

## **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?
<b>Chapter 3: Built Environment</b>			
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
<b>Chapter 4: Natural Environment</b>			
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 <sup>a</sup>
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
<b>Chapter 5: Operations</b>			
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 <sup>b</sup>	Yes	Quantitative

Notes:

- <sup>a</sup> The Proposed Action would not result in adverse impacts on groundwater and would not have the potential to contribute to cumulative groundwater impacts.
- <sup>b</sup> 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.<sup>1</sup>
- Potential coal export projects that would introduce rail traffic and vessel traffic.<sup>1</sup>
- Potential crude oil-by-rail projects that would introduce rail traffic and vessel traffic.<sup>1</sup>
- 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).

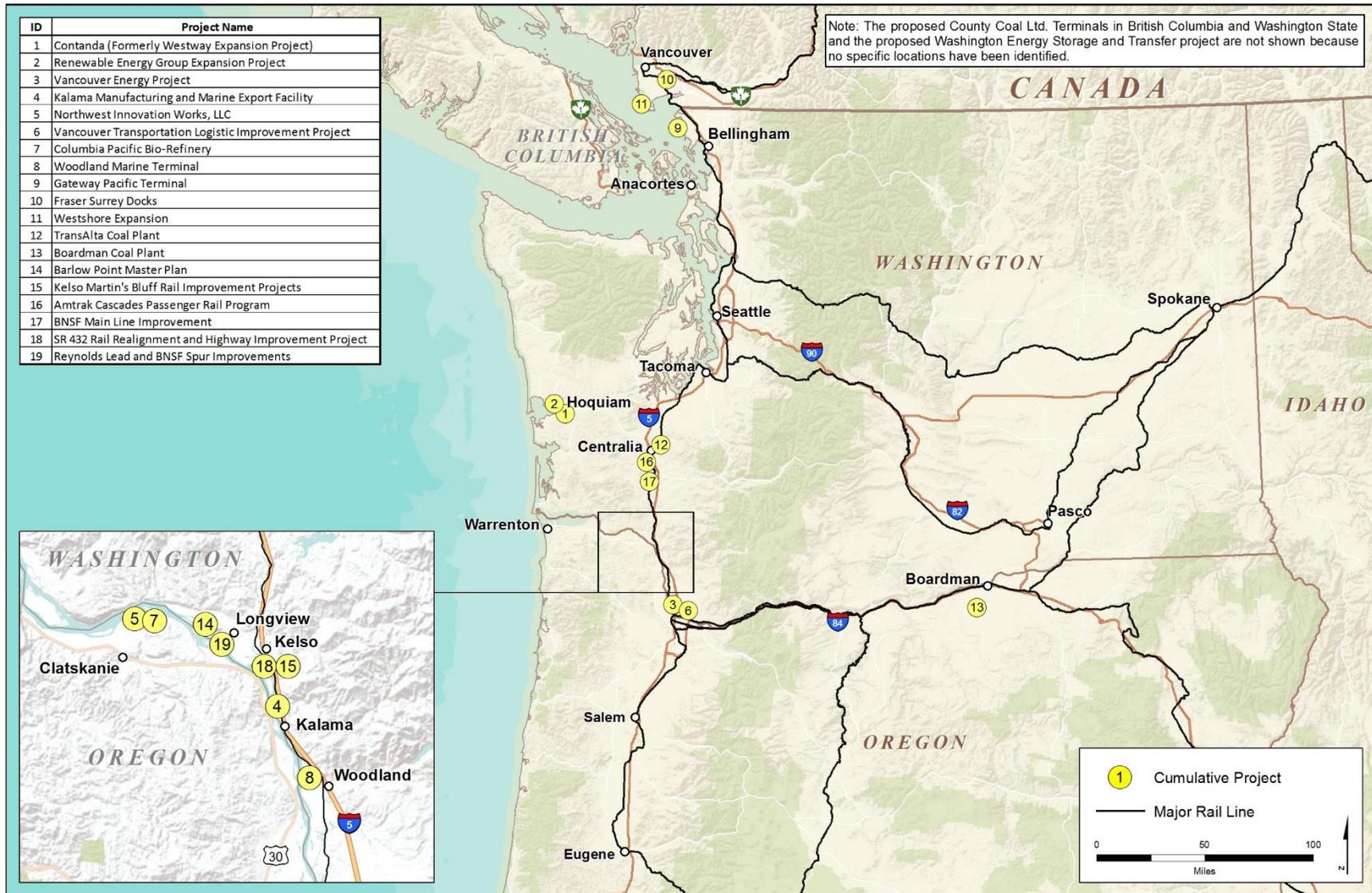
The locations of these projects are shown in Figure 6-1. These projects are referred to as the cumulative projects in this chapter.<sup>2</sup>

