Chapter 6
# Cumulative Impacts

## 6.1 Introduction

Cumulative impacts are impacts that would result from the incremental addition of the Proposed Action to impacts from past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions that occur over time. 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 methods used in the analysis, and identifies the reasonably foreseeable future projects considered. It then describes cumulative impacts that could result from construction and operation of the Proposed Action in combination with the reasonably foreseeable future projects. 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 Draft Environmental Impact Statement (Draft 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 Draft 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 the Proposed Action would be fully operational (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 Draft EIS, whether the Proposed Action would result in adverse impacts on the resource area, and whether the Proposed Action could contribute to cumulative impacts. 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 Potentially Contributing to Cumulative Impacts**

| Section | Environmental Resource Area | Adverse Impacts Resulting from Proposed Action? | Potential for Cumulative Impacts? |
|---|---|---|---|
| **Chapter 3: Built Environment** | | | |
| 3.1 | Land and Shoreline Use | Yes | Yes |
| 3.2 | Social and Community Resources | Yes | Yes |
| 3.3 | Aesthetics, Light, and Glare | Yes | Yes |
| 3.4 | Cultural Resources | Yes | Yes |
| 3.5 | Tribal Resources | Yes | Yes |
| 3.6 | Hazardous Materials | Yes | Yes |
| **Chapter 4: Natural Environment** | | | |
| 4.1 | Geology and Soils | Yes | Yes |
| 4.2 | Surface Water and Floodplains | Yes | Yes |
| 4.3 | Wetlands | Yes | Yes |
| 4.4 | Groundwater | No | No |
| 4.5 | Water Quality | Yes | Yes |
| 4.6 | Vegetation | Yes | Yes |
| 4.7 | Fish | Yes | Yes |
| 4.8 | Wildlife | Yes | Yes |
| 4.9 | Energy and Natural Resources | Yes | Yes |

| Section | Environmental Resource Area | Adverse Impacts Resulting from Proposed Action? | Potential for Cumulative Impacts? |
|---|---|---|---|
| **Chapter 5: Operations** | | | |
| 5.1 | Rail Transportation | Yes | Yes |
| 5.2 | Rail Safety | Yes | Yes |
| 5.3 | Vehicle Transportation | Yes | Yes |
| 5.4 | Vessel Transportation | Yes | Yes |
| 5.5 | Noise and Vibration | Yes | Yes |
| 5.6 | Air Quality | Yes | Yes |
| 5.7 | Coal Dust | Yes | Yes |
| 5.8 | Greenhouse Gas Emissions and Climate Change[a] | Yes | Yes |

Notes:
[a] 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. See Section 5.8.2 for the potential cumulative impacts of climate change on the Proposed Action.

The resource-specific methods and assumptions described in the respective sections of Chapter 3, Chapter 4, and Chapter 5 of this Draft EIS were used for the cumulative impacts analysis. A qualitative assessment of cumulative impacts was conducted for the built environment (Chapter 3) and natural environment (Chapter 4), which include the following resources.

- Land and Shoreline Use
- Social and Community Resources
- Aesthetics, Light, and Glare
- Cultural Resources
- Tribal Resources
- Hazardous Materials
- Geology and Soils
- Surface Water and Floodplains
- Wetlands
- Water Quality
- Vegetation
- Fish
- Wildlife
- Energy and Natural Resources

A quantitative assessment of cumulative impacts was conducted for the operations environment (Chapter 5) resources. A discussion of specific methods is provided for each of these resource areas.

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

### 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. Some cumulative impacts study areas are identical to the resource study areas described in Chapters 3, 4, and 5. Other resources have a larger cumulative impacts study area.[1] The cumulative impacts study area for each resource is defined in each resource section. In some instances, multiple study areas are defined for each of the resources to identify potential cumulative impacts related to on-site activities, rail transportation, and vessel transportation.

### 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. Key past and present actions include prior industrial development at the project area and vicinity; the development of transportation infrastructure, including the BNSF Railway Company (BNSF) main line, Interstate 5 (I-5), and dredging of the Columbia River navigation channel; and 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 Draft EIS and accounted for in the impacts analysis.

### 6.2.2.3 Reasonably Foreseeable Future Actions

An inventory of future actions that could contribute to cumulative impacts on resources analyzed for the Proposed Action (Figure 6-1 and Table 6-2) was developed in consultation with the co-lead agencies.[2] The future actions are organized by the following types of project.

- Potential bulk product export projects that would introduce rail traffic and vessel traffic.[3]
- Potential coal export projects that would introduce rail traffic and vessel traffic.[3]
- Potential crude oil-by-rail projects that would introduce rail traffic and vessel traffic.[3]
- 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. The cumulative projects were identified and analyzed in 2016.

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[1] For example, while the study area for wetlands is the 540-acre site that is currently leased by the Applicant (Applicant's leased area), the wetlands cumulative impacts study area encompasses Washington State Water Resources Inventory Area 25 (the Grays-Elochoman watershed), a much larger area.

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

[3] 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.

