation impacts on the Reynolds Lead and BNSF Spur would be the same as presented in Chapter 5, Section 5.1, *Rail Transportation*, because none of the cumulative projects would add rail traffic to the Reynolds Lead or BNSF Spur.

BNSF Main Line in Cowlitz County

Projected 2038 capacity on the BNSF main line in Cowlitz County without improvements or operating changes is approximately 80 trains per day. Projected 2038 cumulative rail traffic under the Cumulative Proposed Action scenario is 139 trains per day and 131 trains per day under the Cumulative No-Action scenario. If all 16 Proposed Action-related trains use the segment south of Longview Junction (UP trains to and from the Uinta Basin and Powder River Basin), the 2038 projected cumulative rail traffic volume on this segment would be 147 trains daily (Cumulative Proposed Action scenario) and would exceed current capacity (80 trains daily). It is expected that BNSF and UP would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

BNSF Main Line Routes in Washington State beyond Cowlitz County

The Proposed Action would add rail traffic to the BNSF main line routes in Washington State. Table 6-5 presents projected 2038 capacity and projected trains per day by route for the two scenarios. Figure 6-2 illustrates the projected 2038 rail traffic volume under the Cumulative Proposed Action scenario on BNSF main line routes in Washington State.

Table 6-5. Projected 2038 Train Volumes in Washington State by Scenario

		Projected Trains per Day in 2038	
Segment	Projected Capacity in 2038[a]	Cumulative No-Action Scenario	Cumulative Proposed Action Scenario
Idaho/Washington State Line–Spokane	76	177	193
Spokane–Pasco	38	116	132
Pasco–Vancouver	41	82	90
Vancouver–Longview Junction	80	131	139
Longview Junction–Auburn	80	131	139
Auburn–Pasco	39	37	45

Notes:
[a] Projected 2035 capacity without improvements or operational changes per the *Washington State Rail Plan* (Washington State Department of Transportation 2014).

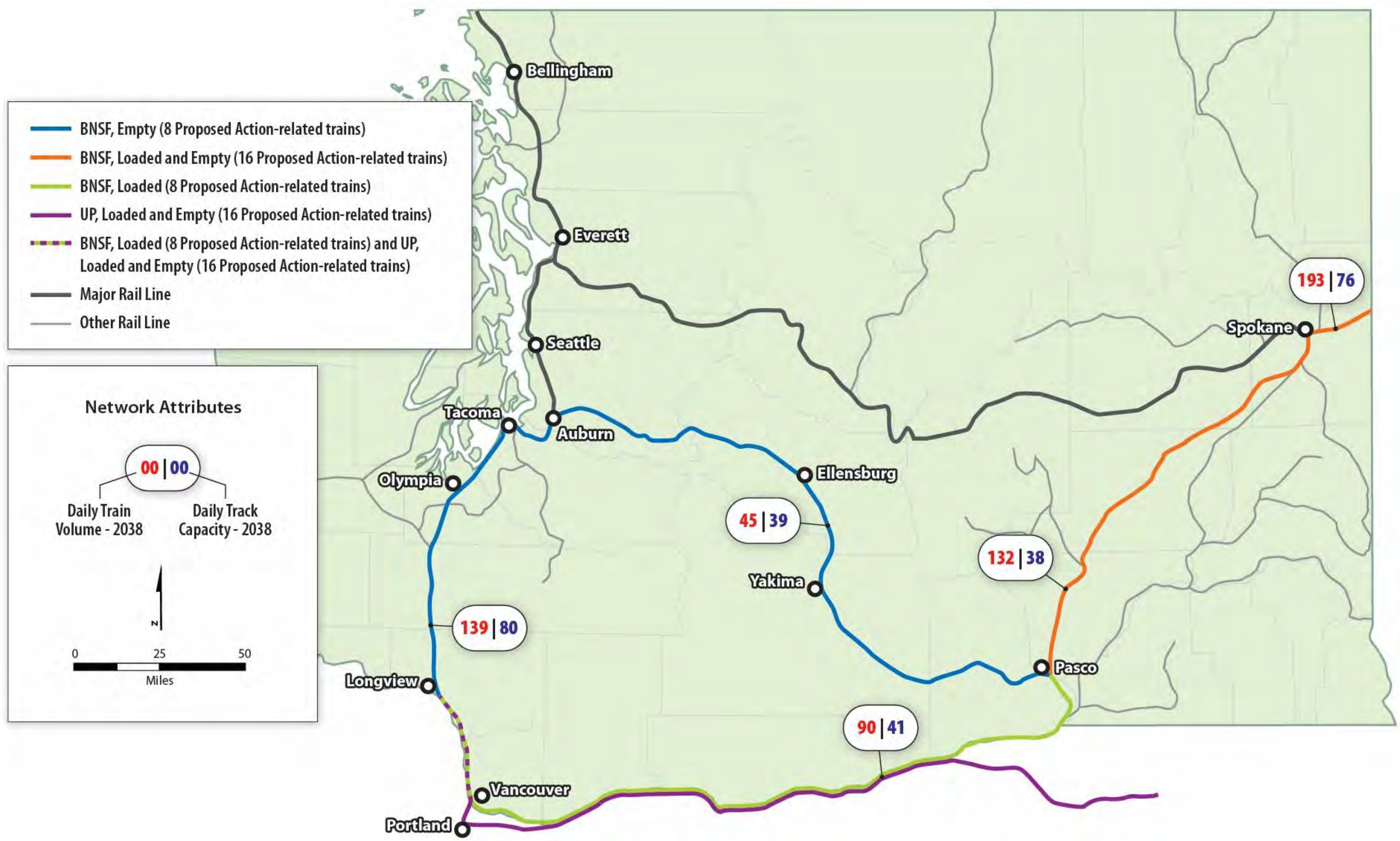
The following sections describe each of the routes in more detail for the Cumulative Proposed Action scenario. It is expected that BNSF would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

- **Idaho/Washington State Line–Spokane**. All Proposed Action-related BNSF trains to and from the Powder River Basin would move over this segment. Projected 2038 capacity without improvements or operational changes is 76 trains per day. The capacity concerns for this segment extend beyond Washington State to Sandpoint, Idaho. This potential constraint is identified in the *Washington State Rail Plan* as a key potential chokepoint. The projected cumulative rail traffic volume in 2038 is 193 trains per day. Without improvements or operating changes, this rail traffic volume would result in congestion or delays on this segment.

- **Spokane–Pasco**. All Proposed Action-related BNSF trains to and from the Powder River Basin would move over this segment. Projected 2038 capacity without improvements or operating changes is 38 trains per day. This potential constraint is identified in the *Washington State Rail Plan* as a key potential chokepoint. The projected cumulative rail traffic volume in 2038 is 132 trains per day. Without improvements or operating changes, this rail traffic volume would result in congestion or delays on this segment.

- **Pasco–Vancouver**. Loaded Proposed Action-related BNSF trains from the Power River Basin would move over this segment. Projected 2038 capacity without improvements is 41 trains per day. This potential constraint is identified in the *Washington State Rail Plan* as a significant capacity concern. The projected cumulative rail traffic volume in 2038 is 90 trains per day with Proposed Action-related trains. Without improvements or operating changes, this rail traffic would result in congestion or delays on this segment.

Figure 6-2. Projected 2038 Cumulative Train Volume in Washington State with Proposed Action-Related Trains



- **Vancouver–Longview Junction and Longview Junction–Auburn (outside Cowlitz County)**. This is the same segment as described previously for Cowlitz County.
- **Auburn–Yakima and Yakima–Pasco.** Empty Proposed Action-related BNSF trains would move over this segment. Projected 2038 capacity without improvements is 39 trains per day. The projected cumulative rail traffic volume in 2038 is 45 trains per day with Proposed Action-related trains. Without improvements or operating changes, this rail traffic would result in congestion or delays on this segment.

Outside Washington State

Rail traffic estimates provided in the *Washington State Rail Plan* in combination with the rail traffic for the cumulative projects, including Proposed Action-related trains, show that rail traffic will increase on BNSF and UP routes beyond Washington State. The existing capacity on BNSF main lines outside Washington State is approximately 18 to 75 trains per day on Proposed Action-related train routes, depending on location and track characteristics. Rail traffic in 2038 could exceed capacity on some BNSF routes if no capacity expansions or operating changes were implemented. It is expected that BNSF would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

The existing capacity on UP routes outside Washington State is approximately 16 to 173 trains per day on Proposed Action-related train rail routes, depending on location and track characteristics. Rail traffic in 2038 could exceed capacity on some UP routes if no capacity expansions or operating changes were implemented. It is expected that UP would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

6.3.3.2 Rail Safety

This section discusses potential cumulative impacts on rail safety.

Study Area

The study area for cumulative impacts on rail safety is the project area, Reynolds Lead, BNSF Spur, and the expected rail routes of Proposed Action-related trains in Washington State.

No cumulative projects would increase rail traffic on the Reynolds Lead or BNSF Spur. Along BNSF main line routes, any cumulative project that would add new rail traffic is in this study area (Table 6-3).

Methods

The analysis used the same methods as the No-Action and Proposed Action analyses for 2028, as documented in Chapter 5, Section 5.2, *Rail Safety*. Existing rail accident data from the Federal Railroad Administration (FRA) were used as the basis for the rail safety and accident analysis.[5] While the Washington Utilities and Transportation Commission gathers information on accidents that occur in Washington State, the commission does not have the corresponding data on train miles

[5] A train accident involves one or more railroads that have sustained combined track, equipment, and/or structural damage in excess of the reporting threshold. The FRA reporting threshold was $10,500 in 2016.

in the state for determining accidents per million train miles. The following points describe the methods to estimate freight rail traffic in 2038.

- **Reynolds Lead and BNSF Spur.** Cumulative rail safety impacts on the Reynolds Lead and BNSF Spur would be the same as presented in Chapter 5, Section 5.2, *Rail Safety*, because none of the cumulative projects would add rail traffic to the Reynolds Lead or BNSF Spur.
- **BNSF main line routes in Washington State.** The cumulative baseline freight train traffic beyond Longview Junction was developed from the *Washington State Rail Plan* using linear extrapolation of 2010 and 2035 projected train traffic to 2038. As described in Section 6.3.3.1, *Rail Transportation*, it was assumed that all rail traffic for the cumulative projects (Table 6-3) was not included in the *Washington State Rail Plan* estimates. Cumulative project rail routes were based on existing BNSF operations, which assumes that directional running continues by routing westbound-loaded unit trains through the Columbia River Gorge and Vancouver and eastbound empty unit trains via Stampede Pass.

The cumulative rail safety analysis considered three scenarios.

- **Cumulative No-Action scenario.** Represents cumulative rail traffic in 2038 without Proposed Action-related trains.
- **Cumulative Proposed Action scenario.** Represents cumulative rail traffic in 2038 with Proposed Action-related trains.
- **Cumulative–loaded coal trains.** Represents cumulative rail traffic for all loaded coal trains, including Proposed Action-related trains. The following cumulative projects were included in the analysis: Gateway Pacific Terminal, Fraser Surrey Docks, Westshore Terminals Expansion, and TransAlta Coal Plant.

Cumulative Impacts

As discussed in Chapter 5, Section 5.2, *Rail Safety*, the Proposed Action would have no direct impacts on rail safety but could have indirect impacts on rail safety because Proposed Action-related trains traveling on the Reynolds Lead and BNSF Spur, BNSF main line in Cowlitz County, and BNSF main line routes in Washington State would increase the potential for train accidents.

This section describes the potential cumulative impacts on rail safety with and without Proposed Action-related trains in 2038. Table 6-6 illustrates the estimated accidents per year by scenario. The FRA accident reporting threshold was $10,500 in 2016, which means any incident of $10,500 or more is classified as an accident. Therefore, accidents include a wide a variety of incident types and severities, and are not limited to collisions or derailments.

The predicted number of accidents on the Reynolds Lead and BNSF Spur is 0.25 accident per year (or one accident every 4 years) for loaded coal trains, which would all be Proposed Action-related trains. If all freight trains are considered, the predicted accident rate is 0.68 per year. Without Proposed Action-related trains, the estimated accident per year is 0.18, or one accident every 5 to 6 years. As described in Table 6-2 (Reynolds Lead and BNSF Spur Improvements), LVSW has indicated it would improve the Reynolds Lead and BNSF Spur to Track Class 2 standards. However, if the Reynolds Lead and BNSF Spur are not improved to Track Class 2 standards, the estimates for the Reynolds Lead and BNSF Spur would be approximately 1.5 to 3 times higher.

Table 6-6. Predicted Train Accidents per Year by Scenario in 2038

Route Segment	Miles	Predicted Accidents Per Year in 2038: Cumulative No-Action Scenario	Cumulative Proposed Action Scenario	Cumulative-Loaded Coal Trains Scenario[a]
Idaho/Washington State Line–Spokane	18.6	4.80	5.20	0.70
Spokane–Pasco	145.5	24.60	28.00	5.40
Pasco–Vancouver	221.4	26.50	29.10	8.30
Vancouver–Longview Junction	34.8	6.70	7.10	1.30
Longview Junction–LVSW Yard (BNSF Spur)	2.1	0.09	0.24	0.07
LVSW Yard–Project Area (Reynolds Lead)	5.0	0.09	0.44	0.18
Longview Junction–Auburn	118.6	22.70	24.10	3.00
Auburn–Yakima	139.6	7.50	9.20	N/A
Yakima–Pasco	89.4	4.80	5.90	N/A

Notes:
[a] Includes Proposed Action-related trains and loaded coal trains for the following cumulative projects: Gateway Pacific Terminal, Fraser Surrey Docks, and Westshore Terminals Expansion.
N/A = not applicable (loaded coal trains are not assumed to use this segment)

Within Washington State on BNSF main line routes, the predicted number of freight train accidents is approximately 97 per year without Proposed Action-related trains, and 108 accidents per year with Proposed Action-related trains. The predicted number of loaded coal train accidents in Washington State is approximately 19 per year (including Proposed Action-related trains).

6.3.3.3 Vehicle Transportation

This section discusses potential cumulative impacts on vehicle transportation.

Study Area

The study area for cumulative impacts consists of the project area and the public and private at-grade crossings on the Reynolds Lead and BNSF Spur, and all public at-grade crossings on the BNSF main line in Cowlitz County (Cowlitz County study crossings). A review of selected at-grade rail crossings identified by the Washington State Department of Transportation (WSDOT) on the BNSF main line beyond Cowlitz County was also conducted (statewide study crossings). WSDOT identified these statewide crossings of interest during the project's scoping process. These statewide study crossings are at-grade state highway crossings or at-grade crossings near state highways.