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<sup>1</sup> 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.

<sup>2</sup> The cumulative projects were identified and analyzed for this Final EIS in December 2016.

**Figure 6-1. Cumulative Project Locations**



**Table 6-2. Reasonably Foreseeable Future Actions (Cumulative Projects)**

<b>Project</b>	<b>Proponent</b>	<b>Location</b>	<b>Description</b>	<b>Contributing Activity<sup>a</sup></b>	<b>Schedule/Status</b>
<b>Potential Bulk Product Projects: Rail Traffic (BNSF Main Line) and Vessel Traffic (Columbia River)</b>					
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.

<b>Project</b>	<b>Proponent</b>	<b>Location</b>	<b>Description</b>	<b>Contributing Activity<sup>a</sup></b>	<b>Schedule/Status</b>
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.

<b>Project</b>	<b>Proponent</b>	<b>Location</b>	<b>Description</b>	<b>Contributing Activity<sup>a</sup></b>	<b>Schedule/Status</b>
5. Northwest Innovation Works Methanol Facility <sup>b</sup>	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.

<b>Project</b>	<b>Proponent</b>	<b>Location</b>	<b>Description</b>	<b>Contributing Activity<sup>a</sup></b>	<b>Schedule/Status</b>
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.
<b>Potential Coal Terminal Projects: Rail Traffic (BNSF Main Line in Washington State) and Vessel Traffic (Columbia River)</b>					
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.

<b>Project</b>	<b>Proponent</b>	<b>Location</b>	<b>Description</b>	<b>Contributing Activity<sup>a</sup></b>	<b>Schedule/Status</b>
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.
<b>Potential Projects: City of Longview, City of Kelso, and Cowlitz County</b>					
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 <sup>a</sup>	Schedule/Status
<b>Potential Projects: BNSF Main Line Rail Infrastructure or Other Rail Infrastructure</b>					
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: <ul style="list-style-type: none"> <li>• New bypass and siding tracks to ease congestion</li> <li>• Multiple upgrades to existing track</li> <li>• Upgrades to advanced warning signal systems and safety-related projects</li> <li>• Station upgrades and expansions</li> <li>• Eight new locomotives</li> </ul>	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.

<b>Project</b>	<b>Proponent</b>	<b>Location</b>	<b>Description</b>	<b>Contributing Activity<sup>a</sup></b>	<b>Schedule/Status</b>
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 <sup>a</sup>	Schedule/Status
<b>Potential Projects: No Specific Proposal or Location</b>					
20. County Coal Ltd. Terminals, BC <sup>c</sup>	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 <sup>c</sup>	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 <sup>c</sup>	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:

- <sup>a</sup> 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.
- <sup>b</sup> 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.
- <sup>c</sup> 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<sup>3</sup> 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<sup>a</sup>**

Project	Train Trips		
	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
<b>Total Rail Trips (rounded)</b>	<b>54</b>	<b>376</b>	<b>19,584</b>

Notes:

This table does not include Proposed Action-related rail traffic.

<sup>a</sup> 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<sup>a</sup>**

Project	Annual Vessel Calls <sup>b</sup>	Annual Vessel Transits <sup>b</sup>
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
<b>Total Cumulative Project Vessel Trips</b>	<b>548</b>	<b>1,096</b>

Notes:

This table does not include Proposed Action-related vessel traffic.

<sup>a</sup> 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.

<sup>b</sup> The maximum anticipated number of vessel calls and vessel transits is presented.