## Figure 6-1. Cumulative Project Locations

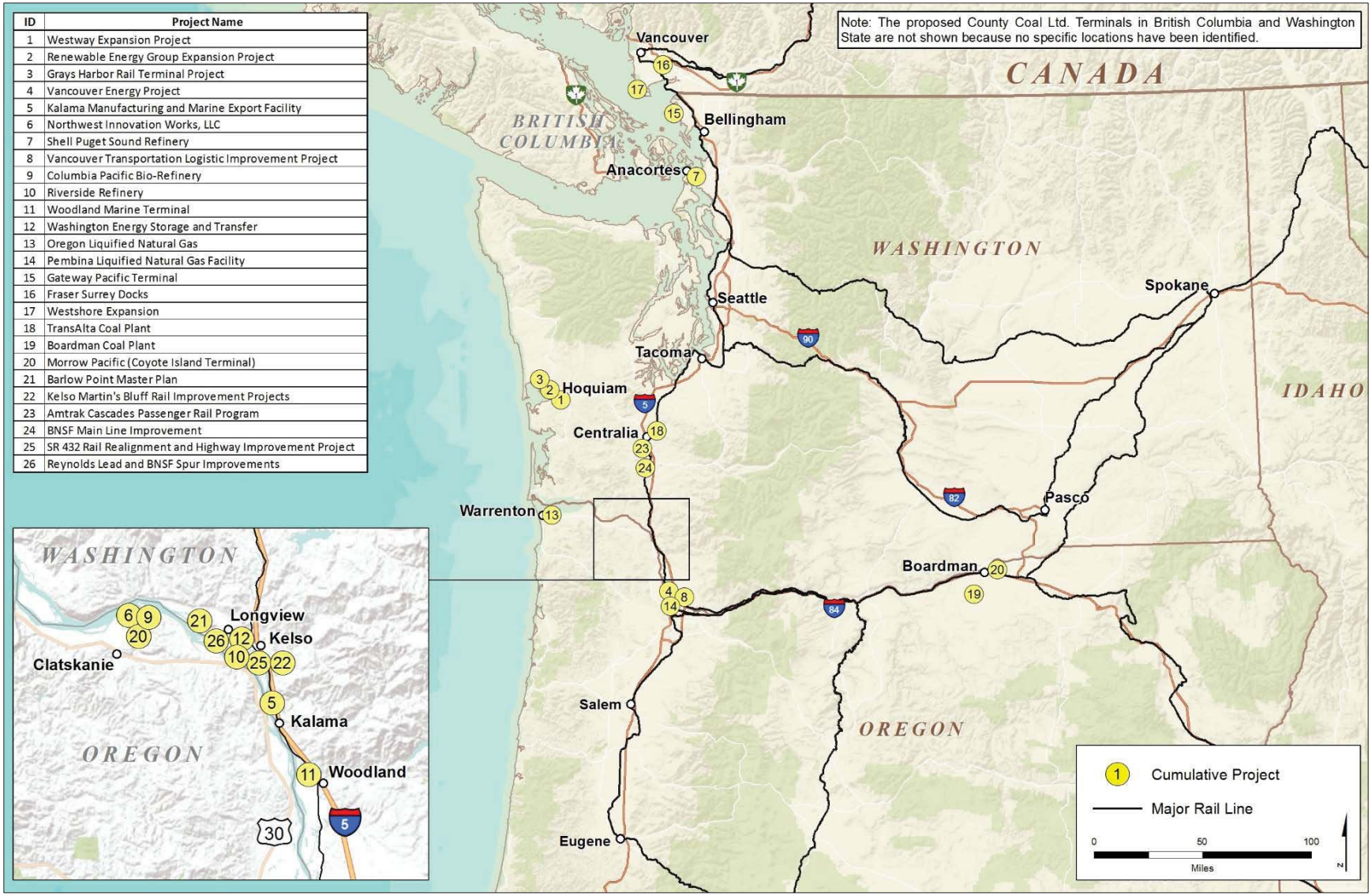


**Table 6-2. Reasonably Foreseeable Future Actions**

| Project | Proponent | Location | Description | Contributing Activity[a] | Schedule/Status |
|---|---|---|---|---|---|
| **Potential Bulk Product Projects: Rail Traffic (BNSF Main Line) and Vessel Traffic (Columbia River)** | | | | | |
| 1. Westway Expansion Project | Westway Terminal Company, 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. | Draft EIS released in August 2015. Construction is anticipated to start in 2016 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. Construction is anticipated to start in 2017 if permits are issued. REG is discussing changes to the proposal that may affect the number of train trips and project schedule. |
| 3. Grays Harbor Rail Terminal Project | USD Group, LLC | Port of Grays Harbor, Terminal 3 | Proposed construction and operation of a new 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 train trip (loaded and unloaded) per day (365 train trips per year). | As of early 2016, this proposal is no longer active.[b] |

| Project | Proponent | Location | Description | Contributing Activity[a] | Schedule/Status |
|---|---|---|---|---|---|
| 4. 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. |
| 5. 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. | Draft EIS released in March 2016. Construction is anticipated to begin in late 2016 if permits are issued. |
| 6. Northwest Innovation Works Methanol Facility[c] | 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 | 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. |

| Project | Proponent | Location | Description | Contributing Activity[a] | Schedule/Status |
|---|---|---|---|---|---|
| | | | Columbia River. Anticipated full operation would produce 3.6 million metric tons of methanol per year. | | |
| 7. Shell Puget Sound Refinery | Shell Oil Products US | March Point, Anacortes, WA | Proposed construction of rail yard and spur from adjacent BNSF main line onto the Shell Puget Sound Refinery property. The proposed action would not increase the capacity of the refinery. | Proposed action would increase BNSF main line rail traffic in Washington State by 2 train trips (loaded and unloaded) per day, maximum of 12 train trips per week.<br>No change to Columbia River vessel traffic. | EIS in process. |
| 8. 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 terminal, with an average throughput of up to 22,000 barrels of crude oil per day. Facility would receive oil 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. | EIS in process. |
| 9. 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. |
| 10. Riverside Refinery | Waterside Energy, LLC | Port of Longview, WA | Proposed construction and operation of refinery. The refinery would produce 30,000 barrels per day of gasoline, diesel, jet fuel, and atmospheric residuals and 15,000 barrels per day of renewable fuels. Crude oil | Proposed action would increase BNSF main line 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 24 vessels | As of early 2016, the proposal is no longer active.[b] |