Vehicle traffic generated by the cumulative projects in the study area is assumed included in the annual traffic growth rate used to perform the analysis as described below.

Methods

This section describes the methods used to evaluate the potential cumulative impacts on vehicle transportation in the study area.

Cowlitz County Study Crossings

The following section describes the methods to evaluate potential cumulative impacts at the study crossings on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County.

Analysis Scenarios

The following scenarios were analyzed.

- **Cumulative No-Action scenario**. This scenario represents conditions in 2038 without construction of the Proposed Action. It includes 10 years of added vehicle growth from 2028 conditions. It also assumes existing and planned activities for the Applicant's bulk product terminal as defined in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.
- **Cumulative Proposed Action scenario**. This scenario represents conditions in 2038 with all cumulative projects, including the Proposed Action. It includes 10 years of added vehicle growth from 2028 conditions. It also assumes existing and planned activities for the Applicant's bulk product terminal as defined in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.

Vehicle and Train Volumes

The following sections describe the methods to establish vehicular and train volumes for the analysis scenarios.

Vehicles

Table 6-7 shows the average daily traffic and PM peak hour (hereinafter referred to as peak hour) traffic data for all study crossings in 2038. Future traffic volumes for 2038 included a combination of background traffic and vehicular traffic associated with the Proposed Action.

Background traffic was estimated by developing a linear growth rate between existing and forecast traffic volumes at the study crossings and upstream intersections along the Reynolds Lead and BNSF Spur. The derived growth rates were applied to the 2028 No-Action scenario traffic volumes for 10 years to develop year 2038 Cumulative No-Action scenario traffic volumes. At the study crossings along the BNSF main line in Cowlitz County, the data suggest that the traffic volumes are forecast to increase at a rate of 2% annually. For comparison purposes, a 2% annual growth rate was applied to traffic count data to reflect baseline traffic conditions in the *SR 432 Highway Improvements and Rail Realignment Study* (Cowlitz-Wahkiakum Council of Governments 2014). The 2% annual growth rate was applied to the 2028 No-Action scenario traffic volumes at study crossings along the BNSF main line in Cowlitz County for 10 years to develop 2038 No-Action Cumulative Proposed Action scenario traffic volumes. Vehicular traffic related to the Proposed Action was added to the 2038 No-Action Cumulative Proposed Action scenario to develop the 2038 Cumulative Proposed Action scenario traffic volumes. The analysis assumes existing conditions at the Industrial Way/Oregon Way intersection because a preferred alternative to improve the intersection has not been identified and implementation by 2038 is not certain.[6]

[6] The Industrial Way/Oregon Way Intersection Project (#18 in Table 6-2) led by Cowlitz County Public Works, currently in the preliminary design environmental review phase, is addressing traffic congestion, freight mobility, and safety issues at the Industrial Way/Oregon Way intersection.

Trains

Cumulative rail traffic on the BNSF Spur and Reynolds Lead was developed by adding the rail traffic for all cumulative projects to the projected 2038 baseline rail traffic. Rail traffic on the Reynolds Lead and BNSF Spur in 2038 would be the same as 2028. Table 6-7 presents the number of trains for each scenario on the Reynolds Lead and BNSF Spur.

Cumulative baseline rail traffic beyond Longview Junction on BNSF main line routes were developed from the *Washington State Rail Plan* using linear extrapolation of 2010 and 2035 projected rail traffic to 2038. Rail traffic for the cumulative projects (Table 6-3) was added to the 2038 projections. The estimates are intended to provide a "snapshot" of estimated rail traffic volumes to identify potential cumulative traffic. Cumulative project rail routes were based on existing BNSF operations, which assume that westbound-loaded unit trains travel via Vancouver through the Columbia River Gorge and eastbound empty unit trains via Stampede Pass. Table 6-7 presents the assumed number of trains for each 2038 scenario on BNSF main line routes in Cowlitz County.

Table 6-7. Motor Vehicle and Train Volumes at Study Crossings in 2038 by Scenario

Crossing Name (USDOT Crossing ID)	Time Period	2038 Cumulative No-Action Scenario		2038 Cumulative Proposed Action Scenario	
		Vehicle	Train	Vehicle	Train
Reynolds Lead and BNSF Spur Study Crossings					
Project area access at 38th Avenue	Per Day	600	4.0	1,700	20.0
	Peak Hour	60	1	170	2
Weyerhaeuser access at Washington Way	Per Day	4,600	4.0	4,600	20.0
	Peak Hour	460	1	460	2
Weyerhaeuser NORPAC access	Per Day	1,150	4.0	1,150	20.0
	Peak Hour	115	1	115	2
Industrial Way (SR 432) (101806G)	Per Day	12,300	4.0	12,950	20.0
	Peak Hour	1,230	1	1,295	2
Oregon Way (SR 433) (101805A)	Per Day	21,250	4.0	21,500	20.0
	Peak Hour	2,125	1	2,150	2
California Way (101821J)	Per Day	7,900	4.0	7,900	20.0
	Peak Hour	790	1	790	2
3rd Avenue (SR 432) (101826T)	Per Day	24,650	4.0	24,850	20.0
	Peak Hour	2,465	1	2,485	2
Dike Road (101791U)	Per Day	400	7.1	400	23.1
	Peak Hour	40	1	40	2
BNSF Main Line in Cowlitz County Study Crossings					
Taylor Crane Road in Castle Rock (092481X)	Per Day	100	131.1	100	139.1
	Peak Hour	10	6.3	10	8.3
Cowlitz Street in Castle Rock (092476B)	Per Day	1,650	131.1	1,650	139.1
	Peak Hour	165	6.3	165	8.3
Cowlitz Gardens Road in Kelso (092466V)	Per Day	1,000	131.1	1,000	139.1
	Peak Hour	100	6.3	100	8.3

Crossing Name (USDOT Crossing ID)	Time Period	2038 Cumulative No-Action Scenario		2038 Cumulative Proposed Action Scenario	
		Vehicle	Train	Vehicle	Train
Mill Street in Kelso (092458D)	Per Day	3,450	131.1	3,450	139.1
	Peak Hour	345	6.3	345	8.3
S River Road in Kelso (092457W)	Per Day	2,550	131.1	2,550	139.1
	Peak Hour	255	6.3	255	8.3
Toteff Road/ Port Road in Kalama (092446J)	Per Day	1,650	131.1	1,650	139.1
	Peak Hour	165	6.3	165	8.3
W Scott Avenue in Woodland (092437K)	Per Day	3,600	131.1	3,600	139.1
	Peak Hour	360	6.3	360	8.3
Davidson Avenue in Woodland (092435W)	Per Day	2,700	131.1	2,700	139.1
	Peak Hour	270	6.3	270	8.3
Whalen Road in Woodland (092434P)	Per Day	2,100	131.1	2,100	139.1
	Peak Hour	210	6.3	210	8.3

Performance Measures

Unlike passenger trains, freight trains do not run on a schedule. Railroad companies evaluate each situation and dispatch trains based on a number of criteria, including available crew, number of cars, cost of fuel, and overall revenue. Analysis and projection of rail impact operations requires analyzing the rail traffic and developing typical operations. To analyze the highest potential vehicle delay impacts that could occur related to the Proposed Action, an analysis of vehicle delay during the peak traffic hour was completed. The following performance measures were used to assess vehicle transportation cumulative impacts.

- **Level of service (vehicle delay):** A study crossing or upstream intersection that would operate below level of service D under the Cumulative Proposed Action scenario that would not otherwise operate below level of service D under the Cumulative No-Action scenario for the same year.
- **Queuing (vehicle delay):** An estimated queue length that would extend from a study crossing that exceeds available storage length under the Cumulative Proposed Action scenario that would not otherwise exceed the available storage length under the Cumulative No-Action scenario from the same year.
- **Vehicle safety:** A study crossing that would have an expected accident frequency above 0.075 under the Cumulative Proposed Action scenario that would be at or below 0.075 under the Cumulative No-Action scenario.

Chapter 5, Section 5.3, *Vehicle Transportation*, describes these performance measures in more detail.

Washington State Study Crossings

A qualitative assessment of the potential cumulative impact of 2038 rail traffic on BNSF main line routes to vehicle delay, emergency service response, and vehicle safety was performed for the statewide study crossings. Two scenarios were evaluated: Cumulative No-Action scenario (without

Proposed Action-related trains) and Cumulative Proposed Action scenario (with Proposed Action-related trains).

Cumulative Impacts

As described in Chapter 5, Section 5.3, *Vehicle Transportation*, the Proposed Action would not result in direct impacts on vehicle transportation in the project area. The Proposed Action would have indirect vehicle delay and vehicle safety impacts at grade crossings on the Reynolds Lead and BNSF Spur, BNSF main line in Cowlitz County, and on BNSF main line routes in Washington State. The following section describes the cumulative impacts for the two Cumulative Proposed Action scenarios.

Cowlitz County Study Crossings

The following section describes the vehicle delay and vehicle safety conditions at the Cowlitz County study crossings.

Vehicle Delay

Average vehicle delay, peak hour vehicle delay, and queuing for the two 2038 Cumulative Proposed Action scenarios are presented here.

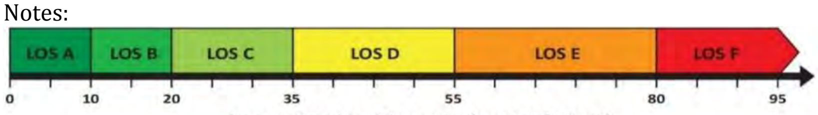
Average Vehicle Delay

Table 6-8 shows the estimated average delay per vehicle and level of service that would be experienced during a 24-hour period at the study crossings along the Reynolds Lead and BNSF Spur in 2038.

Table 6-8. Estimated 24-Hour Average Level of Service at Reynolds Lead and BNSF Main Line Study Crossings in 2038 by Scenario[a]

Crossing	Cumulative No-Action Scenario	Cumulative Proposed Action Scenario
Project Area Access at 38th Avenue	A	**F**
Weyerhaeuser Access at Washington Way	A	C
Weyerhaeuser NORPAC Access	A	B
Industrial Way (SR 432)	A	A
Oregon Way (SR 433)	A	A
California Way	A	B
3rd Avenue (SR 432)	A	B
Dike Road	A	C

Notes:



[a] **Shaded black** values indicate a vehicle delay impact (a study crossing that operates below level of service D under the Cumulative Proposed Action scenario that would not otherwise operate below level of service D under the Cumulative No-Action scenario for the same year).

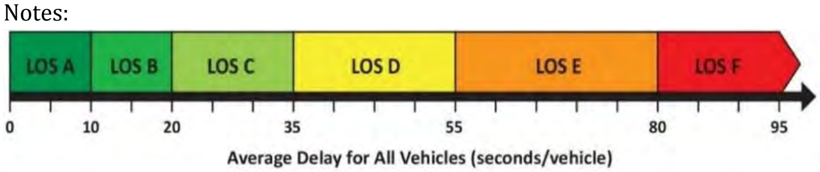
As shown, all study crossings along the Reynolds Lead and BNSF Spur would operate above level of service D, except the project area access opposite 38th Avenue, which would operate at level of service F.

Table 6-9 shows the estimated 24-hour average vehicle delay at the study crossings along the BNSF main line in Cowlitz County. All study crossings would operate at level of service A or B for both scenarios.

Table 6-9. Estimated 24-Hour Average Level of Service at BNSF Main Line Study Crossings in 2038 by Scenario

Crossing	Cumulative No-Action Scenario	Cumulative Proposed Action Scenario
Taylor Crane Road (Castle Rock)	A	A
Cowlitz Street (Castle Rock)	A	A
Cowlitz Gardens (Kelso)	A	A
Mill Street (Kelso)	B	B
S River Road (Kelso)	B	B
Toteff Road/Port Road (Kalama)	A	A
W Scott Avenue (Woodland)	A	A
Davidson Avenue (Woodland)	A	A
Whalen Road (Woodland)	A	A

Notes:



Peak Hour Vehicle Delay

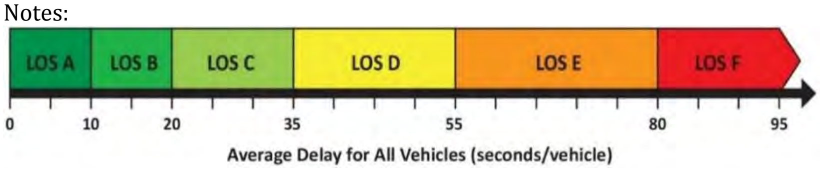
Table 6-10 shows the estimated peak hour vehicle delay at the study crossings on the Reynolds Lead and BNSF Spur by scenario in 2038 if 2 Proposed Action-related trains travel during the peak hour. The peak hour level of service would be below level of service D at four of the eight study crossings if 2 Proposed Action-related trains travel during the peak hour. No study crossings would operate below level of service D without Proposed Action-related trains. However, one upstream intersection (Industrial Way/Oregon Way)[7] would operate below level of service D without Proposed Action-related trains due to an increase in background traffic volumes.

[7] Grade-separating the Industrial Way and Oregon Way crossings, as proposed by the Industrial Way/Oregon Way Intersection Project, could eliminate motor vehicle delay and vehicle queuing at the Industrial Way and Oregon Way study crossings, and modify operations at the Industrial Way/Oregon Way intersection by 2038.

Table 6-10. Estimated Peak Hour Level of Service at Reynolds Lead and BNSF Spur Study Crossings and Upstream Intersections in 2038 by Scenario[a]

Study Crossing/Upstream Intersection	Cumulative No-Action Scenario	Cumulative Proposed Action Scenario[b]
Study Crossing		
Project Area Access at 38th Avenue	B	**F**
Weyerhaeuser Access at Washington Way	A	**E**
Weyerhaeuser NORPAC Access	A	D
Industrial Way (SR 432)	A	C
Oregon Way (SR 433)	A	C
California Way	A	D
3rd Avenue (SR 432)	B	**E**
Dike Road	C	**E**
Upstream Intersection		
Industrial Way/38th Avenue	B	B
Industrial Way/Washington Way	C	C
Industrial Way/NORPAC Access	C	D
Industrial Way/Weyerhaeuser	C	D
Industrial Way/Oregon Way	**F**	**F**
Industrial Way/California Way	C	C
3rd Avenue/Industrial Way	C	D
Dike Road/Frontage Road	A	A

Notes:



[a] **Bolded, shaded gray** values indicate a study crossing or intersection that operates below level of service D in the No-Action scenario. **Shaded black** values indicate a vehicle delay impact (a study crossing that operates below level of service D under the Cumulative Proposed Action scenario that would not otherwise operate below level of service D under the Cumulative No-Action scenario for the same year).