<sup>3</sup> 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.<sup>4</sup>

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

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<sup>4</sup> 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 measurable 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 nearby 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**

Segment	Projected Capacity in 2038 <sup>a</sup>	Projected Trains per Day in 2038	
		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:  
<sup>a</sup> 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.<sup>5</sup> 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

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<sup>5</sup> 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 <sup>a</sup>
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–LVSU Yard (BNSF Spur)	2.1	0.09	0.24	0.07
LVSU 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:  
<sup>a</sup> 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.<sup>6</sup>

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<sup>6</sup> 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
<b>Reynolds Lead and BNSF Spur Study Crossings</b>					
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
<b>BNSF Main Line in Cowlitz County Study Crossings</b>					
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.

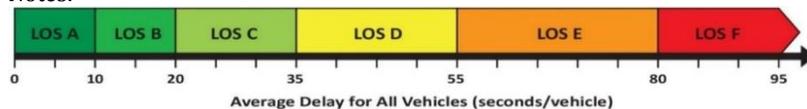
##### Average Vehicle Delay

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<sup>a</sup>**

Crossing	Cumulative No-Action Scenario	Cumulative Proposed Action Scenario
Project Area Access at 38th Avenue	A	<b>F</b>
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:



<sup>a</sup> **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).

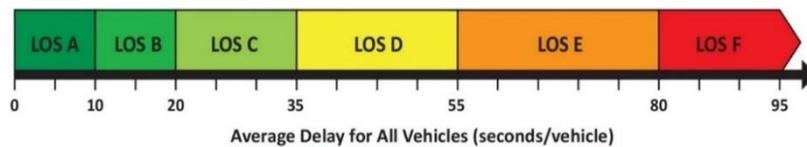
As shown, all study crossings along the Reynolds Lead and BNSF Spur would operate above level of service D, except the project area access opposite 38th Avenue, which would operate at level of service F.

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*

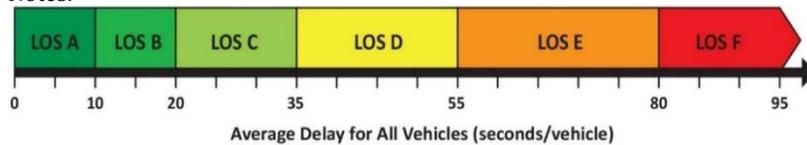
Table 6-10 shows the estimated peak hour vehicle delay at the study crossings on the Reynolds Lead and BNSF Spur by scenario in 2038 if 2 Proposed Action-related trains travel during the peak hour. The peak hour level of service would be below level of service D at four of the eight study crossings if 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)<sup>7</sup> would operate below level of service D without Proposed Action-related trains due to an increase in background traffic volumes.

<sup>7</sup> 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<sup>a</sup>**

Study Crossing/Upstream Intersection	Cumulative No-Action Scenario	Cumulative Proposed Action Scenario <sup>b</sup>
<b>Study Crossing</b>		
Project Area Access at 38th Avenue	B	<b>F</b>
Weyerhaeuser Access at Washington Way	A	<b>E</b>
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	<b>E</b>
Dike Road	C	<b>E</b>
<b>Upstream Intersection</b>		
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	<b>F</b>	<b>F</b>
Industrial Way/California Way	C	C
3rd Avenue/Industrial Way	C	D
Dike Road/Frontage Road	A	A

Notes:



<sup>a</sup> **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).

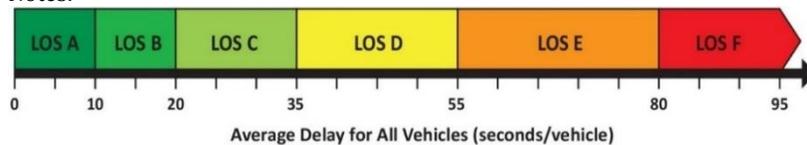
<sup>b</sup> This level of service would occur if 2 Proposed Action-related trains travel during the peak hour.

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<sup>a</sup>**

Crossing	Cumulative No-Action Scenario	Cumulative Proposed Action Scenario <sup>b</sup>
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:



<sup>a</sup> **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).