| Project | Proponent | Location | Description | Contributing Activity[a] | Schedule/Status |
|---|---|---|---|---|---|
| | | | would arrive by rail. Renewable fuels would be refined from used cooking oils and virgin seed and vegetable oils imported by vessel (medium and large liquid carriers) from international markets.<br>Product would be exported by barge to local and regional markets and potentially by larger vessels to other West Coast markets. | (48 one-way transits) per year. | |
| 11. 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. | Application in review. Cowlitz County issued SEPA Mitigated Determination of Non-Significance (MDNS) on January 9, 2014, and SEPA Revised MDNS June 16, 2015. |
| 12. Washington Energy Storage & Transfer | Waterside Energy, LLC | Port of Longview, WA | Proposed construction and operation of liquefied petroleum gas (propane and butane) export facility. The proposed action would receive 75,000 barrels per day, store it on site, and export it from a marine terminal located on an adjacent privately owned parcel.<br>Liquid petroleum gas would be loaded onto very large gas carriers for export to international customers. | Proposed action would increase BNSF main line rail traffic in Washington State by an average of 2 train trips (loaded and unloaded) per day and vessel traffic in the Columbia River by 54 vessels (108 one-way transits) per year. | As of early 2016, the proposal is no longer active.[b] |
| 13. Oregon Liquefied Natural Gas | Oregon LNG | Warrenton, OR | Proposed construction and operation of a liquefied natural gas export terminal and an 87- | Proposed action would increase vessel traffic in the Columbia River by 125 | As of early 2016, the proposal is no longer active.[b] |

| Project | Proponent | Location | Description | Contributing Activity[a] | Schedule/Status |
|---|---|---|---|---|---|
| (LNG) | | | mile natural gas connector pipeline to transport primarily Canadian natural gas from an existing pipeline in Washington State to the terminal site. The proposed action would produce up to 9 million metric tons of LNG annually, which would be transported via vessel to Asia. | vessels (250 one-way transits) per year. | |
| 14. Pembina LNG Facility | Pembina Pipeline Corp. | Port of Portland, OR | Proposed construction and operation of a propane export terminal. Facility would receive approximately 37,000 to 72,000 barrels of propane via rail daily that would likely be exported to Asian markets. | Action would increase BNSF main line rail traffic in Washington State by less than 1 train trip (loaded and unloaded) per day and vessel traffic in the Columbia River by 30 vessels (60 one-way transits) per year. | As of early 2016, the proposal is no longer active.[b] |
| **Potential Coal Terminal Projects: Rail Traffic (BNSF Main Line in Washington State) and Vessel Traffic (Columbia River)** | | | | | |
| 15. Gateway Pacific Terminal | SSA Marine and BNSF | Cherry Point, WA | Proposed construction and operation of a deep-water marine terminal that would handle 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. | NEPA and SEPA EISs in process. Draft EISs expected to be released in late 2016. |
| 16. 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. |
| 17. 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 | Proposed action would increase BNSF main line rail traffic in Washington State by an average of 6 train trips (loaded and unloaded) per | Renovations began in 2014, anticipated to be complete by 2018. |

| Project | Proponent | Location | Description | Contributing Activity[a] | Schedule/Status |
|---|---|---|---|---|---|
| | | | 36 million). | day. No change to Columbia River vessel traffic. | |
| 18. 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. |
| 19. 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. |
| 20. Morrow Pacific (Coyote Island Terminal) | Ambre Energy | Port of Morrow, near Boardman, OR and Port Westward, OR | Proposed construction and operation of a coal-storage and barge-loading facility, with a maximum output of 8.8 million short tons. The proposed action would involve two sites: at Port of Morrow near Boardman, OR, and at Port Westward Industrial Park. Coal would arrive at the Port of Morrow via rail using the Union Pacific Railroad (UP) rail line. Coal would be transported from Port of Morrow to Port Westward Industrial Park via barge on the Columbia River. At Port Westward, coal would be transloaded from the barges onto ocean-going vessels. | Proposed action would increase vessel traffic in the Columbia River by 133 vessels (266 one-way transits; not including barges) per year.<br>The proposed action would increase rail traffic on UP routes in Oregon and would not increase rail traffic on the BNSF main line in Washington State. | In September 2014, the Oregon Department of State Lands denied permit.[b] |

| Project | Proponent | Location | Description | Contributing Activity[a] | Schedule/Status |
|---|---|---|---|---|---|
| **Potential Projects: City of Longview, City of Kelso, and Cowlitz County** | | | | | |
| 21. 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.<br>Potential for increased rail traffic.<br>Potential for increased vessel traffic. | Longview City Council postponed action on land use designation proposal until the comprehensive plan update is completed. |
| **Potential Projects: BNSF Main Line Rail Infrastructure or Other Rail Infrastructure** | | | | | |
| 22. 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.<br>Fall 2017 projected completion. |