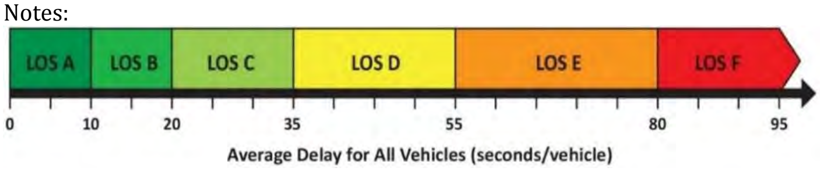
[b] This level of service would occur if 2 Proposed Action-related trains travel during the peak hour.

Table 6-11 illustrates the estimated peak hour vehicle delay at the BNSF main line study crossings in Cowlitz County by scenario if 2 Proposed Action-related trains travel during the peak hour. The level of service at two study crossings would operate below level of service D in 2038.

Table 6-11. Estimated Cumulative Peak Hour Level of Service at BNSF Main Line Study Crossings in 2038 by Scenario[a]

Crossing	Cumulative No-Action Scenario	Cumulative Proposed Action Scenario[b]
Taylor Crane Road (Castle Rock)	B	D
Cowlitz Street (Castle Rock)	C	D
Cowlitz Gardens (Kelso)	B	D
Mill Street (Kelso)	C	**E**
S River Road (Kelso)	C	**E**
Toteff Road/Port Road (Kalama)	B	D
W Scott Avenue (Woodland)	C	D
Davidson Avenue (Woodland)	B	D
Whalen Road (Woodland)	B	D

Notes:



[a] **Shaded black** values indicate a vehicle level of service impact (a study crossing that operates below level of service D under the Cumulative Proposed Action scenario that would not otherwise operate below level of service D under the Cumulative No-Action scenario for the same year).

[b] This level of service would occur if 2 Proposed Action-related trains travel during the peak hour.

Vehicle Queuing

Increased vehicle delay from trains blocking grade crossings can have secondary impacts on nearby intersections. As vehicles begin to queue while waiting for the crossing to open, increased roadway congestion can affect upstream intersections. Table 6-12 illustrates the grade crossings that would have a queue that would exceed available storage length. This table also illustrates the increase in the queue length in number of cars compared to the Cumulative No-Action scenario. Two queue lengths would exceed the available storage length under the Cumulative Proposed Action scenario (with Proposed Action-related trains) that would not be exceeded under the Cumulative No-Action scenario (without Proposed Action-related trains).

Table 6-12. Estimated Cumulative Peak Hour Vehicle Queue Lengths in 2038 by Scenario[a]

Crossing Name	Road Movement[b]	2038 No-Action Cumulative — Estimated Queue Length at Crossing (feet)	2038 Cumulative — Estimated Queue Length at Crossing (feet)	Intersection Affected by Queue from Crossing	Intersection Movement[c]	2038 No-Action Cumulative — Estimated Queue Length at Intersection (feet)	2038 Cumulative — Estimated Queue Length at Intersection (feet)
Reynolds Lead and BNSF Spur Study Crossings							
Project Area Access at 38th Avenue	Northbound	40	1,380	Industrial Way/ 38th Avenue	Westbound Left	40	440
	Southbound	40	440		Eastbound Right	20	100
Weyerhaeuser Access at Washington Way	Northbound	560	1,740	Industrial Way/ Washington Way	Westbound Left	100	100
					Eastbound Right	240	2,060
	Southbound	240	2,060		Southbound Through	80	380
Weyerhaeuser NORPAC Access	Northbound	80	120	Industrial Way/ NORPAC Access	Westbound Left	20	20
	Southbound	40	160		Eastbound Right	20	140
Industrial Way	Northbound	360	520	Industrial Way/ Weyerhaeuser	Eastbound Left	200	620
	Southbound	400	4,660		Northbound Through	240	400
Oregon Way	Northbound	2,100	3,380	Industrial Way/ Oregon Way	Northbound Through	1,860	3,420
					Eastbound Left	420	2,920
					Westbound Right	1,480	1,440
	Southbound	1,400	2,900	Oregon Way/ Alabama Street	Eastbound Right	320	300
					Westbound Left	700	1,140
					Southbound Through	580	2,200
California Way	Northbound	220	340	None	N/A	N/A	N/A
	Southbound	200	740				
3rd Avenue	Northbound	2,660	2,960	3rd Avenue/ Industrial Way	Westbound Right	100	125
					Northbound Through	2,300	2,580
				Industrial Way/ California Way	Southbound Left	220	260
	Southbound	920	3,660		Northbound Right	80	80
					Eastbound Through	2,060	2,360
Dike Road	Northbound	80	100	None	N/A	N/A	N/A
	Southbound	100	120				

Crossing Name	Road Movement[b]	2038 No-Action Cumulative	2038 Cumulative	Intersection Affected by Queue from Crossing	Intersection Movement[c]	2038 No-Action Cumulative	2038 Cumulative
		Estimated Queue Length at Crossing (feet)				Estimated Queue Length at Intersection (feet)	
BNSF Main Line in Cowlitz County Study Crossings							
Taylor Crane Road in Castle Rock (092481X)	Eastbound	20	20	None	N/A	N/A	N/A
	Westbound	20	20				
Cowlitz Street in Castle Rock (092476B)	Eastbound	60	80	None	N/A	N/A	N/A
	Westbound	80	120				
Cowlitz Gardens Road in Kelso (092466V)	Eastbound	40	60	None	N/A	N/A	N/A
	Westbound	40	40				
Mill Street in Kelso (092458D)	Eastbound	140	180	None	N/A	N/A	N/A
	Westbound	200	260				
S River Road/ Yew St in Kelso (092457W)	Eastbound	120	120	Pacific Avenue/S River Road	Southbound Right	100	140
	Westbound	160	200		Northbound Left	40	40
Toteff Road/ Port Road in Kalama (092446J)	Eastbound	60	80	None	N/A	N/A	N/A
	Westbound	80	100				
W Scott Avenue in Woodland (092437K)	Eastbound	100	120	None	N/A	N/A	N/A
	Westbound	160	220				
Davidson Avenue in Woodland (092435W)	Eastbound	120	180	None	N/A	N/A	N/A
	Westbound	80	100				
Whalen Road in Woodland (092434P)	Eastbound	80	80	None	N/A	N/A	N/A
	Westbound	100	140				

Notes:
a Shaded gray values indicate a study crossing or intersection queue that exceeds available storage for the scenario. Shaded black values indicate a queuing impact.
b Roadway movement approaching the rail crossing.
c Movement at nearby intersection affected by queue from rail crossing; N/A = data not applicable.

Vehicle Safety

The FRA GradeDec.Net model was used to calculate the total annual predicted accident probability at the study crossings in Cowlitz County. This model accounts for accident history and frequency of trains at existing at-grade crossings, volume of vehicle traffic, existing safety devices at the at-grade crossings, and other factors to determine the potential impacts.

The following sections provide the findings by scenario.

- **Cumulative No-Action scenario.** The analysis concluded that none of the study crossings on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County would be above the benchmark used for the analysis (0.075 accident per year) with existing crossing safety protection.
- **Cumulative Proposed Action scenario.** The analysis concluded that while the accident probability would increase compared the Cumulative No-Action scenario, none of the study crossings on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County would be above the benchmark used for the analysis (0.075 accident per year) with existing crossing safety protection.

Statewide Study Crossings

Table 6-13 illustrates the 2015 and 2038 estimated trains per day at the statewide study crossings for the cumulative scenarios.

Table 6-13 illustrates that rail traffic will increase by 2038; therefore, vehicle delay at the statewide study crossings will also increase. It is estimated that Proposed Action-related trains would represent from approximately 4 to 20% of all rail traffic on BNSF main line routes in Washington State in 2038.

Table 6-13. Projected Rail Traffic at Statewide Study Crossings in 2038 by Scenario

#[a]	Study Crossing	Freight Train Speed[b]	2015 Estimated Trains Per Day[c]	2038 Cumulative No-Action Scenario Projected Trains Per Day[c]	2038 Cumulative Proposed Action Scenario Projected Trains Per Day	% Change Between Cumulative Scenarios
Spokane County						
1	Idaho Road	60	70	184	200	9%
2	McKinzey Road	60	70	184	200	9%
3	Harvard Road	60	70	184	200	9%
4	Barker Road	60	70	184	200	9%
5	Flora Road	60	70	184	200	9%
6	Pines Road-SR 27	60	70	184	200	9%
7	University Road	60	70	184	200	9%
8	Park Road	60	70	184	200	9%
9	Pine Street	35	39	122	138	13%

#[a]	Study Crossing	Freight Train Speed[b]	2015 Estimated Trains Per Day[c]	2038 Cumulative No-Action Scenario Projected Trains Per Day[c]	2038 Cumulative Proposed Action Scenario Projected Trains Per Day	% Change Between Cumulative Scenarios
10	F Street/Cheney-Spangle	35	39	122	138	13%
11	Cheney-Plaza Road	35	39	122	138	13%
Adams County						
12	Paha Packard Road	60	39	122	138	13%
13	Kahlotus Road	60	39	122	138	13%
14	1st Street	50	39	122	138	13%
15	Wilbur/City Road	50	39	122	138	13%
Franklin County						
16	Eltopia Road W	60	39	122	138	13%
17	Sagemoor Road	60	39	122	138	13%
Benton County						
18	East 3rd Avenue	35	34	86	94	9%
19	Dague Road-East 25th Avenue	60	34	86	94	9%
20	Perkins Road	60	34	86	94	9%
21	Bowles Road	60	34	86	94	9%
22	Cochran Road	60	34	86	94	9%
23	Finley Road	60	34	86	94	9%
24	Whitcomb Island	60	34	86	94	9%
Klickitat County						
25	Maple Street	45	34	86	94	9%
26	Walnut Street	45	34	86	94	9%
27	South Dock Grade Road	55	34	86	94	9%
Skamania County						
28	Indian Crossing	55	34	86	94	9%
29	Home Valley Park	55	34	86	94	9%
30	Cemetery Xing	N/A	34	86	94	9%
31	Russell Avenue	20	34	86	94	9%
32	Skamania Landing/Butler Road	60	34	86	94	9%
33	Walker/Skamania Landing	60	34	86	94	9%
34	St Cloud Road	N/A	34	86	94	9%

#[a]	Study Crossing	Freight Train Speed[b]	2015 Estimated Trains Per Day[c]	2038 Cumulative No-Action Scenario Projected Trains Per Day[c]	2038 Cumulative Proposed Action Scenario Projected Trains Per Day	% Change Between Cumulative Scenarios
Lewis County						
35	SR 506-7th Street	50	50	136	142	4%
36	Walnut Street – SR 505/603	50	50	136	142	4%
37	E Locust Street	40	50	136	142	4%
38	Main Street	40	50	136	142	4%
39	Maple Street	40	50	136	142	4%
40	Big Hanaford Road	10	50	136	142	4%
Yakima County						
41	Jones Road East	55	7	40	48	20%
42	Indian Church	55	7	40	48	20%
43	SR241/Reservation	55	7	40	48	20%
44	Gulden Road	55	7	40	48	20%

Notes:
[a] See Chapter 5, Section 5.3, *Vehicle Transportation*, Figure 5.3-6, for study crossing location.
[b] Washington Utilities Transportation Commission 2015.
[c] Washington State Department of Transportation 2014; projected to 2038.
N/A = data not available

Vehicle delay would depend on the speed of the train, length of the train, the traffic volume at the crossing, and the number of lanes at the crossing (for vehicle storage). The traffic volume at the crossing would depend on the time of day. Using existing BNSF train data, trains associated with the cumulative projects are estimated to average approximately 1.2 miles long and would take the following approximate times to pass at study crossings (see Table 6-13 for freight train speeds at study crossings).[8]

- 60 miles per hour (mph): 1.75 minutes
- 50 mph: 2.25 minutes
- 40 mph: 2.5 minutes
- 30 mph: 3 minutes
- 20 mph: 4.25 minutes
- 10 mph: 7.75 minutes

Because the frequency of rail traffic on BNSF main line routes will increase, the probability of an increase in emergency response time at all at-grade crossings would also increase because at-grade crossings would be blocked more frequently. This impact would occur if an emergency vehicle experienced a delay at a grade crossing. The potential for a delay to emergency response would also

[8] Assumes gate closing 30 seconds before the train passes through grade crossing and 12 seconds after the train passes the crossing.

depend on whether the dispatched emergency vehicle would need to cross the rail line and the availability of alternative routes if a train occupies the crossing at the time of the emergency call.

An increase in accident frequency would depend on the type of crossing protection in place and the number of train crossings per day. Increased rail traffic would increase the frequency of accidents compared to existing trains if existing safety crossing protections do not change.

6.3.3.4 Vessel Transportation

This section discusses potential cumulative impacts on vessel transportation.

Study Area

The cumulative impacts study area for vessel transportation consists of the area within 1 mile of the proposed docks, where docking and undocking maneuvers and vessel moorage activities would occur, as well as the waters out to 3 nautical miles seaward of the mouth of the Columbia River, the Columbia River Bar, the Columbia River upriver to Vancouver, Washington,[9] and the Willamette River upriver to the Port of Portland.

Any cumulative project that would introduce new vessel traffic to the lower Columbia River is in this study area (Table 6-4).

Methods

This section focuses on large commercial vessels, excluding fishing vessels and smaller commercial passenger vessels, calling at ports in the study area. These are primarily cargo vessels (i.e., ships and barges carrying various cargo including dry bulk, automobiles, containers, bulk liquids, and other general cargo).

Future traffic volumes for large commercial vessels were projected for 2038 conditions without the Proposed Action (2038 Cumulative No-Action scenario) and with the Proposed Action (2038 Cumulative Proposed Action scenario). The 2038 Cumulative No-Action scenario vessel traffic projection applied a 1% annual growth rate to the 2014 baseline vessel traffic data for all vessel categories and added the anticipated vessel transits for the cumulative projects and the No-Action Alternative.[10] The 2038 Cumulative Proposed Action scenario applied the same 1% annual growth rate to the 2014 baseline vessel traffic data for all vessel categories, added the anticipated vessel transits for the cumulative projects, and added the projected vessel transits for the Proposed Action. For each of these scenarios, incident frequencies and the likelihood of a bunker oil spill and volume were modeled. In addition to the vessel transit projections, the model used environmental data (wind, visibility, and sea-state data).