<sup>b</sup> 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<sup>a</sup>**

Crossing Name	Road Movement <sup>b</sup>	2038 No-Action	2038 Cumulative	Intersection Affected by Queue from Crossing	Intersection Movement <sup>c</sup>	2038 No-Action	2038 Cumulative
		Cumulative	Estimated Queue Length at Crossing (feet)			Cumulative	Estimated Queue Length at Intersection (feet)
<b>Reynolds Lead and BNSF Spur Study Crossings</b>							
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
	Southbound	240	2,060		Eastbound Right	240	2,060
Weyerhaeuser NORPAC Access	Northbound	80	120	Industrial Way/ NORPAC Access	Southbound Through	80	380
	Southbound	40	160		Westbound Left	20	20
Industrial Way	Northbound	360	520	Industrial Way/ Weyerhaeuser	Eastbound Right	20	140
	Southbound	400	4,660		Eastbound Left	200	620
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
California Way	Northbound	220	340	None	Westbound Left	700	1,140
	Southbound	200	740		Southbound Through	580	2,200
3rd Avenue	Northbound	2,660	2,960	3rd Avenue/ Industrial Way	N/A	N/A	N/A
					Westbound Right	100	125
	Southbound	920	3,660	Industrial Way/ California Way	Northbound Through	2,300	2,580
					Southbound Left	220	260
Dike Road	Northbound	80	100	None	Northbound Right	80	80
	Southbound	100	120		Eastbound Through	2,060	2,360

Crossing Name	Road Movement <sup>b</sup>	2038 No-Action Cumulative	2038 Cumulative	Intersection Affected by Queue from Crossing	Intersection Movement <sup>c</sup>	2038 No-Action Cumulative	2038 Cumulative
		Estimated Queue Length at Crossing (feet)				Estimated Queue Length at Intersection (feet)	
<b>BNSF Main Line in Cowlitz County Study Crossings</b>							
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 Northbound Left	100	140
	Westbound	160	200			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:

- <sup>a</sup> Shaded gray values indicate a study crossing or intersection queue that exceeds available storage for the scenario. Shaded black values indicate a queuing impact.
- <sup>b</sup> Roadway movement approaching the rail crossing.
- <sup>c</sup> 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**

# <sup>a</sup>	Study Crossing	Freight Train Speed <sup>b</sup>	2015 Estimated Trains Per Day <sup>c</sup>	2038	2038	% Change
				Cumulative No-Action Scenario Projected Trains Per Day <sup>c</sup>	Cumulative Proposed Action Scenario Projected Trains Per Day	Between Cumulative Scenarios
<b>Spokane County</b>						
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%

# <sup>a</sup>	Study Crossing	Freight Train Speed <sup>b</sup>	2015 Estimated Trains Per Day <sup>c</sup>	2038 Cumulative No-Action Scenario Projected Trains Per Day <sup>c</sup>	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%
<b>Adams County</b>						
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%
<b>Franklin County</b>						
16	Etopia Road W	60	39	122	138	13%
17	Sagemoor Road	60	39	122	138	13%
<b>Benton County</b>						
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%
<b>Klickitat County</b>						
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%
<b>Skamania County</b>						
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%

# <sup>a</sup>	Study Crossing	Freight Train Speed <sup>b</sup>	2015 Estimated Trains Per Day <sup>c</sup>	2038 Cumulative No-Action Scenario Projected Trains Per Day <sup>c</sup>	2038 Cumulative Proposed Action Scenario Projected Trains Per Day	% Change Between Cumulative Scenarios
<b>Lewis County</b>						
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%
<b>Yakima County</b>						
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:

<sup>a</sup> See Chapter 5, Section 5.3, *Vehicle Transportation*, Figure 5.3-6, for study crossing location.

<sup>b</sup> Washington Utilities Transportation Commission 2015.

<sup>c</sup> 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).<sup>8</sup>

- 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

<sup>8</sup> 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,<sup>9</sup> 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.<sup>10</sup> 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

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<sup>9</sup> The Port of Vancouver is the furthest upstream port receiving large commercial vessels.