| Project | Proponent | Location | Description | Contributing Activity[a] | Schedule/Status |
|---|---|---|---|---|---|
| 23. 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:<br>• New bypass and siding tracks to ease congestion<br>• Multiple upgrades to existing track<br>• Upgrades to advanced warning signal systems and safety-related projects<br>• Station upgrades and expansions<br>• Eight new locomotives | Potential for increased passenger rail traffic on BNSF main line (planned 8 additional round trips between Seattle and Portland; 2 round trips are funded). | Construction has begun for 12 projects and completed for 7 projects. Full completion of all projects by 2017. |
| 24 BNSF Main Line Improvements | BNSF | Statewide | Various rail improvements along the 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. |
| 25. 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.<br>May result in delays or disruption in vehicle travel during construction. Upon completion, would accommodate increased vehicle traffic. | NEPA and SEPA EIS in process for Oregon Way/Industrial Way intersection. The 2015 transportation package passed by the Washington State Senate includes $85 million to construct the preferred alternative identified after conclusion of the NEPA and SEPA processes. |
| 26. Reynolds Lead and BNSF Spur | Longview Switching Company | Reynolds Lead and BNSF Spur | Project to improve Reynolds Lead and BNSF Spur if warranted by increased traffic. | Increased safety, speed, and capacity for rail traffic. | Unknown |

| Project | Proponent | Location | Description | Contributing Activity[a] | Schedule/Status |
|---|---|---|---|---|---|
| Improvements | (LVSW) | | 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. | | |
| **Potential Projects: No Specific Proposal or Location** | | | | | |
| 27. County Coal Ltd. Terminals, BC[d] | 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.<br>If the proposed action proceeds, it could increase rail traffic on the BNSF main line in Washington State. | Unknown |

| Project | Proponent | Location | Description | Contributing Activity[a] | Schedule/Status |
|---|---|---|---|---|---|
| 28. County Coal Ltd. Terminals, WA[d] | 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.<br>If the proposed action proceeds, it could increase traffic on the BNSF main line in Washington State. | Unknown |

Notes:

[a] The terms *train trip* and *vessel transit* refer to a one-way trip (either inbound or outbound). Each train may make a loaded inbound trip and an unloaded outbound trip. A single vessel call to a marine terminal includes one inbound and one outbound transit.

[b] Although these projects are no longer active, these sites could be developed with industrial uses in the future. These projects are included in the cumulative analysis because they represent the type of development that could occur on these sites. Furthermore, these projects could seek to locate on other sites in the region and could introduce similar rail or vessel traffic from other locations.

[c] Northwest Innovation Works, LLC has proposed projects at Port Westward and the Port of Tacoma. The facilities at these sites are understood to be similar in size and scope to the Kalama Manufacturing and Marine Export Facility. The Port of Tacoma project is not included on this list because it would not use the BNSF main line in Washington State or the Columbia River for vessel transportation.

[d] 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 2014; 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; Federal Energy Regulatory Commission 2015; Florip 2015; Fraser Surrey Docks LP 2015; HDR Engineering Inc. 2014; ICF International 2016a; ICF International and Hellerworx 2016; KPFF Consulting Engineers 2014; Learn 2011; McGreal 2015; Northwest Innovation Works 2016; Oregon Department of Environmental Quality 2015; Oregon Department of State Lands 2015; Pembina Pipeline Corporation 2014; Port of Kalama and Cowlitz County 2014; Port of Longview 2015; Skagit County and Washington State Department of Ecology 2015; Vancouver Energy 2014; Vaughn 2016; Washington State Department of Ecology 2010; Washington State Department of Transportation 2015 and 2016; Waterside Energy 2015; Whatcom Planning and Development Services 2014.

Tables 6-3 and 6-4 summarize the rail[4] and vessel traffic associated with the reasonably foreseeable future actions contributing to cumulative impacts of the cumulative projects. Table 6-4 also provides the 2038 projected baseline vessel traffic in the Columbia River.

**Table 6-3. Rail Traffic for Reasonably Foreseeable Future Actions[a]**

| | Train Trips | | |
|---|---|---|---|
| **Project** | **Daily** | **Weekly** | **Annual** |
| Westway Expansion Project | 1.25 | 8.75 | 458 |
| REG Expansion Project | 2 | 14 | 730 |
| Grays Harbor Rail Terminal Project | 1 | 7 | 365 |
| Vancouver Energy Project | 8 | 56 | 2,920 |
| Shell Puget Sound Refinery | 2 | 12 | 624 |
| Vancouver Transportation Logistic Improvement Project | 0.6 | 4.2 | 219 |
| Pembina LNG Facility | 1 | 7 | 365 |
| Columbia Pacific Bio-Refinery | 0.6 | 4.2 | 219 |
| Riverside Refinery | 0.6 | 4.2 | 219 |
| Washington Energy Storage & Transfer | 2 | 14 | 730 |
| Gateway Pacific Terminal | 18 | 126 | 6,570 |
| Fraser Surrey Docks | 6 | 42 | 2,190 |
| Westshore Terminals Expansion | 6 | 42 | 2,190 |
| TransAlta Coal Plant | -2.8 | -19.6 | -1,022 |
| Boardman Coal Plant | -2 | -14 | -730 |
| Amtrak Cascades Passenger Rail Program | 16 | 112 | 5,840 |
| **Total Rail Trips** | **60.25** | **419.75** | **21,887** |

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

[a] Train trips include loaded and unloaded trips. This table presents rail traffic for the cumulative projects only. It does not account for projected increases in rail traffic estimated in the *Washington State Rail Plan* (Washington State Department of Transportation 2014).