Cumulative Impacts

The Proposed Action would result in direct and indirect impacts on the vessel transportation system along the Columbia River navigation channel due to vessel operations. These impacts could include

[9] The Port of Vancouver is the furthest upstream port receiving large commercial vessels.

[10] Projected vessel transits for the cumulative projects used in the risk assessment to predict the increased likelihood of a vessel incident under cumulative conditions are based on Table 6-4 of the Draft EIS. Although these numbers are higher than those shown here in Table 6-14, and therefore result in higher incident occurrence, they provide a valid basis for comparing increased risk under the Proposed Action to that under No-Action Alternative.

increased risks of vessel allision (with fixed object), other incidents (collisions, groundings, or fires), and oil spills. The cumulative projects that would add vessel traffic to the study area would have a similar potential to affect the vessel transportation system along the Columbia River navigation channel due to vessel operations. Therefore, the Proposed Action, in combination with the cumulative projects, would contribute to cumulative impacts on vessel transportation.

2038 Vessel Traffic

As shown in Table 6-14, the 2038 Cumulative No-Action scenario includes a projected 6,050 vessel transits in the study area; the 2038 Cumulative Proposed Action scenario includes a projected 7,678 vessel transits in the study area. For comparison, the historical peak vessel traffic years for the Columbia River were 1999 with 2,269 calls (4,538 transits) based on vessels entry and transit data (Washington State Department of Ecology 2014) and 1979 with 2,376 calls (4,752 transits), based on the Bar Pilots' data (Jordan pers. comm.).

Table 6-14. Projected 2038 Vessel Transits[a] per Year by Scenario

Projected Annual Vessel Transits	2038 Cumulative No-Action Scenario (Cumulative Projects and Projected Growth Rate)	2038 Cumulative Proposed Action Scenario
2038 Baseline[b]	4,902	4,902
Cumulative Projects	1,096	1,096
No-Action Alternative/Proposed Action	52	1,680
Total Vessel Transits	**6,050**	**7,678**

Notes:
[a] Vessel transits represent one-way trips.
[b] A projected growth rate of 1% per year was applied to the 2014 baseline vessel traffic data.

Vessel Incidents in the Project Area

During operations, the Proposed Action would result in direct impacts due to an increased risk of a vessel emergency at Docks 2 or 3. The increased risk of vessel emergency would be related to Proposed Action-related vessels and would not be affected by cumulative project vessels. Therefore, the increased risk of vessel emergency at the dock would not contribute to cumulative impacts.

As discussed in Chapter 5, Section 5.4, *Vessel Transportation*, the Proposed Action would result in the potential for another vessel to allide with a project vessel. An allision entails a vessel striking a fixed structure, such as another vessel striking a vessel at berth. Increased vessel traffic from the cumulative projects and background vessel traffic growth could result in an increased risk of an allision with a Proposed Action vessel at Dock 2 or 3. The likelihood of an allision under these circumstances in the 2038 Cumulative Proposed Action scenario would be once in 25 years (DNV GL 2016). As discussed in Chapter 5, Section 5.4, *Vessel Transportation*, the magnitude of the incident could vary from little to no damage to greater consequence events. As shown in Table 5.4-11 of Section 5.4, *Vessel Transportation,* there were 56 vessel allisions in the study area from 2001 to 2014. Of these just over half (52%) resulted in no damage. Of the remaining incidents, 43% resulted in some level of damage and 5% result in total loss (all fishing vessels). More substantial consequences, such as total vessel loss, would be less likely to occur (5% of the total incidents reviewed resulted in total loss due to fishing vessel allisions only) based on a data survey of allisions in the study area (2001 to 2014).[11]

Vessel Incidents in the Study Area

As discussed in Chapter 5, Section 5.4, *Vessel Transportation*, there is a potential for Proposed Action-related vessel traffic to affect or be affected by other vessel movements in the study area. The factors that influence the potential for incidents during vessel transport are complex but are driven largely by changes in the pattern of vessel traffic, particularly those vessels limited to the navigation channel (i.e., deep-draft vessels). Incidents with the potential to occur in the study area during vessel transit include allision, collision, grounding (powered or drift), or fire and can involve vessels limited to the channel (i.e., deep-draft vessels) and other typically smaller vessels (e.g., recreational boats or commercial fishing vessels). In addition, increased traffic related to the Proposed Action has the potential to result in increased risk of oil spills from these incidents and from spills during bunkering in the study area.

As noted above, the cumulative projects would increase vessel traffic and would contribute to the potential for incidents in the study area. A quantitative risk assessment was completed to model the projected increase in risks for both the 2038 Cumulative No-Action scenario and the 2038 Cumulative Proposed Action scenario (DNV GL 2016). Projected vessel transits for the cumulative projects used in the risk assessment to predict the increased likelihood of a vessel incident under cumulative conditions are based on Table 6-4 of the Draft EIS. Although those transit numbers are higher than those shown here in Table 6-4 and Table 6-14, and thus result in higher overall incident occurrence, they provide a valid and conservative basis for comparing increased risk under the Proposed Action to that under No-Action Alternative. Therefore, the analysis was not updated for the Final EIS to reflect revised assumptions for cumulative projects.

This section describes the cumulative increases in risk that could result from the Proposed Action in combination with the cumulative projects. The cumulative increase in risk for the 2038 Cumulative No-Action scenario is also described.

Vessel Allision during Transit

As discussed in Chapter 5, Section 5.4, *Vessel Transportation*, the likelihood of a vessel allision is low in the Columbia River because there are few impediments close to the edge of the navigation channel. There were 56 vessel allisions in the study area from 2004 to 2014 (DNV GL 2016). Just over half of the allision incidents (52%) resulted in no damage, 43% resulted in some level of damage, and 5% resulted in total loss. Because of the low risk associated with vessel allisions involving large commercial vessels that result in damage, the cumulative risks were not quantitatively evaluated in the risk assessment. Given the increase in vessel traffic volumes in the 2038 Cumulative No-Action scenario and the 2038 Cumulative Proposed Action scenario, both scenarios would result in an increase in the risk of vessel allisions compared to existing conditions. However, it is not expected that the Proposed Action and cumulative projects would substantively change the outcome distribution of vessel allision incidents. In other words, in both the 2038 Cumulative No-Action scenario and 2038 Cumulative Proposed Action scenario, about half of the vessel allision incidents would be expected to result in no damage, and a very small proportion

[11] The data also show that between 2001 and 2014, 4% of the allisions resulting in some damage were bulk carrier allisions.

would result in total loss of a vessel. Therefore, the overall cumulative risks related to allisions would remain low.

Other Incidents during Transit

The risks of other incidents, such as collisions, groundings, or fires in the study area would increase under both the 2038 Cumulative No-Action scenario and the 2038 Cumulative Proposed Action scenario due to the increase in the number of vessels in the study area. Table 6-15 provides a summary of the results of the quantitative risk assessment for cumulative conditions and for 2028 conditions with just the Proposed Action vessel traffic.

Table 6-15. Likelihood of Incident Related to the Proposed Action in 2028 and Cumulative Scenarios in 2038

	Predicted Annual Incident Frequency				
Scenario	Collision	Powered Grounding	Drift Grounding	Fire	Total
2028 Proposed Action	3.06	15.20	3.90	0.0043	22.20
2038 Cumulative No-Action	3.95	16.50	4.22	0.0047	24.70
2038 Cumulative Proposed Action	4.42	17.30	4.54	0.0051	26.30
Incremental Increase (2038 Cumulative No-Action to 2038 Cumulative)	0.47	0.80	0.32	0.0004	1.60

Notes:
Source: DNV GL 2016

As shown in Table 6-15, the likelihood of all incidents would increase over time as the volume of vessel traffic in the study area increases unrelated to the Proposed Action. The 2038 Cumulative Proposed Action scenario would have the highest vessel traffic because it would include Proposed Action-related vessels, and thus has the greatest predicted incident frequency. As discussed above, the 2038 Cumulative Proposed Action scenario accounts for vessel traffic associated with projected background growth and the cumulative projects. Based on the analysis for the Proposed Action in Chapter 5, Section 5.4, *Vessel Transportation*, the most frequent incident would be expected to be a powered grounding and the least frequent incident would be a fire. The consequences of a modeled incident can vary greatly from no damage to total loss and an increase in likelihood alone is not representative of the magnitude of the potential consequences. In other words, not all of these incidents are likely to result in notable damages.

Overall, the Proposed Action, in combination with the cumulative projects, would contribute to a cumulative increase in predicted vessel incident frequency in the study area. The modeling predicts approximately 26.30 incidents per year in 2038 Cumulative Proposed Action scenario conditions, compared to 24.70 incidents in 2038 Cumulative No-Action scenario conditions. Groundings (powered and drift) are projected to account for 21.84 of the incidents (17.30 powered groundings and 4.54 drift groundings). The Proposed Action's incremental contribution to this cumulative impact would be small, approximately 1.6 incidents per year over the 2038 Cumulative No-Action scenario. As shown in Table 6-15, the likelihood of all incidents would be substantially higher in the 2038 Cumulative No-Action scenario than in the 2028 Proposed Action condition due to the increase in vessel traffic associated with the cumulative projects and projected background growth unrelated to the Proposed Action.

Oil Spills

As discussed in Chapter 5, Section 5.4, *Vessel Transportation*, risks of oil spills during transit could occur as the result of an incident or during the transfer of fuel onboard. If an incident occurred that resulted in an impact near the stern of a vessel, there is a possibility that a fuel tank could be damaged and fuel spilled. Oil spills could also occur during bunkering (refueling) at anchorages in the study area. In general, the risks of oil spills would increase under the 2038 Cumulative Proposed Action scenario due to the increase in the number of vessels in the study area. To provide additional information about the relative likelihood of various sized oil spills, the risk assessment quantitatively evaluated the increase in risks in the 2038 Cumulative Proposed Action scenario.

Table 6-16 presents the likelihood (in return period years) of different spill sizes that are most likely to occur as a result of the increased risk of collisions or groundings with vessel traffic from the Proposed Action and the cumulative projects in 2038. As discussed in Chapter 5, Section 5.4, *Vessel Transportation*, oil spills could also occur because of a grounding incident. The risk of an oil spill due to a grounding was quantified for Proposed Action vessels only, which would remain constant between 2028 and 2038 (840 vessel calls per year). Therefore, the risk of an oil spill due to grounding would be the same in 2038 and is 2028 (Table 5.4-17 in Chapter 5, Section 5.4, *Vessel Transportation*).

Table 6-16. Likelihood of Different Oil Spill Sizes from Collisions Related to the Proposed Action and Cumulative Projects in 2038

Predicted Return Period (Once in…)	Oil Spill Volume (gallons)
222 years	Greater than 0
224 years	20,900 gallons or less
381 years	59,300 gallons or less
444 years	107,400 gallons or less
2,461 years	166,500 gallons or less

Notes:
Source: DNV GL 2016

As shown in Table 6-16 the likelihood of oil spills from collisions would be relatively low in the 2038 Cumulative Proposed Action scenario, with the most likely scenario occurring once every 224 years with a spill of 20,900 gallons or less. In comparison, the return period of the same size spill in 2028 with just the Proposed Action (without the cumulative projects) would be once every 341 years (Table 5.4-16 in Chapter 5, Section 5.4, *Vessel Transportation*). As noted in Chapter 5, Section 5.4, *Vessel Transportation*, spills in the study area from 2004 to 2014 have ranged from 0.1 gallon to 1,603 gallons, with 84% having a volume of less than 10 gallons. Spills of more than 100 gallons have occurred at a frequency of 0.4 per year or once every 2.2 years. The average size of these relatively larger spills is approximately 630 gallons. A collision that results in an oil spill would be a serious incident with a spill size greater than historic oil spill incidents. This is because a collision that results in an oil spill must strike the location of the oil tank on the vessel with sufficient energy to puncture it. Such an incident would result in a large spill. In general, the cumulative increase in vessel traffic would also result in an increase in the likelihood of these smaller spills.

As discussed in Chapter 5, Section 5.4, *Vessel Transportation*, an amendment to Maritime Air Pollution from Ships Annex that went into effect in 2007 included a new regulation 12A on oil fuel tank protection. The regulation limits an individual fuel tank to a maximum capacity limit of 3,270 cubic yards—15,725 barrels—and includes requirements for the protected location of the fuel tanks and performance standards for accidental oil fuel outflow. These requirements can help reduce the extent of releases in the event of a vessel incident.

Overall, the Proposed Action would contribute to an increase in the likelihood of an oil spill; however, the relative contribution of the Proposed Action to the overall risk would decline over time (as the cumulative total of trips increased) and the risks in general, due to a vessel incident, would remain low.

Other Impacts

Increased vessel traffic associated with the Proposed Action and cumulative projects would have the potential to result in cumulative impacts related to vessel wake, propeller wash, underwater noise and vibration, discharge of ballast water, and shoreline erosion. These potential cumulative impacts are addressed in Section 6.3.1.4, *Cultural Resources*; Section 6.3.2.2, *Surface Water and Floodplains*; Section 6.3.2.4, *Water Quality*; Section 6.3.2.5, *Vegetation*; Section 6.3.2.6, *Fish*, and Section 6.3.2.7, *Wildlife*. These vessel-related cumulative impacts are particularly complex and depend on a variety of interrelated factors. In general, the increase in deep-draft vessels associated with the Proposed Action and cumulative projects would result in the increased potential for vessel-related cumulative impacts to occur.

6.3.3.5 Noise and Vibration

This section discusses potential cumulative noise impacts.

Based on the analysis in Chapter 5, Section 5.5, *Noise and Vibration*, the Proposed Action would have negligible vibration impacts during operations. For this reason, only the potential cumulative noise impacts in the project area and rail and vessel operations are discussed in this section.

Study Area

The study area for the cumulative noise impacts is defined as the project area, Reynolds Lead and BNSF Spur, and the expected routes for Proposed Action-related trains on the BNSF main line in Washington State. No cumulative projects would increase rail traffic on the Reynolds Lead and BNSF Spur.

The study area for vessel noise and vibration includes the project area and the Columbia River to 3 nautical miles offshore. Any cumulative project that would add new vessel traffic is in this study area (Table 6-4).

Methods

For BNSF main line routes in Washington State, an assessment of the change in noise levels relative to 2015 rail traffic was performed. Cumulative baseline rail traffic beyond Longview Junction on BNSF main line routes in Washington State were developed from the *Washington State Rail Plan* using linear extrapolation of 2010 and 2035 projected train traffic provided in the plan to 2038 conditions. As described in Section 6.3.3.1, *Rail Transportation*, it was assumed that all rail traffic for the cumulative projects (Table 6-3) was not included in the 2035 *Washington State Rail Plan* baseline estimates and so was added to the baseline estimates. Cumulative project rail routes were based on existing BNSF operations, which assume that directional running routes westbound loaded unit trains via Vancouver through the Columbia River Gorge and eastbound empty unit trains via Stampede Pass. This analysis analyzed two scenarios: Cumulative No-Action scenario (without Proposed Action-related Trains) and Cumulative Proposed Action scenario (with Proposed Action-related trains).