<sup>10</sup> 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<sup>a</sup> per Year by Scenario**

<b>Projected Annual Vessel Transits</b>	<b>2038 Cumulative No-Action Scenario (Cumulative Projects and Projected Growth Rate)</b>	<b>2038 Cumulative Proposed Action Scenario</b>
2038 Baseline <sup>b</sup>	4,902	4,902
Cumulative Projects	1,096	1,096
No-Action Alternative/Proposed Action	52	1,680
<b>Total Vessel Transits</b>	<b>6,050</b>	<b>7,678</b>

Notes:  
<sup>a</sup> Vessel transits represent one-way trips.  
<sup>b</sup> 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).<sup>11</sup>

### **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

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<sup>11</sup> 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**

Scenario	Predicted Annual Incident Frequency				
	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**

<b>Predicted Return Period (Once in...)</b>	<b>Oil Spill Volume (gallons)</b>
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**

<b>Route Segment</b>	<b>Cumulative No-Action Scenario L<sub>dn</sub> Increase</b>	<b>Cumulative Proposed Action Scenario L<sub>dn</sub> Increase</b>
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 <sub>dn</sub> )
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 emission 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 PM<sub>2.5</sub> and PM<sub>10</sub> 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:<sup>12</sup>

- Proposed Action (Cowlitz County, Washington): 8 loaded coal trains per day
- Gateway Pacific Terminal (Whatcom County, Washington): 9 loaded coal trains per day<sup>13</sup>
- 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 PM<sub>10</sub> and PM<sub>2.5</sub> 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 PM<sub>2.5</sub> ambient air quality standard less than 100 feet from the rail line.

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<sup>12</sup> For more information on these projects, see Table 6 -2.

<sup>13</sup> 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 ( $\mu\text{g}/\text{m}^3$ )	Background ( $\mu\text{g}/\text{m}^3$ ) <sup>a</sup>	Total Concentration ( $\mu\text{g}/\text{m}^3$ ) <sup>b</sup>	NAAQS ( $\mu\text{g}/\text{m}^3$ )
PM10	24 hours <sup>c</sup>	50	96	28	124	150
		100	73.6	28	102	150
PM2.5	24 hours <sup>d</sup>	50	14.4	21	<b>35.4</b>	35
		100	12.2	21	33.2	35
	Annual <sup>e</sup>	50	6.7	5.9	<b>12.6</b>	12
		100	5.4	5.9	11.3	12

Notes:

- <sup>a</sup> Background concentrations are monitoring design values for Woodland, Washington (Northwest International Air Quality Environmental Science and Technology Consortium 2015).
  - <sup>b</sup> **Bolded, shaded gray** indicates an estimated total concentration that would exceed the NAAQS.
  - <sup>c</sup> The PM10 24-hour modeled impact is 3-year average of the 2nd high concentration from each year.
  - <sup>d</sup> The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations.
  - <sup>e</sup> 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 ;  $\mu\text{g}/\text{m}^3$  = 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 ( $\text{g}/\text{m}^2/\text{month}$ )	Maximum Monthly Deposition ( $\text{g}/\text{m}^2/\text{month}$ ) <sup>a</sup>	Benchmark Used for the Analysis ( $\text{g}/\text{m}^2/\text{month}$ ) <sup>b</sup>
50	<b>7.0</b>	<b>10.6</b>	2.0
100	<b>4.5</b>	<b>7.4</b>	2.0
150	<b>3.1</b>	<b>5.8</b>	2.0
200	<b>2.2</b>	<b>4.2</b>	2.0
250	1.6	<b>3.2</b>	2.0

Notes:

- <sup>a</sup> **Bolded, shaded gray** indicates an estimated deposition would be higher than the benchmark used for the analysis.
- <sup>b</sup> Source: New Zealand Ministry of Environment 2001  
 $\text{g}/\text{m}^2/\text{month}$  = 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 ( $\mu\text{g}/\text{m}^3$ )	Background ( $\mu\text{g}/\text{m}^3$ ) <sup>a</sup>	Total Concentration ( $\mu\text{g}/\text{m}^3$ )	NAAQS ( $\mu\text{g}/\text{m}^3$ )
PM10	24 hours <sup>b</sup>	100	45.1	56	101.1	150
PM2.5	24 hours <sup>c</sup>	100	7.0	19	26.0	35
	Annual <sup>d</sup>	100	2.4	6.1	8.5	12

Notes:

- <sup>a</sup> Background concentrations are monitoring design values for The Dalles, Oregon.
- <sup>b</sup> The PM10 24-hour modeled impact is 3-year average of the 2nd high concentration from each year.
- <sup>c</sup> The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations.
- <sup>d</sup> 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;  $\mu\text{g}/\text{m}^3$  = 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 ( $\text{g}/\text{m}^2/\text{month}$ )	Maximum Monthly Deposition ( $\text{g}/\text{m}^2/\text{month}$ )	Benchmark Used for the Analysis ( $\text{g}/\text{m}^2/\text{month}$ ) <sup>a</sup>
100	<b>4.8</b>	<b>8.3</b>	2.0
150	<b>3.4</b>	<b>4.5</b>	2.0
200	<b>2.4</b>	<b>3.4</b>	2.0
250	1.8	<b>2.6</b>	2.0

Notes:

- <sup>a</sup> **Bolded, shaded gray** indicates an estimated deposition would be higher than the benchmark used for the analysis.
  - <sup>b</sup> Source: New Zealand Ministry of Environment 2001
- $\text{g}/\text{m}^2/\text{month}$  = 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 ( $\mu\text{g}/\text{m}^3$ )	Background ( $\mu\text{g}/\text{m}^3$ ) <sup>a</sup>	Total Concentration ( $\mu\text{g}/\text{m}^3$ ) <sup>b</sup>	NAAQS ( $\mu\text{g}/\text{m}^3$ )
PM10	24 hours <sup>c</sup>	100	77.4	101	<b>178.4</b>	150
PM2.5	24 hours <sup>d</sup>	100	9.0	24.2	33.2	35
	Annual <sup>e</sup>	100	6.7	5.9	<b>12.6</b>	12

Notes:

<sup>a</sup> 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.

<sup>b</sup> **Bolded, shaded gray** indicates an estimated total concentration that would exceed the NAAQS.

<sup>c</sup> The PM10 24-hour modeled impact is 3-year average of the 2nd high concentration from each year.

<sup>d</sup> The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations.

<sup>e</sup> 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;  $\mu\text{g}/\text{m}^3$  = 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 ( $\text{g}/\text{m}^2/\text{month}$ )	Maximum Monthly Deposition ( $\text{g}/\text{m}^2/\text{month}$ ) <sup>a</sup>	Benchmark Used for the Analysis ( $\text{g}/\text{m}^2/\text{month}$ ) <sup>b</sup>
100	<b>2.3</b>	<b>2.8</b>	2.0
200	0.8	1.6	2.0

Notes:

<sup>a</sup> **Bolded, shaded gray** indicates an estimated deposition would be higher than the benchmark used for the analysis.

<sup>b</sup> Source: New Zealand Ministry of Environment 2001

$\text{g}/\text{m}^2/\text{month}$  = 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)
<b>Planned</b>			
Proposed Action	Washington	2025	44
Gateway Pacific Terminal <sup>a</sup>	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
<b>Total Planned</b>			<b>118</b>
<b>Existing</b>			
Westshore Terminals	British Columbia	Existing	33
Neptune	British Columbia	Existing	12
Ridley	British Columbia	Existing	12
<b>Total Existing</b>			<b>57</b>
<b>Total Planned and Existing</b>			<b>175</b>

Notes:

<sup>a</sup> 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<sup>14</sup> 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<sub>2</sub>e 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<sup>a</sup>**

Area	Net Emissions (Million Metric Tons CO <sub>2</sub> e)
Cowlitz County	0.04
Washington State	0.37
United States	0.29
International <sup>b</sup>	31.18
<b>Total</b>	<b>31.47<sup>c</sup></b>

Notes:

<sup>a</sup> Net emissions compared to the Cumulative No-Action scenario (i.e., no coal export terminals).

<sup>b</sup> Outside the United States.

<sup>c</sup> United States plus international.

CO<sub>2</sub>e = carbon dioxide equivalent

Within Cowlitz County, greenhouse gas emissions in 2038 would be approximately 0.040 million metric tons of CO<sub>2</sub>e 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<sub>2</sub>e 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<sub>2</sub>e greater than emissions in the Cumulative No-Action scenario.

<sup>14</sup> 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.