**Table 6-4. Vessel Traffic for Reasonably Foreseeable Future Actions[a]**

| **Project** | **Annual Vessel Calls[b]** | **Annual Vessel Transits[b]** |
|---|---|---|
| Vancouver Energy Project | 290 | 580 |
| Kalama Manufacturing and Marine Export Facility | 54 | 108 |
| Northwest Innovation Works Methanol Facility | 54 | 108 |
| Vancouver Transportation Logistic Improvement Project | 18 | 36 |
| Columbia Pacific Bio-Refinery | 108 | 216 |
| Riverside Refinery | 24 | 48 |
| Woodland Marine Terminal | 24 | 48 |
| Washington Energy Storage & Transfer | 54 | 108 |

[4] 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.

| Project | Annual Vessel Calls[b] | Annual Vessel Transits[b] |
|---|---|---|
| Oregon LNG | 125 | 250 |
| Pembina LNG Facility | 30 | 60 |
| Morrow Pacific (Coyote Island Terminal) | 133 | 266 |
| **Total Cumulative Project Vessel Trips** | **914** | **1,828** |

Notes:
This table does not include Proposed Action-related vessel traffic.
[a] This table only includes future actions that would add vessel traffic to the Columbia River. Future actions that would add traffic to other waterways, such as Grays Harbor, are not relevant to this cumulative impacts analysis and are not summarized in the table.
[b] The maximum anticipated number of vessel calls and vessel transits is presented.

# 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 for 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.[5]

The following cumulative projects are located in this study area: Barlow Point Master Plan Project, Riverside Refinery, Washington Energy Storage & Transfer, 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. The cumulative projects in

[5] 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.

the study area include other industrial development projects and transportation projects. These cumulative projects would change the land use of their respective project sites to more intensive industrial uses or would provide transportation improvements to support industrial uses. The Riverside Refinery and Washington Energy Storage & Transfer projects, like the Proposed Action, would be located in areas designated for industrial uses in the *Cowlitz County Comprehensive Plan* (Cowlitz County 2014). In these cases, the cumulative projects have already been accounted for in local land use planning. Therefore, because the Proposed Action and cumulative projects in the study area would be consistent with surrounding industrial uses and the comprehensive plan designations on their respective project sites, the cumulative projects 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). The Barlow Point Master Plan Project, Riverside Refinery, and Washington Energy Storage & Transfer projects 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 the cumulative projects, would contribute to cumulative impacts on shoreline use due to the development of new structures and uses in the shoreline area. The Proposed Action and cumulative projects would be required to demonstrate 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. The following sections discuss impacts on social and community cohesion and public services, the local economy, 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, Riverside Refinery, Washington Energy Storage & Transfer, 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 Proposed Action and cumulative projects in Cowlitz County would add rail traffic to the BNSF main line and BNSF Spur. The rail traffic attributable to the cumulative projects would increase vehicle delay at public at-grade crossings as a result of increased gate downtime. The increased vehicle delay as a result of the cumulative projects and the Proposed Action would contribute to a cumulative impact by adversely affecting the accessibility of community resources and public services.

As discussed in Chapter 3, Section 3.2, *Social and Community Resources*, Proposed Action-related trains would increase rail traffic-related 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 noise levels along the Reynolds Lead and would result in an imperceptible increase in noise levels at Gerhart Gardens Park. 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 the Proposed Action and other cumulative projects to result in cumulative impacts related to increased demand for housing and public services.

#### Local Economy

Construction and operation of the Proposed Action and cumulative projects would affect the local economy by generating economic and fiscal benefits for the local area, Cowlitz County, and Washington in the form of jobs, wages, economic output, and tax revenues. Therefore, the Proposed Action, in combination with the cumulative projects, would contribute to beneficial cumulative impacts on the local economy.

The Proposed Action and cumulative projects would increase rail traffic on the BNSF main line in Cowlitz County. The increase in rail traffic would result in increased gate downtime at the at-grade crossings, which would increase vehicle delay at these crossings, as discussed in Section 6.3.3.3, *Vehicle Transportation*. This vehicle delay could affect accessibility to local businesses. Therefore, the Proposed Action, in combination with the cumulative projects, would contribute to cumulative impacts on local business activity. Rail traffic on the Reynolds Lead would be the same in 2038 as in 2028 and gate downtime would be the same. Therefore, the cumulative projects would not contribute to cumulative impacts on local business activity due to vehicle delay along the Reynolds Lead.

#### 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 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. Therefore, the Proposed Action would contribute to cumulative impacts on utilities in combination with the cumulative projects. 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 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 in 2059.

#### Minority and Low-Income Populations

The analysis of minority and low-income populations concluded that horn noise from Proposed Action-related trains on the Reynolds Lead during operations would have a disproportionately high and adverse effect on minority and low-income populations. The cumulative projects would not add rail traffic to the Reynolds Lead, and would not contribute to increased noise levels due to horn noise. The 2028 noise levels presented in Chapter 5, Section 5.5, *Noise and Vibration*, would be the same in 2038. Therefore, rail traffic associated with the cumulative projects would not contribute to a further impact on minority and low-income communities along the Reynolds Lead beyond what has been discussed for the Proposed Action.

### 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, Riverside Refinery, Washington Energy Storage & Transfer, 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. These impacts would occur within the corridor of industrial, transportation, and utility land uses 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, would 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* (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 but undocumented archaeological sites in the project area. The cumulative projects in the study area would not affect these resources in the project area 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 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.