For the vessel noise, an assessment of vessel noise from each vessel trip was performed by identifying the potential noise exposure at varying distances from the Columbia River navigation channel.

Cumulative Impacts

As described in Chapter 5, Section 5.5, *Noise and Vibration*, noise from coal export terminal operations is projected to exceed the Washington State noise standard at one residence. Proposed Action-related trains on the Reynolds Lead would increase noise to levels that would exceed applicable noise level criteria at noise-sensitive receptors including residences near the Reynolds Lead. Proposed Action-related trains on BNSF main line routes in Washington State would emit noise and Proposed Action-related vessels would emit noise on the Columbia River to 3 nautical miles offshore.

No cumulative projects or coal export terminal operations would combine to cause excessive noise levels near a residence. The Barlow Point Master Plan identifies potential for uses for the land near the residence, but no specific land use actions have been proposed at the Barlow Point site. Therefore, the estimated 2028 noise levels at this residence presented in Chapter 5, Section 5.5, *Noise and Vibration*, would be the same in 2038.

The following section describes the cumulative noise impacts related to rail and vessel operations.

Rail

The following sections describe the cumulative rail noise impacts for the Reynolds and BNSF Spur, and BNSF main line routes in Washington State.

Reynolds Lead and BNSF Spur

Cumulative noise impacts on the Reynolds Lead and BNSF Spur would be the same as presented in Chapter 5, Section 5.5, *Noise and Vibration*, because none of the cumulative projects would add rail traffic on the Reynolds Lead or BNSF Spur.

There is the potential for decreased train horn noise near the Oregon Way and Industrial Way crossings of the Reynolds Lead. The *SR 432 Highway Improvements and Rail Realignment Study* completed in September 2014 (Cowlitz-Wahkiakum Council of Governments 2014) identified various design concepts for rail and highway improvements to improve safety, mobility, congestion, and freight capacity. The top project that emerged from the study was a grade-separated intersection at the Industrial Way/Oregon Way intersection (SR 432/SR 433 intersection). This project, called the Industrial Way/Oregon Way Intersection Project led by Cowlitz County Public Works, currently in the preliminary design environmental compliance phase, is addressing traffic congestion, freight mobility, and safety issues at the Industrial Way/Oregon Way intersection. In January 2017, one of two design options advanced to the EIS phase would grade-separate the Reynolds Lead crossing with Oregon Way and Industrial Way, meaning trains would not be required to sound horns for public safety at the Oregon Way and Industrial Way crossings of the Reynolds Lead. If this design option is identified as the preferred alternative and the project is constructed before 2038, all noise impacts from Proposed Action-related rail traffic within the immediate vicinity of the crossings at Oregon Way and Industrial Way would not occur.

BNSF Main Line Routes in Washington State

Table 6-17 illustrates the estimated 2038 rail traffic noise exposure relative to 2015 conditions based on the rail traffic volumes provided in Section 6.3.3.1, *Rail Transportation*.

Table 6-17. Estimated 2038 Rail Traffic Cumulative Increase in Noise Exposure Relative to 2015 Conditions by Scenario

Route Segment	Cumulative No-Action Scenario L_{dn} Increase	Cumulative Proposed Action Scenario L_{dn} Increase
Idaho/Washington State Line-Spokane	4.0	4.4
Spokane-Pasco	4.7	5.3
Pasco-Vancouver	3.9	4.2
Vancouver-Longview Junction	4.2	4.4
Longview Junction-Auburn	4.2	4.4
Auburn-Pasco	7.2	8.1

The estimated cumulative increase compared to existing noise levels is 3.9 dBA to 7.2 dBA without Proposed Action-related trains, and 4.2 dBA to 8.1 dBA with Proposed Action-related trains. The contribution of Proposed Action-related trains would be between 0.3 dBA and 0.9 dBA. The highest increase in noise exposure would occur on the Auburn–Pasco segment. As described in Chapter 5, Section 5.5, *Noise and Vibration*, the relative impacts from exposure to increased noise would depend on the existing noise level. As the existing level of noise exposure increases, the additional noise exposure needed to cause a higher-magnitude impact per applicable noise criteria decreases. On average, potentially affected receptors would generally experience an average increase in noise exposure over the course of any given day. Noise-sensitive receptors would experience train horns sounding more frequently for public safety at at-grade crossings because more rail traffic would be operating.

Vessels

Proposed Action-related vessel traffic would be approximately 70 ships per month or approximately 840 ships a year in 2038 (1,640 one-way transits). As shown in Section 6.3.3.4, *Vessel Transportation*, vessel traffic is projected to increase approximately 1% annually plus vessel traffic related to the cumulative projects.

Table 6-18 illustrates the potential noise level from Proposed Action-related vessel traffic at various perpendicular distances from the Columbia River navigation channel. The cumulative noise exposure from each Proposed Action-related vessel trip was assumed similar to the noise exposure from all cumulative vessel noise traffic. The estimated noise exposure from Proposed Action-related vessel traffic would be comparable to or less than ambient noise levels at the noise-sensitive receivers and would not result in any cumulative noise impacts at noise-sensitive receivers.

Table 6-18. Potential Noise Exposure Levels from Vessel Traffic at Various Perpendicular Distances from the Columbia River Navigational Channel

Distance (feet)	Day-night Sound Level (L_{dn})
400	44
600	40
800	38
1000	36
1200	34
1400	33
1600	32

6.3.3.6 Air Quality

This section discusses potential cumulative impacts on air quality.

Study Area

The study area for the cumulative impacts on local air quality is defined as the project area, Reynolds Lead, and BNSF Spur. Cumulative local air quality impacts would be the same as presented in Chapter 5, Section 5.6, *Air Quality*, because none of the cumulative projects would add rail traffic on the Reynolds Lead or BNSF Spur. The study area for potential cumulative impacts on air quality statewide includes the expected rail routes for Proposed Action-related trains in Washington State and the Columbia River to 3 nautical miles offshore. Any cumulative projects that would add new rail traffic (Table 6-3) or vessel traffic (Table 6-4) are in this study area.

Methods

Rail and vessel emissions in 2038 under cumulative conditions were assessed. The analysis used the estimates of vessel and rail trips in 2038 identified in Section 6.3.3.1, *Rail Transportation,* and Section 6.3.3.4, *Vessel Transportation,* to determine potential cumulative air quality impacts from locomotive and vessel emissions in the study area.

Cumulative Impacts

As described in Chapter 5, Section 5.6, *Air Quality*, sources of emissions during operation of the Proposed Action in the project area would include fugitive emissions from coal handling and mobile source emissions from maintenance and operation, and emissions from Proposed Action-related trains and vessels in the project area. Indirect emissions would include emissions from Proposed Action-related trains on the Reynolds Lead, BNSF Spur, and BNSF main line routes in Washington State, and vessel emissions from Proposed Action-related vessels from the project area to 3 nautical miles offshore. Cumulative local air quality impacts would be the same as presented in Chapter 5, Section 5.6, *Air Quality*, because none of the cumulative projects are in the study area.

The following sections assess cumulative air quality impacts in the statewide study area.

Locomotives

As shown in Section 6.3.3.1, *Rail Transportation*, rail traffic in the study area is projected to increase by 2038. Because the most stringent EPA-mandated set of locomotive emission standards, called

Tier 4, will be nearly fully phased in by 2038, emissions of nitrogen oxide, particulate matter, and VOC are projected to have an overall decrease ranging from 35 to 60% relative to existing Washington State locomotive emissions. EPA has not mandated lower standards for carbon monoxide and sulfur oxides. The projected increase of these emissions in the study area is about 200% by 2038. All rail traffic in the study area is projected to increase emissions for all air pollutants by about 11%, but with lower emissions for nitrogen oxide, particulate matter, and VOC compared to current levels because of the Tier 4 emission standards. The cumulative projects would also increase the inhalation cancer risk near rail routes in the study area from locomotive diesel particulate matter emissions.

Vessels

As shown in Section 6.3.3.4, *Vessel Transportation*, vessel trips in the study area are projected to increase by 57% by 2038 with the vessel trips related to the Proposed Action and the cumulative projects compared to 2038 baseline conditions, and air emissions would increase similarly with the exception of nitrogen oxide. The Maritime Air Pollution from Ships Annex VI, to which the United States is a signatory, requires compliance with Tier III nitrogen oxide mission standards for marine vessel engines built on or after January 1st, 2016 that operate in the North American emission control area. Assuming all vessels by 2038 comply with the requirement, nitrogen oxide emissions would decrease by about 34% relative to current Columbia River vessel emissions. Therefore, while cumulative vessel traffic in 2038 is projected to increase air emissions by about 57%, nitrogen oxide emissions are estimated to be lower than current levels.

6.3.3.7 Coal Dust

This section discusses potential cumulative impacts from coal dust.

Study Area

The study area for direct impacts is the project area. The study area for indirect impacts is as follows.

- **Cowlitz County and Ecology**: The area along the Reynolds Lead and BNSF Spur up to 1,000 feet from the rail line. No cumulative projects in this study area would transport coal.
- **Ecology only**: The area along the rail routes for Proposed Action-related trains on BNSF main line routes in Washington State up to 1,000 feet from the rail line. The following cumulative projects are in this study area: Gateway Pacific Terminal, Fraser Surrey Docks, Westshore Terminals Expansion, and TransAlta Coal Power Plant.

Methods

Cumulative coal dust impacts in the project area and on the Reynolds Lead and BNSF Spur would be the same as the Proposed Action-related impacts presented in Chapter 5, Section 5.7, *Coal Dust*, because none of the cumulative projects would transport coal on the Reynolds Lead or BNSF Spur.

On BNSF main line routes in the study area, air quality modeling using AERMOD was conducted using the data collected during the coal train field study described in Chapter 5, Section 5.7, *Coal Dust*, and other applicable coal dust studies. Potential cumulative coal dust impacts were estimated at three locations: on the BNSF main line in Cowlitz County, in the Columbia River Gorge, and in eastern Washington between Spokane and Pasco. The operation of the BNSF surfactant facility in

Pasco was conservatively assumed to cause no reduction in coal dust emissions. The *SEPA Coal Technical Report* (ICF 2017b) provides the methods and assumptions to perform the modeling. The same assumptions for coal dust emission rates for PM2.5 and PM10 and deposition were applied.

The total number of loaded coal trains was estimated based on existing coal trains (average of 2 to 4 trains per day) and the number of loaded coal trains in Washington State associated with the cumulative projects in 2038:[12]

- Proposed Action (Cowlitz County, Washington): 8 loaded coal trains per day
- Gateway Pacific Terminal (Whatcom County, Washington): 9 loaded coal trains per day[13]
- Fraser Surrey Docks (Surrey, British Columbia): 3 loaded coal trains per day
- Westshore Terminals Expansion (Delta, British Columbia): 3 loaded coal trains per day
- TransAlta Coal Power Plant (Lewis County, Washington): Removal of an average of 1.4 loaded coal trains per day due to the shutdown of the coal power plant

Assuming 4 existing coal trains per day, and assuming the estimated coal rail traffic for the cumulative projects, approximately 25.6 loaded coal trains were estimated at all three analysis locations in 2038. All locations were estimated to have the same loaded coal trains because all existing coal trains and coal trains associated with the cumulative projects were assumed to travel the same route: from the Washington State–Idaho border, through Spokane, Pasco, Columbia River Gorge, and on the BNSF main line in Cowlitz County. The differences in findings between locations would be a result of local meteorology and orientation of the rail line.

The impacts are discussed in terms of the comparison with the National Ambient Air Quality Standards (NAAQS) for coal dust air concentration and for coal dust deposition in terms of nuisance levels. Additional information on NAAQS and coal dust deposition nuisance levels is provided in Chapter 5, Section 5.7, *Coal Dust*.

Cumulative Impacts

Cumulative coal dust impacts in the project area and on the Reynolds Lead and BNSF Spur would be the same as the Proposed Action-related impacts presented in Chapter 5, Section 5.7, *Coal Dust*, because none of the cumulative projects would transport coal on the Reynolds Lead or BNSF Spur.

This section describes the cumulative coal dust impacts that could result from coal unit train traffic at three locations on the BNSF main line in Washington State.

BNSF Main Line in Cowlitz County

Table 6-19 presents the estimated maximum PM10 and PM2.5 concentrations at 50 and 100 feet on the BNSF main line in Cowlitz County in comparison to ambient air quality standards. The estimated concentrations exceed the 24-hour and annual PM2.5 ambient air quality standard less than 100 feet from the rail line.

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[12] For more information on these projects, see Table 6 -2.

[13] The development application for the Gateway Pacific Terminal was active at the time the analysis was completed (December 2016).

Table 6-19. Estimated Maximum PM10 and PM2.5 Concentrations—BNSF Main Line in Cowlitz County

Pollutant	Averaging Period	Distance from Rail Line (feet)	Modeled Impact (μg/m³)	Background (μg/m³)[a]	Total Concentration (μg/m³)[b]	NAAQS (μg/m³)
PM10	24 hours[c]	50	96	28	124	150
		100	73.6	28	102	150
PM2.5	24 hours[d]	50	14.4	21	**35.4**	35
		100	12.2	21	33.2	35
	Annual[e]	50	6.7	5.9	**12.6**	12
		100	5.4	5.9	11.3	12

Notes:
[a] Background concentrations are monitoring design values for Woodland, Washington (Northwest International Air Quality Environmental Science and Technology Consortium 2015).
[b] **Bolded, shaded gray** indicates an estimated total concentration that would exceed the NAAQS.
[c] The PM10 24-hour modeled impact is 3-year average of the 2nd high concentration from each year.
[d] The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations.
[e] Modeled impact is the annual average over the 3 modeled years.
PM10 = particulate matter with a diameter of 10 micrometers or less; PM2.5 = particulate matter with a diameter of 2.5 micrometers or less ; μg/m³ = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards

Table 6-20 presents estimated maximum and average monthly coal dust deposition along the BNSF main line in Cowlitz County at varying distances. The average maximum monthly coal dust deposition is estimated to be above the benchmark used for the analysis at less than 200 feet from the rail line. The maximum monthly deposition is estimated to be above the benchmark used for the analysis at less than 250 feet from the rail line.

Table 6-20. Estimated Average Maximum and Maximum Monthly Coal Dust Deposition—BNSF Main Line in Cowlitz County

Distance (feet)	Average Maximum Monthly Deposition (g/m²/month)	Maximum Monthly Deposition (g/m²/month)[a]	Benchmark Used for the Analysis (g/m²/month)[b]
50	**7.0**	**10.6**	2.0
100	**4.5**	**7.4**	2.0
150	**3.1**	**5.8**	2.0
200	**2.2**	**4.2**	2.0
250	1.6	**3.2**	2.0

Notes:
[a] **Bolded, shaded gray** indicates an estimated deposition would be higher than the benchmark used for the analysis.
[b] Source: New Zealand Ministry of Environment 2001
g/m²/month = grams per cubic meter per month

BNSF Main Line in the Columbia River Gorge

Table 6-21 presents the estimated maximum PM10 and PM2.5 concentrations at 100 feet on the BNSF main line in the Columbia River Gorge in comparison to ambient air quality standards. Estimated maximum PM10 and PM2.5 concentrations are below the NAAQS.

Table 6-21. Estimated Maximum PM10 and PM2.5 Concentrations—BNSF Main Line in Columbia River Gorge

Pollutant	Averaging Period	Distance from Rail Line (feet)	Modeled Impact (µg/m³)	Background (µg/m³)[a]	Total Concentration (µg/m³)	NAAQS (µg/m³)
PM10	24 hours[b]	100	45.1	56	101.1	150
PM2.5	24 hours[c]	100	7.0	19	26.0	35
	Annual[d]	100	2.4	6.1	8.5	12

Notes:
[a] Background concentrations are monitoring design values for The Dalles, Oregon.
[b] The PM10 24-hour modeled impact is 3-year average of the 2nd high concentration from each year.
[c] The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations.
[d] Modeled impact is the annual average over the 3 modeled years.
PM10 = particulate matter with a diameter of 10 micrometers or less; PM2.5 = particulate matter with a diameter of 2.5 micrometers or less; µg/m³ = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards

Table 6-22 presents estimated maximum and average monthly coal dust deposition along the BNSF main line in the Columbia River Gorge at varying distances. The average maximum monthly coal dust deposition is estimated to be above the benchmark used for the analysis within 200 feet from the rail line. The maximum monthly deposition is estimated to be at the benchmark used for the analysis at 250 feet from the rail line.

Table 6-22. Estimated Average Maximum and Maximum Monthly Coal Dust Deposition—BNSF Main Line in Columbia River Gorge

Distance (feet)	Average Maximum Monthly Deposition (g/m²/month)	Maximum Monthly Deposition (g/m²/month)	Benchmark Used for the Analysis (g/m²/month)[a]
100	**4.8**	**8.3**	2.0
150	**3.4**	**4.5**	2.0
200	**2.4**	**3.4**	2.0
250	1.8	**2.6**	2.0

Notes:
[a] **Bolded, shaded gray** indicates an estimated deposition would be higher than the benchmark used for the analysis.
[b] Source: New Zealand Ministry of Environment 2001
g/m²/month = grams per cubic meter per month

BNSF Main Line in Eastern Washington

Table 6-23 presents the estimated maximum PM10 and PM2.5 concentrations at 100 feet on the BNSF main line in the eastern Washington in comparison to ambient air quality standards. A potential exists for an exceedance of the 24-hour PM10 and annual PM2.5 ambient air quality standard at 100 feet from the rail line.

Table 6-23. Estimated Maximum PM10 and PM2.5 Concentrations—BNSF Main Line in Eastern Washington

Pollutant	Averaging Period	Distance from Rail Line (feet)	Modeled Impact (μg/m³)	Background (μg/m³) [a]	Total Concentration (μg/m³)[b]	NAAQS (μg/m³)
PM10	24 hours[c]	100	77.4	101	**178.4**	150
PM2.5	24 hours[d]	100	9.0	24.2	33.2	35
	Annual[e]	100	6.7	5.9	**12.6**	12

Notes:
[a] Background for PM10 is the maximum high second high 24-hour average over the 3-year period (2012–2014) from Kennewick or Spokane. The background PM2.5 from the Spokane monitor from the 2012–2014 period.
[b] **Bolded, shaded gray** indicates an estimated total concentration that would exceed the NAAQS.
[c] The PM10 24-hour modeled impact is 3-year average of the 2nd high concentration from each year.
[d] The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations.
[e] Modeled impact is the annual average over the 3 modeled years.
PM10 = particulate matter with a diameter of 10 micrometers or less; PM2.5 = particulate matter with a diameter of 2.5 micrometers or less; μg/m³ = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards

Table 6-24 presents estimated maximum and average monthly coal dust deposition along the BNSF main line in eastern Washington. The estimated average maximum monthly coal dust deposition is above the benchmark used for the analysis at 100 feet from the rail line. The estimated maximum monthly deposition is above the benchmark used for the analysis at 100 feet from the rail line.

Table 6-24. Estimated Average Maximum and Maximum Monthly Coal Dust Deposition—BNSF Main Line in Eastern Washington

Distance (feet)	Average Maximum Monthly Deposition (g/m²/month)	Maximum Monthly Deposition (g/m²/month)[a]	Benchmark Used for the Analysis (g/m²/month)[b]
100	**2.3**	**2.8**	2.0
200	0.8	1.6	2.0

Notes:
[a] **Bolded, shaded gray** indicates an estimated deposition would be higher than the benchmark used for the analysis.
[b] Source: New Zealand Ministry of Environment 2001
g/m²/month = grams per square meter per month

6.3.3.8 Greenhouse Gas Emissions

This section discusses potential cumulative impacts from greenhouse gas emissions.

Study Area

The study area for cumulative impacts from greenhouse gas emissions is Cowlitz County, Washington State, the United States, and the Pacific Basin. Table 6-25 identifies the projects that were considered.

Methods

Estimates of coal transport, coal consumption, and natural gas substitution are informed by projections in the *SEPA Coal Market Assessment Technical Report* (ICF 2017c), which considers scenarios based on economic and policy projections. The scenarios are intended to represent a range of greenhouse gas estimates to reflect the uncertainty in the energy market. The coal market assessment evaluated two scenarios:

- **Cumulative Proposed Action scenario.** This scenario includes the Proposed Action and existing and planned expansion of existing and new coal export terminals in the Pacific Northwest of the United States and western Canada shown in Table 6-25.
- **Cumulative No-Action Scenario.** None of the planned coal export terminals in Table 6-25 would be constructed.

Table 6-25. Planned and Existing Pacific Northwest and Western Canada Coal Export Terminals

Terminal	Location	Assumed Online Year	Capacity (MMT/year)
Planned			
Proposed Action	Washington	2025	44
Gateway Pacific Terminal[a]	Washington	2030	48
Fraser Surrey Docks	British Columbia	2018	4
Westshore Terminals Expansion	British Columbia	2017	3
Ridley Terminals Expansion	British Columbia	2016	13
Neptune Terminals Expansion	British Columbia	2018	6
Total Planned			**118**
Existing			
Westshore Terminals	British Columbia	Existing	33
Neptune	British Columbia	Existing	12
Ridley	British Columbia	Existing	12
Total Existing			**57**
Total Planned and Existing			**175**

Notes:
[a] The development application for the Gateway Pacific Terminal was active at the time the analysis was completed (December 2016).
MMT/year = million metric tons per year

The greenhouse gas emissions from the construction and operation of the other six planned coal export terminals in Table 6-25 were not included in the cumulative emissions analysis. The impact of these other coal export terminals was limited to their ability to influence coal supplies and prices, and therefore greenhouse gas emissions related to the coal market assessment. The analysis assumed each coal export terminal would operate at full capacity for a total export tonnage of 175 million metric tons of coal per year.

The uncertainty associated with estimating coal extraction emissions is high compared to other sources of emissions included in the analysis. Coal extraction emissions are driven by methane emissions from mining and post-mining operations (e.g., transportation and handling), where estimates can vary by as much as +/- 300% depending on the mining method (i.e., surface or underground), computation method, and data availability. Information on extraction emissions is disclosed in the *SEPA Greenhouse Gas Emissions Technical Report*.

Cumulative Impacts

The coal market assessment found the operation of the planned coal export terminals in Table 6-25 would increase the domestic coal prices and decrease domestic coal consumption, resulting in a decrease in domestic greenhouse gas emissions from coal combustion. Natural gas consumption would increase because it would be used as a substitute for coal. Overall, net domestic greenhouse gas emissions would increase. Asian coal displacement, coupled with induced demand[14] from reduced international coal prices, would outweigh any reduction in domestic emissions, and would result in a net increase in international greenhouse gas emissions.

Table 6-26 illustrates the total net greenhouse gas emissions in 2038 in million metric tons of CO_2e for the Cumulative Proposed Action scenario compared to the Cumulative No-Action scenario.

Table 6-26. Total Net Greenhouse Gas Emissions in 2038 for the Cumulative Proposed Action Scenario[a]

Area	Net Emissions (Million Metric Tons CO_2e)
Cowlitz County	0.04
Washington State	0.37
United States	0.29
International[b]	31.18
Total	**31.47**[c]

Notes:
[a] Net emissions compared to the Cumulative No-Action scenario (i.e., no coal export terminals).
[b] Outside the United States.
[c] United States plus international.
CO_2e = carbon dioxide equivalent

Within Cowlitz County, greenhouse gas emissions in 2038 would be approximately 0.040 million metric tons of CO_2e greater than the Cumulative No-Action scenario where none of the planned coal export terminals would be constructed. Within Washington State, greenhouse gas emissions would be approximately 0.37 million metric tons of CO_2e greater than emissions in the Cumulative No-Action scenario. Emissions would increase by approximately 0.29 million metric tons in the United States due to domestic rail transportation and other domestic emission sources outweighing the decrease in emissions from domestic coal substitution for natural gas. Outside of the United States, greenhouse gas emissions would be approximately 31.47 million metric tons of CO_2e greater than emissions in the Cumulative No-Action scenario.

[14] This analysis addresses coal combustion in Asia that would result from the increased supply of coal due to the operation of the Proposed Action. The addition of 118 million metric tons to the supply of coal in Asia would increase supply and lower international coal prices. Asian coal markets would respond to lower prices by consuming more coal overall. This additional demand for coal that is a result of shifts due to the shift in the price of coal is referred to as induced demand.

Chapter 7
Public Involvement and Agency Coordination

Public and agency outreach efforts for the Millennium Bulk Terminals—Longview State Environmental Policy Act (SEPA) and National Environmental Policy Act (NEPA) Environmental Impact Statements (EIS) began in summer 2013, and have continued throughout this environmental review process.

Cowlitz County and the Washington State Department of Ecology (Ecology), the co-lead agencies for the SEPA environmental review (SEPA co-lead agencies), identified the following objectives to guide the public involvement process.

- Conduct a thorough, impartial, and transparent public review process that informs the development of the Draft and Final EISs.
- Provide clear milestones for public participation.
- Effectively and efficiently share with, and obtain information from, the public and stakeholders during the EIS development processes.
- Meet or exceed state and local requirements for public involvement as defined by the SEPA processes.

This chapter summarizes the public and agency outreach activities and outlines next steps.

7.1 Scoping

The purpose of scoping is to determine the "scope" or content of an EIS. The scope identifies the potential environmental impacts and alternatives that need to be evaluated. The scoping process provides an opportunity for the public, communities, tribes, and agencies to recommend methods for analysis and alternatives to evaluate in the EIS and to identify issues and concerns. Public comments on the scope of the EIS help the SEPA co-lead agencies determine what should be addressed in the EIS.

The SEPA co-lead agencies together with the U.S. Army Corps of Engineers (Corps) (for the NEPA process) used an expanded scoping process that provided for a 95-day comment period from August 16, 2013 to November 18, 2013. During this time, the public, agencies, communities, and tribes were able to learn about the Proposed Action, the EIS process, and provide scoping comments. Five public scoping meetings were held around Washington State. Agencies, local governments, tribes, and the public were invited to participate in the scoping process by providing comments and attending a public scoping meeting.

7.1.1 Public Notices and Media Activities

The SEPA co-lead agencies and the Corps used a broad-based, multimedia approach was used to notify the public about the Proposed Action and of the purpose, time, and location of the scoping meetings.

7.1.1.1 Website

The SEPA co-lead agencies and the Corps used the EIS website (www.millenniumbulkeiswa.gov) throughout public scoping to post announcements and as a repository for scoping materials and information. The SEPA co-lead agencies and the Corps emphasized the availability of the EIS website. The EIS website address was included in all news releases and informational materials and identified as the project information hub and portal for submitting comments during the scoping period. The website address was also provided to each scoping meeting venue for incorporation into venue websites.

The scoping meeting dates and locations were also included on Ecology's public calendar and posted on the Cowlitz County Building and Planning home page.

7.1.1.2 Media Releases

Standard press releases, as well as social media, were used to inform the public of the scoping process, scoping meetings, and comment opportunities. Media releases from the co-lead agencies were distributed before each meeting, with designated contacts listed for reporter follow-ups. Social media such as Twitter were used as appropriate by the co-lead agencies.

Display ads were placed in local newspapers where scoping meetings were held, including *The Spokane Spokesman-Review*, *The Tri-City Herald* (Pasco), *The Columbian* (Vancouver/Clark County), *The Longview Daily News*, and *The Tacoma News-Tribune.*

7.1.1.3 Public Notices

People interested in updates on the project were added to the project LISTSERV before and during the scoping period. Announcements were sent to the LISTSERV group throughout the scoping period. Public notice was also provided via the SEPA Register.

Care was taken to ensure that notices of meetings reached minority and low-income populations. Approximately 6,000 flyers (in English and Spanish) were mailed to minority and low-income neighborhoods identified near the project area, including the Highlands neighborhood in Longview. Flyers were also placed at public locations near the target neighborhoods and posted to the EIS website. An example of this flyer is included in Appendix J, *Scoping Summary Report*.

7.1.2 Prescoping Meetings and Interviews

Meetings were held with stakeholders and local agency staff prior to public scoping. The purpose of these meetings was to discuss expectations, meeting ground rules, and general communication. Prior to the scoping meetings, various stakeholders, and local agency representatives were identified and interviewed to guide planning for the scoping process.

The interviews identified the following characteristics and opportunities for each stakeholder.

- Understanding and expectations about the scoping process and the Proposed Action.
- Experience with similar processes and lessons learned.
- Suggestions on scoping meeting design and ground rules.
- Effective communication channels and outreach methods, particularly for low-income and minority populations.