During operations, the Proposed Action could affect onshore archaeological resources if increased shoreline erosion, due to wakes from Proposed Action-related vessels, altered or destroyed the landforms on or in which resources are located. Although a shoreline analysis concluded that impacts on archaeological sites along the lower Columbia River were not likely to result from an increase in project-related vessel traffic, other cumulative projects (Table 6-4) would increase vessel traffic in the Columbia River. Therefore, the Proposed Action, in combination with the cumulative projects, could 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*, operation of the Proposed Action would affect tribal resources as a result of rail traffic delaying tribal fishers' access to traditional fishing locations and delivery of fish to buyers. Cumulative projects would also add rail traffic to the BNSF main line in the Columbia River Gorge. Therefore, the Proposed Action, in combination with the cumulative projects, would contribute to cumulative impacts on tribal resources by increasing rail traffic and delaying access to traditional fishing locations. The greatest potential for additional delay would be at unmapped traditional fishing locations where tribal fishers use unimproved at-grade crossings. Proposed Action and cumulative project-related rail traffic would delay tribal fishers' ability to access these unmapped traditional fishing locations.

Operation of the Proposed Action would also affect tribal resources through activities that cause physical or behavioral responses in fish or that affect aquatic habitat. These impacts could reduce the number of fish available for harvest by the tribes in areas upstream of Bonneville Dam.

Cumulative projects would also introduce vessel traffic and other activities that may cause physical or behavioral responses in fish or affect aquatic habitat. Therefore, the Proposed Action, in combination with the cumulative projects, would 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. 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 a transportation route at the same time as the Proposed Action. 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 during rail operations for the Proposed Action or during a rail collision and 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 from train collisions or derailment. The Proposed Action, in combination with the cumulative projects, would contribute to cumulative impacts related to the potential release of hazardous materials during rail operations or collisions or derailments. However, locomotives and rail cars for the Proposed Action and cumulative projects are assumed to be maintained, and leaks would be repaired in a timely manner 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 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 shipping 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 geology and soils impacts related to soil erosion during construction and exposure to geologic hazards (e.g., seismic events and landslides). The cumulative projects in the immediate vicinity could also result in impacts related to soil erosion. Therefore, the Proposed Action, in combination with the cumulative projects, could contribute to cumulative impacts related to soil erosion. Cumulative soil erosion impacts would be limited to a small, localized area and would only occur if both the Proposed Action and one or both cumulative projects in the study area are under construction at the same time. Like the Proposed Action, the cumulative projects would likely be required to obtain an NPDES Construction Stormwater General 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.

As discussed in Chapter 4, Section 4.2, *Surface Water and Floodplains*, the project area is protected by levees and does not function as a floodplain. The Proposed Action would not decrease the ability of the Columbia River to retain floodwaters in the floodplain. Therefore, the Proposed Action would not contribute to cumulative impacts related to floodplains and no further analysis is necessary.

## Study Area

The cumulative impacts study area for surface water impacts due to on-site activities 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 cumulative impacts study area for surface water impacts due to vessel traffic is shoreline and nearshore areas extending 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

The Proposed Action could affect surface water by altering the project area drainage during construction due to the placement of heavy equipment and establishment of staging areas. This could result in localized flooding and increased erosion from redirected sheetflow. Projects associated with the Barlow Point Master Plan Project would be located on a parcel adjacent to the project area, and construction activities for that project could also alter local drainage patterns. Cumulative impacts on drainage patterns could occur if both the Proposed Action and the Barlow Point Master Plan Project are constructed. 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 General 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 General Permit.

The Proposed Action would result in less water discharged to the CDID #1 stormwater system 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. The 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 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 that result 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.

The Proposed Action would result in increased vessel traffic on the Columbia River, as would other cumulative projects. Increased vessel traffic could contribute to cumulative impacts related to shoreline erosion caused by vessel wakes, which could result in localized increases in surface water turbidity.

### 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, the Riverside Refinery, Washington Energy Storage & Transfer, 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*, the Proposed Action would affect wetlands by permanently filling 24.1 acres of wetlands, resulting in the loss of wetland functions throughout this area. The cumulative projects, especially the Barlow Point Master Plan Project, could also result in the loss of wetland functions in their respective project sites. 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.

For the Proposed Action, the Applicant would prepare a comprehensive wetlands mitigation plan in coordination with the U.S. Army Corps of Engineers (Corps), Washington State Department of Ecology (Ecology), and Cowlitz County to address the impacts on wetlands affected by placement of fill from the Proposed Action. Mitigation actions may be implemented at one or several locations to ensure that the range of ecological functions are provided to offset identified, unavoidable project impacts and the types of wetland functions affected by the Proposed Action. Chapter 4, Section 4.3, *Wetlands*, identifies that a mitigation plan would be required for the Proposed Action. Cumulative projects that result in impacts on wetlands would also be required to prepare and implement comprehensive mitigation plans, thus reducing the potential for cumulative impacts. Furthermore, the comprehensive mitigation plans for each of the cumulative projects would be required to achieve the goal of no net loss of wetlands and, as a result, would require compensatory mitigation at a ratio greater than 1:1. Therefore, the potential for cumulative impacts on wetlands is negligible.

### 6.3.2.4 Water Quality

This section discusses potential cumulative impacts on water quality. For cumulative impacts and mitigation measures related to coal dust, see Section 6.3.3.7, *Coal Dust*.

#### Study Area

The cumulative impacts study area for water quality impacts due to on-site activities is the project area (including dredged material disposal sites), the CDID #1 stormwater system drainage ditches adjacent to the project area, and Columbia River Segment 2 (river miles 37 to 72).