The SEPA co-lead agencies and the Corps identified 40 individuals (or groups of individuals) to be contacted for interviews. Thirty interviews were conducted with stakeholders representing the following diverse range of interests and demographics.

- Environmental and conservation groups
- Landowner organizations
- Labor organizations
- Economic development and business organizations
- Port authorities
- River navigation pilots
- Local community groups

In addition to these interviews, a local agency meeting was held on August 6, 2013, in Kelso, Washington. The purpose of the meeting was to provide an overview of the Proposed Action, discuss the environmental process and preliminary schedule, and solicit input regarding scoping. Representatives from the following 11 jurisdictions were invited to participate in this meeting. Staff members from the Association of Washington Cities were also invited to participate in this meeting.

- Camas
- Kalama
- Kelso
- Longview
- Pasco
- Rainier, Oregon
- Spokane
- Tacoma
- Vancouver
- Washougal
- Woodland

7.1.3 Agency and Tribal Notifications and Scoping

On August 19, 2013, a letter informing tribes of the scoping process and requesting input was sent to all tribes in Washington State, as well as tribes in Oregon and Idaho that expressed interest in the Proposed Action. Appendix J, *Scoping Summary Report*, contains a copy of the letter sent to tribes.

In addition to tribal outreach, on October 23, 2013, a state agency scoping meeting was held at Ecology's offices in Lacey, Washington. State agency staff were given the opportunity to learn about the Proposed Action, ask questions, and suggest studies and activities for the EIS scope. Appendix J, *Scoping Summary Report,* contains a list of attendees.

7.1.4 Comment Period and Open Houses

During the 95-day scoping period, the SEPA co-lead agencies and the Corps provided multiple opportunities for interested members of the public to learn about the Proposed Action and the EIS process and to provide scoping comments. The SEPA co-lead agencies and the Corps invited members of the public, government agencies, tribes, and other organizations to provide scoping comments through the following methods.

- Sending a comment by mail to the SEPA co-lead agencies in care of ICF, 710 Second Avenue, Suite 550, Seattle, WA 98104.
- Obtaining a comment form at a scoping meeting and submitting written comments at the meeting or through U.S. mail.
- Using the online comment form on the EIS website.
- Submitting a comment by email to a dedicated project email address.
- Making a public verbal comment at a scoping meeting.
- Providing an individual verbal comment at a scoping meeting in a quiet room.

All comments received were posted on the EIS website so users could review all comments submitted. For mass mailings or email petitions, the comments were reviewed individually, but only one representative document was uploaded on the EIS website. Similarly, some organizations collected a large number of comments from individuals and then submitted them in one package; a representative document was uploaded to the EIS website in the same format in which they were submitted. All comments were retained as part of the administrative record.

Five scoping meetings were held (Table 7-1).

Table 7-1. SEPA EIS Open House Scoping Meetings

City	Meeting Date and Time	Venue
Longview	Tuesday, September 17, 2013, 4 p.m. to 8 p.m.	Cowlitz County Expo Center
Spokane	Wednesday, September 25, 2013, 4 p.m. to 8 p.m.	Spokane Convention Center
Pasco	Tuesday, October 1, 2013, 4 p.m. to 8 p.m.	The Trac Center
Clark County	Wednesday, October 9, 2013, 4 p.m. to 8 p.m.	Clark County Fairgrounds
Tacoma	Thursday, October 17, 2013, 4 p.m. to 8 p.m.	Tacoma Convention Center

7.2 Scoping Comments

Scoping comments were collected through a variety of methods and organized by comments received from individuals, agencies, tribes, and organizations. Scoping comments were considered in the development of the EIS. Appendix J, *Scoping Summary Report*, contains information regarding the scoping comments.

7.2.1 Total Comments Submitted

In total, 217,566 comments were received during the 95-day scoping comment period. Of the 217,566 submissions received, approximately 214,640 were from mass mail form letter or email campaigns. Of the roughly 3,000 unique submissions, approximately 2,000 were found to contain substantive text. Scoping comments were received in a variety of ways, including electronic, written, and verbal comments. Electronic comments were submitted online through the EIS website or via email to a designated email address or to the SEPA co-lead agencies. Written comments included unique letters, form letters, or comment cards that were received through U.S. mail or at the public scoping meetings. Written comments also included preprinted cards and form letters or postcards from nongovernmental organizations. Verbal comments were received at the public scoping meetings, either as presented to the audience or to a court reporter in a semiprivate setting.

7.2.2 Agency and Tribal Comments

Of the 217,566 comment letters received during the 95-day scoping comment period, 127 letters were received from federal and state agencies, state elected officials, local agencies or organizations, and tribes. Table 7-2 lists the agencies and tribes that provided scoping comments.

7.3 Draft EIS Public Comment Period

Publication of the Draft EIS on April 29, 2016, triggered another round of public outreach and involvement, including notification to interested parties about the document's availability and public hearings to solicit input on the Draft EIS.

During the 45-day Draft EIS public comment period (April 29 through June 13, 2016), the SEPA co-lead agencies provided multiple opportunities to comment on the Draft EIS. The co-lead agencies invited members of the public, government agencies, tribes, and organizations to provide comments through the following methods.

- Sending a comment by mail to Millennium Bulk Terminals—Longview SEPA EIS in care of ICF, 710 Second Avenue, Suite 550, Seattle, WA 98104.
- Obtaining a comment form at a public hearing and submitting written comments at the hearing or through U.S. mail.
- Using the online comment form on the EIS website (www.millenniumbulkeiswa.gov).
- Making a public oral comment at a Draft EIS public hearing.
- Providing an individual oral comment to a court reporter at a Draft EIS public hearing in a quiet room.

Table 7-2. Agency and Tribal Scoping Commenters

Federal Agencies	State Agencies	Local and Regional Agencies	State Elected Officials	Tribes and Tribal Representation
• Bonneville Power Administration • Columbia River Gorge Commission (submitted two letters) • National Marine Fisheries Service • National Park Service • U.S. Department of Agriculture Forest Service • U.S. Environmental Protection Agency	• Washington State Department of Archaeology and Historic Preservation • Washington State Department of Health • Washington State Department of Natural Resources • Washington State Department of Transportation • Washington Utilities and Transportation Commission	• City of Camas, Washington • City of Cheney, Washington • City of Eugene, Oregon • City of Everett, Washington • City of Hood River, Oregon • City of Kennewick, Washington • City of Lacey, Washington • City of Livingston, Montana • City of Longview, Washington • City of Milwaukie, Oregon • City of Missoula, Montana • City of Mosier, Oregon • City of Olympia, Washington • City of Sandpoint, Idaho • City of Spokane, Washington • City of Sumner, Washington • City of Tacoma, Washington • City of The Dalles, Oregon • City of Vancouver, Washington • City of Washougal, Washington • Cowlitz-Wahkiakum Council of Governments • Cowlitz 2 Fire & Rescue • King County Executive • Gallatin City-County Board of Health • Metropolitan King County Council • Olympic Region Clean Air Agency • Port of Longview • San Juan County Council • Spokane Regional Clean Air Agency • Thurston County Commissioner	• Washington State Legislature, Representatives and Senators from Districts 3, 4, 8, 9, 17, 18, 20, 23, 24, 27, 28, 32, 33, 34, 35, 36, 37, 38, 40, 43, 46	• Coeur d'Alene Tribe of Indians • Columbia River Inter-Tribal Fish Commission • Confederated Tribes and Bands of the Yakama Nation • Confederated Tribes of the Umatilla Indian Reservation • Confederated Tribes of the Warm Springs Reservation of Oregon (submitted two letters) • Cowlitz Indian Tribe • Nez Perce Tribe • Nisqually Indian Tribe • Upper Columbia United Tribes

7.3.1 Notification of Public Hearings and Comment Period

The SEPA co-lead agencies used a broad-based, multimedia approach to notify the public of the purpose, time, and location of each public hearing. The following methods were used to notify the public of the hearings.

- **EIS website**. Public hearing information was posted on the EIS website and the websites of the SEPA co-lead agencies. The EIS website address was displayed prominently in all news releases and informational materials and identified as the project information hub and portal for submitting comments during the review period. Each venue where the public hearings took place incorporated the EIS website into the venue website.
- **Media releases**. Media releases from the SEPA co-lead agencies were distributed no later than 7 days before each public hearing, with designated contacts listed for reporter follow-ups. An initial media release regarding the release of the Draft EIS was distributed on April 7, 2016.
- **Elected official alerts**. The SEPA co-lead agencies sent notices to designated elected officials on the local, state, and national levels. Notices followed existing agency protocols for communication with elected officials.
- **Public hearing notification**. Notifications of public hearings were published in local newspapers where public hearings were held: *The Longview Daily News* (April 29 and May 10, 2016)*, The Spokane Spokesman-Review* (April 29 and May 12, 2016), and *The Tri-City Herald* (Pasco) (April 29 and May 19, 2016).
- **Local project mailing**. An informational flyer was mailed to approximately 5,900 residents in neighborhoods near the project area, including the Highlands neighborhood, 2 weeks prior to the Longview public hearing on May 24, 2016.
- **Project email list**. An email was sent to people who signed up for the project email notification service.

7.3.2 Public Hearings and Open Houses

The SEPA co-lead agencies held three public hearings and open houses at three locations:

May 24, 2016, 1:00 to 4:00 p.m. and 5:00 to 9:00 p.m.
Cowlitz County Regional Conference Center
1900 7th Avenue
Longview, WA 98632

May 26, 2016, 1:00 to 4:00 p.m. and 5:00 to 9:00 p.m.
Spokane Convention Center
334 W Spokane Falls Boulevard
Spokane, WA 99201

June 2, 2016, 1:00 to 4:00 p.m. and 5:00 to 9:00 p.m.
TRAC Center
6600 Burden Boulevard
Pasco, WA 99301

The public hearings provided a forum to present and receive comments on the Draft EIS. Attendees were able to provide comments in person, either in a semi-private setting or before an audience. Attendees were also provided with comment forms for written comments.

Commenters were encouraged to focus their comments on three topics.

- Methods used for the analyses.
- Findings in the Draft EIS related to potential resource impacts.
- Proposed measures to avoid, minimize, and mitigate impacts of the Proposed Action.

The public hearings included an open house, which allowed the public to interact with agency representatives and to access information about the SEPA EIS process as well as details about the Proposed Action. Exhibit boards showed the proposed coal export terminal, findings contained in the Draft EIS, and a general timeline. Exhibit boards also included guidance on providing comments during the Draft EIS comment period and information about how the comments will be used.

7.4 Draft EIS Public Comments

Approximately 267,000 comment submissions were received during the 45-day Draft EIS public comment period. Of these submissions, approximately 263,000 were from mass mail form letter or petition campaigns and approximately 4,000 were unique submissions (i.e., not a form letter or petition). All comments submitted during the Draft EIS public comment period were reviewed and considered in the development of this Final EIS.

Volume IV, *Responses to Comments on the Draft Environmental Impact Statement*, of this Final EIS presents responses to comments on the Draft EIS. Copies of all public comments received on the Draft EIS are included in an appendix to this volume.

7.4.1 Comments Received by Method

As described in Section 7.3, *Draft EIS Public Comment Period,* comments on the Draft EIS were received through various methods, including comments submitted electronically using the online comment form on the EIS website, oral comments provided at the public hearings, and written comments submitted by mail or at the public hearings. Table 7-3 presents the number of comment submissions and the method by which they were submitted.

Table 7-3. Comment Submissions by Method

Method	Number of Submissions
Online comment forms	3,166
U.S. mail/emails[a]	78
Public hearings (written)	284
Public hearings (oral testimony)	693
Form letters	262,965
Total	**267,186**

Notes:
[a] Submission of comments via email was not a defined method to submit public comments; however, comments emailed directly to the SEPA co-lead agencies were considered for this Final EIS.

7.4.2 Comments Received by Commenter Type

Comments on the Draft EIS were received from agencies and elected officials, organizations, tribes, and the general public. Table 7-4 presents the number of submissions received by each of these commenter types. Final EIS Volume IV, *Responses to Comments on the Draft Environmental Impact Statement*, identifies the specific agencies, organizations, tribes, and individuals that provided comments on the Draft EIS.

Table 7-4. Comment Submissions by Commenter Type

Commenter Type	Number of Submissions
Federal agencies	4
State agencies	5
Local and regional agencies	22
Elected officials	50
Tribes and tribal representation	13
Organizations	101
General public	4,026
Form letters	262,965
Total	**267,186**

7.5 Next Steps

The Final EIS provides information for public, state, and local agencies to support decision-making regarding permits for the Proposed Action. These agencies include Cowlitz County, City of Longview, Southwest Clean Air Agency, Three Rivers Regional Wastewater Authority, Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, and Ecology. Local, regional, and state agencies will conduct their respective reviews as defined by adopted local, regional, and state rules. All primary local, regional, state, and federal permits must be issued before the Proposed Action may begin. The NEPA Final EIS, expected to be published in 2017, will also inform local, state, and federal permit decisions.

Chapter 8
Required Plans, Permits, and Approvals

Table 8-1 lists the anticipated plans, permits, and approvals required for the Proposed Action.

Table 8-1. Required Plans, Permits, and Approvals

Plan / Permit / Approval	Jurisdiction / Agency
Local	
Shoreline Substantial Development Permit	Cowlitz County
Shoreline Conditional Use Permit	Cowlitz County
Critical Areas Permit	Cowlitz County
Floodplain Permit	Cowlitz County
Building and Site Development Permits	Cowlitz County
Wastewater Discharge Permit	Three Rivers Regional Wastewater Authority
Utility Service Permit	City of Longview
Notice of Construction	Southwest Clean Air Agency
State	
Clean Water Act Section 401 Water Quality Certification	Washington State Department of Ecology
National Pollutant Discharge Elimination System Construction Stormwater Permit	Washington State Department of Ecology
National Pollutant Discharge Elimination System Industrial Stormwater Permit	Washington State Department of Ecology
Water Rights Permit	Washington State Department of Ecology
Shoreline Conditional Use Permit	Washington State Department of Ecology
Hydraulic Project Approval	Washington Department of Fish and Wildlife
Site Use Authorization for Dredging or Flow Lane Disposal Authorization	Washington State Department of Natural Resources
Aquatic Lands Lease[a]	Washington State Department of Natural Resources
Federal	
Clean Water Act Section 404 (Department of the Army Permit)	U.S. Army Corps of Engineers
Rivers and Harbors Act Section 10 (Department of the Army Permit)	U.S. Army Corps of Engineers
Rivers and Harbors Act Section 14 (Section 408) (Department of the Army Permit)	U.S. Army Corps of Engineers
Section 106 of the National Historic Preservation Act	U.S. Army Corps of Engineers
Endangered Species Act Consultation	U.S. Fish and Wildlife Service and National Marine Fisheries Service

Plan / Permit / Approval	Jurisdiction / Agency
Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996—Section 305 Consultation	National Marine Fisheries Service
Marine Mammal Protection Act	National Marine Fisheries Service

Notes:
[a] The project area landowner (Northwest Alloys) holds a 30-year aquatic lands lease (20-B09222) with the Washington State Department of Natural Resources (WDNR). According to WDNR, under the terms of the lease, Northwest Alloys must obtain WDNR's written consent prior to construction of improvements. Northwest Alloys has not yet requested and WDNR has not provided its consent to the improvements proposed by the Applicant (Palazzi pers. comm. 2017).

Glossary

100-year floodplain	Areas with a 1% chance of flooding annually.
active channel margin	The shoreline and nearshore edge habitat, extending from the ordinary high water mark (+11.1 feet) to 0 feet Columbia River Datum.
air toxics	Pollutants known or suspected to cause cancer or other serious health effects.
allision	The striking of a vessel with a fixed structure, such as a dock or vessel at berth.
ambient noise	Sum of all noise (from human and naturally occurring sources) at a specific location over a specific period.
anadromous	A life history strategy of fish that includes migration between fresh- and salt-water, in which reproduction and egg deposition occurs in freshwater while rearing to the adult stage occurs in the ocean.
annual average daily traffic	Measure of traffic level; refers to the total volume of traffic that passes an intersection or crossing each year divided by 365 days.
anthropogenic	Relating to, or resulting from the influence of human beings on the environment.
Applicant	Millennium Bulk Terminals—Longview, LLC
Applicant's leased area	The approximately 540-acre site currently leased by the Applicant.
aquifer	Geologic layers that hold and transmit groundwater.
archaeological resources	Features and deposits located on or below the ground surface that are evidence of prior human occupation or use in a particular area.
attainment	Designation by the U.S. Environmental Protection Agency indicating a region's criteria pollutant concentrations meet federal air quality standards.
automatic block signal	A railroad electronic signal system that can control when a train can advance into the next section of track.
a-weighted decibel	Adjustable measure of noise level that approximates the frequency response of the human ear.
ballast	Crushed stone on which rail ties are laid and distributes the load from the rail ties and facilitates drainage.
ballast water	Water held in tanks on ships to provide stability and maneuverability. Commonly used to regulate weight of a ship that has been emptied of cargo.
baseline volume	The volume (such as trains or vehicles) before adding other volumes (such as trains or vehicles related to an action).

benthic habitat	The habitat occurring on the bottom or bed of a body of water, including the sediment surface and some sub-surface layers.
berm	A raised bank or strip bordering a river or canal.
best management practice	Methods or techniques found to be the most effective and practical means in achieving an objective while making the optimum use of resources.
black mud	Substance generated during the production of aluminum from the operation of the cryolite recovery process.
BNSF Spur	The approximate 2.0-mile-long railroad track between the BNSF main line and the Longview Switching Company yard.
bubble curtain	An underwater system that produces a curtain of bubbles, which acts as a barrier against shock waves, debris, or fish.
buffer bin	A mechanical apparatus used during the transfer of coal from the stockpile areas to ships and allow for the diversion of coal.
bulk commodity	Cargo transported unpackaged in large quantities in either liquid or granular form.
bunkering	The process of refueling a ship.
carbon dioxide-equivalent	A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential.
Cascadia Subduction Zone	A fault line between the North America tectonic plate and the Juan de Fuca plate beneath the Pacific Ocean.
centralized traffic control	Railroad control system where electrical circuits monitor the location of trains, allowing dispatchers to control train movements from a remote location, usually a central dispatching office.
coal dust nuisance impacts	Coal dust that affects the aesthetics, look, or cleanliness of a surfaces but not the health of humans and the environment.
coal tar pitch	Amorphous black or brown residue produced by the distillation or heat treatment of coal tar.
Columbia River Datum	Vertical datum established in 1911 for the Columbia River from the lower river to the Bonneville Dam.
conveyors	A mechanical apparatus for moving articles or bulk material from place to place by moving belt or a chain of receptacles.
criteria air pollutants	Common air pollutants regulated by the National Ambient Air Quality Standards: ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide, and lead.
critical area	Area protected by local jurisdictions through critical area regulations. Includes wetlands, areas with a critical recharging effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently flooded areas, and geologically hazardous areas.

cultural resource	Broad range of resources that represent or convey a place's heritage or help tell the story of a region's past and are considered important to a community and worth preserving, such as a building, structure, object, site, landscape, or district associated with human manipulation of the environment.
culturally significant property	Site or location considered culturally important to the history of a group of people, or are locations where culturally important events or practices are known to have occurred.
cumulative impact	Impact that would result from the incremental addition of an action to impacts from past, present, and reasonably foreseeable future actions.
day-night average noise level (Ldn)	A 24-hour average noise level with a 10-decibel upward adjustment of noise levels occurring at night to account for most peoples' sensitivity to noise at night.
deadweight tonnage	A measure of how much weight a ship is carrying or can safely carry; the sum of the weights of cargo, fuel, fresh water, ballast water, provisions, passengers, and crew.
decibel	Unit for measuring sound pressure level.
deepwater zone	The area extending waterward from the shallow water zone, approximately 450 feet ranging in depth from -20 feet Columbia River Datum to -40 feet Columbia River Datum.
depressional wetland	Wetlands located in topographic depressions where surface water can accumulate.
distinct population segment	The smallest division of a taxonomic species permitted to be protected under the federal Endangered Species Act.
Dock 1	Existing dock in the Columbia River in the Applicant's leased area.
Docks 2 and 3	Proposed docks in the Columbia River in the project area.
downgradient	The direction that groundwater flows.
draft (vessel)	The depth of water to which a ship sinks according to its load. The Columbia River's deep draft navigation system provides for a 43-foot-deep by 600-footwide channel inside the Columbia River Bar.
dredge prism	Area of the bottom of a waterbody where substrate material will be removed during dredging. Typically a three-dimensional area, measured in cubic feet or cubic yards.
dredging	To clean out the bed of a harbor, river, or other area of water, by scooping out mud, weeds and other material with a dredge, or in-water excavating machine.
dry fog	Liquid droplets between 1-10 microns. Dry fog does not moisten exposed surfaces.
emergent vegetation	A plant rooted in the bed of a body of water, with stem and leaves extending above the surface of the water.

equivalent sound level (Leq)	Average sound energy level for a specified unit of time, frequently 1 hour.
eulachon	A small, anadromous fish from the eastern Pacific Ocean. Also called smelt, candlefish, or hooligan.
evolutionarily significant unit	A population of organisms that is considered distinct for purposes of conservation.
floodplain	An area of land adjacent a river or stream that floods during periods of high water discharge.
floodway	Channel and adjacent floodplain that contain floodwaters.
flow lane disposal	The discharge of dredged materials into in-river sites known to naturally scour during period of tide change or high water conditions.
fugitive emissions	Emissions that are not emitted from a stack, vent, or other specific point that control discharge.
General Land Office plat map	A map showing divisions of land produced by the General Land Office, which became the Bureau of Land Management in 1946.
geographic information systems	A system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data.
geotechnical boring	Below-ground boring to obtain soil strata. Typically done for geotechnical investigations, to establish soil compressibility, strength, and other characteristics likely to influence construction activities.
global warming potential	Measure of how effective a greenhouse gas is at trapping heat.
grade crossing	A location at which a road or street crosses a railroad at the same level, rather than over or under using a bridge or tunnel.
greenhouse effect	The retention of outgoing thermal energy and incoming solar energy in Earth's atmosphere.
greenhouse gases	Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by Earth's surface, the atmosphere itself, and clouds. These constituents trap solar energy in the atmosphere and contribute to global warming and climate change.
groundwater	Water beneath the Earth's surface.
Handymax-class vessels	Vessels with deadweight tonnage of up to 60,000 tons with a draft of between 36 and 39 feet.
hazardous air pollutants	Air pollutants that are known or suspected of causing health effects.

historic resources	Elements of the built environment, such as buildings or structures, or human-made objects or landscapes that are listed in, or eligible for listing in the National Register of Historic Places. Defined by the regulations for implementing Section 106 of the National Historic Preservation Act.
horn noise	Sound of locomotive warning horns for public safety.
hydrogeomorphic classification	A functional assessment approach for classifying wetlands.
impervious surface area	Surfaces, such as roads, sidewalks, rooftops, and parking lots, that are covered in materials that do not allow for the infiltration of water, such as asphalt, concrete, brick, and stone.
level of service	A qualitative measure of traffic flow (on a scale of A through F) based on the delay (measured in seconds of delay per vehicle) experienced by vehicles at an intersection, or in this EIS, a railroad crossing.
locomotive	Rail transport vehicle that provides the motive power for a train.
main line	Railroad track used for through trains or is the principal artery of the railroad system from which yards, sidings, and spurs are connected.
manifest train	A freight train with a mixture of car types and cargoes.
megawatt	Standard of energy equal to 1 million watts, or 1,000 kilowatts.
noise contour	Line plotted on a map that shows equal noise levels.
nonpoint-source pollution	Pollution that originates from diffuse sources, such as land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification.
ordinary high water mark	The line on the shore established by fluctuations of water and indicated by physical characteristics.
outfall	The point where a river, drain, or sewer empties into another body of water.
palustrine wetland	An inland wetland that lacks flowing water, contains ocean-derived salts in concentrations of less than 0.5 parts per thousand, and is non-tidal.
Panamax vessel	Vessel with a deadweight tonnage between 60,000 and 100,000 tons and with a draft of between 42 and 49 feet.
particulate matter	The mixture of solid particles and liquid droplets suspended in the air, many of which are hazardous. The particles vary in size, composition, and origin. The National Ambient Air Quality Standards (NAAQS) establish maximum concentrations for particle sizes with diameter of less than or equal to 10 micrometers (PM10) and particles with a mean diameter of less than or equal to 2.5 micrometers (PM2.5) in size.
pile	A pole made of wood, concrete, or steel that is driven deep into the ground to serve as structural support.
pinniped	A taxonomic classification for fin-footed marine mammals, including seals, sea lions, and walruses.

pollutant	A substance or energy introduced into the environment that has undesired effects, or adversely affects the usefulness of a resource.
potline	An electrically-connected row of reduction pots used in aluminum smelting.
practical capacity (railroad)	Number of trains that can be accommodated in a given time period, determined by signal type, number of tracks, and geometric limitations.
priority habitat and species	As defined by the Washington Department of Fish and Wildlife, habitat types or elements with unique or significant value to a diverse assemblage of species. Priority species are those species that require protective measures for their survival due to their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance.
profile, shaped profile (coal)	Shape of loaded coal in a rail car.
project area	The approximate 190-acre site for the proposed export terminal.
rail yard	Series of railroad tracks for storing, sorting, or loading/unloading, railroad cars and/or locomotives.
reclaimer	Machine that collects coal from the stockpile pads and begins the process of transferring coal to the docks for loading onto vessels.
Reynolds Lead	The approximate 5.1 mile-long railroad track between the Longview Switching Company yard and the Applicant's leased area.
riparian	Of, relating to, or situated on the bank of a river.
sedimentation	Process by which particles settle to the bottom of a water body.
seismicity	The occurrence or frequency of earthquakes in a region.
settlement ponds	Ponds using sedimentation to remove matter and turbidity from wastewater and used to control water pollution.
shallow water zone	The fully inundated near-shore zone extending from the edge of the active channel margin at 0 feet Columbia River Datum out to -20 feet Columbia River Datum.
sheet flow	A flow of water over the ground that is not confined to channels or streams.
short ton	2,000 pounds. Distinct from tonne (1,000 kilograms) and long ton (2,240 pounds).
siding	Section of railroad track connecting on both ends to the main line, usually used as a parking lane or passing lane.
smelting	The extraction of a metal from ore by a process involving heating and melting. Portions of the project area were previously used for aluminum smelting activities.
smolt	A young salmon first migrating from fresh water to the ocean.
spent potliner	A waste material generated by aluminum smelting.

spur	A short railway line branching off of a larger line.
stacker	Machine that deposits coal on the stockpile pads.
stockpile pads	Discrete areas designed for the storage of coal. Stockpile pads are used to stage coal unloaded from train, prior to loading onto vessels.
substrate	Mineral and organic material forming the bottom of a waterway or waterbody; also the base or substance upon which an organism is growing.
sump	A low place that collects runoff such as water or chemicals.
Superfund site	A polluted location undergoing a long-term clean-up response action for hazardous material contamination under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
swale	A linear depression of land, similar to a shallow channel and usually moist or marshy.
switching (railroad)	A railroad operation within and near the limits of a rail yard; generally consists of breaking down and building up trains, storing and classifying rail cars, and serving industries within and near yard limits.
topper agent	Coating applied to the coal placed in a rail car after loading to reduce fugitive emissions.
track class	Railroad classification system for railroad tracks that identify maximum speeds, as defined by the Federal Railroad Administration.
traffic warrant control	Railroad control system where train crews obtain authority to occupy and move on a main track from the dispatcher usually by phone, radio, or electronic transmission to the locomotive.
train accident rate	Number of accidents per train mile. The Federal Railroad Administration accident reporting threshold was $10,500 in 2016.
transfer tower	Tower capable of redirecting, transferring, or separating coal to different conveyors.
tribal resources	Tribal fishing and gathering practices and treaty rights, specifically, the collective rights and access to traditional areas associated with a tribe's sovereignty or formal treaty rights.
tsunami	A seismic sea wave.
turbidity	Relative haziness or cloudiness of a water body.
turning basin (vessel)	Wider areas along a channel that are the same depth as the channel, used to maneuver or turn vessels
unit train	A train in which all cars carry the same commodity and are shipped from the same origin to the same destination.
upland	Land or an area of land lying above the level where water flows or where flooding occurs.

vehicle peak hour	The hour of the day with the highest traffic volume.
viewshed	The geographical area visible from a particular location.
visual quality	Characteristic of the visual landscape as measured by vividness, intactness, and unity.
volatile organic compounds	Organic compounds that have a high vapor pressure at room temperature, which gives them a low boiling point. These compounds tend to exist as a gas at room temperature.
watershed	Area in which all rainfall, surface water, and groundwater drains to the same river, lake, or other waterbody.
wayside noise (railroad)	Combined effect of locomotive noise and rail car/wheel noise.
wetlands	Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.
wick drain	A device for draining pore water from soft, compressible soils.

COWLITZ COUNTY
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State of Washington