The following cumulative projects are in this study area: the Barlow Point Master Plan Project, the Northwest Innovation Works facility at Port Westward, the Columbia Pacific Bio-Refinery, the Riverside Refinery, Washington Energy Storage & Transfer, and the Kalama Manufacturing and Marine Export Facility.

The cumulative impacts study area for water quality impacts due to rail traffic is the rail route for Proposed Action-related trains on the BNSF main line in Washington State. Any cumulative project that would introduce new rail traffic to Washington State 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 extending 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

During construction, the Proposed Action could temporarily introduce pollutants due to equipment and material use. During operation, the Proposed Action could introduce pollutants from spills of hazardous materials. The cumulative projects between river miles 37 and 72 could also introduce pollutants due to construction equipment and material use, or because of releases during operations. Therefore, the Proposed Action, in combination with the cumulative projects, would contribute to cumulative impacts on water quality related to the potential release of hazardous materials or other contaminants. However, the Proposed Action would be required to have a site-specific construction stormwater pollution prevention plan that includes best management practices for material handling and construction waste management would reduce the potential for water quality impacts from these sources. It is expected that similar measures would be required for the cumulative projects.

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 General 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. Cumulative projects between river miles 37 and 72, such as the Kalama Manufacturing and Marine Export Facility and Northwest Innovation Works facility at Port Westward, would also involve dredging activities in the Columbia River and potential flow lane disposal. Other projects between river miles 37 and 72 could also involve dredging activities. The Proposed Action, in combination with the cumulative projects, could contribute to cumulative impacts on water quality due to dredging. However, 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, ensuring potential impacts of the Proposed Action and cumulative projects are temporary and localized in nature.

Operation of the Proposed Action and discharge of treated stormwater from the Proposed Action are not expected to cause a measureable increase in chemical indicators in the Columbia River. Operations would not cause a measurable impact on water quality or biological indicators or affect designated beneficial uses due to contaminants from stormwater runoff. Therefore, the Proposed Action would not contribute to cumulative impacts on water quality related to stormwater.

Operation of the Proposed Action could indirectly affect water quality by introducing contaminants from shipping vessels 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 in Washington State and increased vessel traffic on the Columbia River. 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.

However, 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 regulate the discharge and quality of ballast water, and the 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 cumulative impacts study area for vegetation impacts related to on-site activities is the Applicant's leased area (which includes the project area) and land immediately adjacent to the leased area, contiguous forestland and other intact vegetation communities, and vegetation 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 for vegetation impacts related to rail traffic is the rail route for Proposed Action-related trains on the BNSF main line in Washington State. 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 for vegetation impacts related to vessel traffic is the Columbia River extending 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 would result in direct impacts on vegetation in the Applicant's leased area. Except for impacts related to the deposition of coal dust on vegetation along the rail line, the Proposed Action's direct impacts would be limited to the Applicant's leased area. These direct impacts would not contribute to cumulative impacts on vegetation. 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 the tidal marsh erosion from vessel wakes and the disturbance of vegetation during rail and vessel transport. Cumulative projects would also require vessel and rail transport and would contribute to similar impacts. Therefore, the Proposed Action, in combination with the cumulative projects, could contribute to cumulative impacts related to tidal marsh erosion along the Columbia River and disturbance of vegetation along the Columbia River and rail route. As discussed in Chapter 4, Section 4.6, *Vegetation*, the location and extent of tidal marsh erosion impacts 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, and water depth. The potential for shoreline erosion can also be influenced by the slope and physical character of the shoreline (i.e., soil susceptibility to erosion) as well as the amount and type of vegetation that occurs along the shoreline. In particular, vegetation may be eroded on the thin strip of shoreline along the northern end of Lord Island, where large or perpendicular wakes are more likely and would increase with the Proposed Action and cumulative project vessels. This impact 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 tidal marsh vegetation in the lower Columbia River. Thus, cumulative projects could result in impacts on shoreline or tidal marsh vegetation.

## 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 is the project area and the area extending 300 feet from the dredging area and each dredged material disposal site. The study area for cumulative impacts on fish from underwater noise is the main channel of the Columbia River 3.92 miles upstream and downstream of the project area (measured from the proposed docks).

The following cumulative projects are in these study areas: the Barlow Point Master Plan Project, the Riverside Refinery, and Washington Energy Storage & Transfer.

The study area for cumulative impacts on fish from 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 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, 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.

#### On-Site Activities

During construction, the Proposed Action's potential impacts related to alteration and removal of aquatic habitat, 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 downstream. The Barlow Point Master Plan Project could result in similar impacts as the Proposed Action in this area. Therefore, cumulative impacts on fish from construction activities could occur if both the Proposed Action and the Barlow Point Master Plan Project are under construction 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. The Proposed Action and the Barlow Point Master Plan Project would both alter and remove aquatic habitat, and would, therefore, contribute to a cumulative impact on aquatic habitat.

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, Riverside Refinery, and Washington Energy Storage & Transfer. 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 shaded (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.

Fugitive coal dust particles would be generated by the Proposed Action through the movement of coal into and around the project area as well as during transfer onto vessels 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 vegetation 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. The Barlow Point Master Plan Project, Washington Energy Storage & Transfer, and Riverside Refinery 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 that they would. Cumulative impacts on fish 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. Simultaneous pile driving from one of 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 alternatives 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 result in impacts on fish related to increased underwater noise generated by project related vessels and fish stranding associated with wakes from project-related vessels. Cumulative projects would increase vessel traffic in the Columbia River, and could result in similar impacts. 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 cumulative impacts study area for impacts on terrestrial wildlife due to on-site activities is the project area and adjacent, contiguous forestland and intact vegetation communities. 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 due to rail traffic is the rail route in Washington State. 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 due to on-site activities 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 following cumulative projects are in this study area: the Barlow Point Master Plan Project, the Riverside Refinery, and Washington Energy Storage & Transfer.

The study area for cumulative impacts on aquatic wildlife from 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

#### 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. 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 would not result in an impact at the population scale or affect the overall fitness of a population. The Proposed Action and the Barlow Point Master Plan Project would both alter and remove terrestrial habitat, and would therefore contribute to a cumulative impact on these habitats. The Proposed Action would permanently remove 201.95 acres of degraded habitat. The Barlow Point Master Plan Project would remove up to 280 acres of habitat.

Operation of the Proposed Action would result in direct impacts on wildlife related to leaks and spills that could degrade terrestrial habitat adjacent to the project area as well as fugitive coal dust. The adjacent Barlow Point Master Plan Project could result in development that would also have the potential for leaks or spills.

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.

Fugitive coal dust particles would be generated by the Proposed Action by coal moving through the project area, from unloading coal off 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 vegetation 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, the Barlow Point Master Plan Project, Washington Energy Storage & Transfer, and Riverside Refinery 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. Therefore, cumulative impacts on aquatic wildlife from construction activities could occur if the Proposed Action and 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. 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. Impacts on pinnipeds and diving birds would likely result in 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 and could result in potential impacts on pinnipeds related to vessel strikes and elevated underwater noise levels associated with vessels. 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 vessel size (i.e., Handymax and Panamax) and vessel speed (i.e., less than 14 knots). Additionally, pinnipeds in the Columbia River are likely habituated to vessel traffic and capable of avoiding vessels.

Cumulative impacts on pinnipeds from vessel noise could occur. By 2028, when the Proposed Action would be at full build-out, approximately 6,120 vessel transits per year would occur in the Columbia River, including the 1,680 vessel transits associated with the Proposed Action. 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 comply with measures imposed through the permitting process and federal Endangered Species Act Section 7 consultation. Mitigation requirements and avoidance and minimization measures would address pile driving and removal, dredging and sediment control, construction timing, and general construction practices (e.g., spill containment), as appropriate. These requirements and measures would reduce potential cumulative impacts on terrestrial and aquatic wildlife and habitats during construction activities. Chapter 4, Section 4.8, *Wildlife,* identifies the 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 could also increase energy use and the use of natural resources. Therefore, the Proposed Action, in combination with the cumulative projects, could contribute to cumulative impacts related to energy and natural resources. It is expected that the cumulative demand for energy would be minor compared to the current regional demand for electricity and other fuels and could be met by the existing local and regional supply. 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.

Capacities for the Reynolds Lead and BNSF Spur were estimated using the methods developed by the Association of American Railroads. Capacity estimates provided are practical capacities consistent with the capacity estimates presented in the *Washington State Rail Plan*. 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. Practical capacity provides a reasonable figure for real-world train capacity rather than operational capacity, which only considers the number of trains per day that could run over a route.

## 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 Proposed Action-related trains 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

Table 6-5 illustrates the projected trains per day in 2038 on the Reynolds Lead and BNSF Spur by scenario.

**Table 6-5. Projected Trains per Day on Reynolds Lead and BNSF Spur in 2038 by Scenario**

| | Projected Trains Per Day in 2038 | |
|---|---|---|
| **Spur Line** | **Cumulative No-Action Scenario** | **Cumulative Proposed Action Scenario** |
| Reynolds Lead | 4.0 | 20.0 |
| BNSF Spur | 9.6 | 25.6 |

Two reasonably foreseeable actions at the Port of Longview (Washington Energy Storage & Transfer and Riverside Refinery) would add, on average, 2.6 new rail trips daily on the BNSF Spur. With Proposed Action-related trains, approximately 25.6 trains would operate on the BNSF Spur in 2038. Trains related to these two projects at the Port of Longview would not operate on the Reynolds Lead. Therefore, rail traffic on the Reynolds Lead would be the same in 2038 as in 2028 (20 trains per day). If the Longview Switching Company (LVSW) does not make improvements to the Reynolds Lead and BNSF Spur, capacity of the Reynolds Lead and BNSF Spur would be approximately 16 trains per day. Without improvements to increase capacity, neither the Reynolds Lead nor BNSF Spur would have the capacity to handle the cumulative rail traffic (25.6 trains per day on the BNSF Spur and 20 trains per day on the Reynolds Lead).

However, as described in Chapter 5, Section 5.1, *Rail Transportation*, LVSW has indicated it would expand capacity to meet projected volume from existing and future customers, which would be consistent with typical U.S. railroad policy to accommodate freight traffic. This action is identified as the Reynolds Lead and BNSF Spur Improvements in Table 6-2. LVSW has indicated that it would upgrade the traffic control technology on the Reynolds Lead and BNSF Spur. The upgrade in traffic control technology would increase capacity on the Reynolds Lead and BNSF Spur from approximately 16 trains per day to approximately 30 trains per day. This improvement would provide sufficient capacity to handle the cumulative rail traffic on the BNSF Spur and Reynolds Lead.

### 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 142 trains per day and 134 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 cumulative rail traffic volume on this segment would be 150 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 6-6 illustrates projected trains per day by route for the two Cumulative Proposed Action scenarios in 2038. 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 6-6. Projected 2038 Train Volumes in Washington State by Scenario**

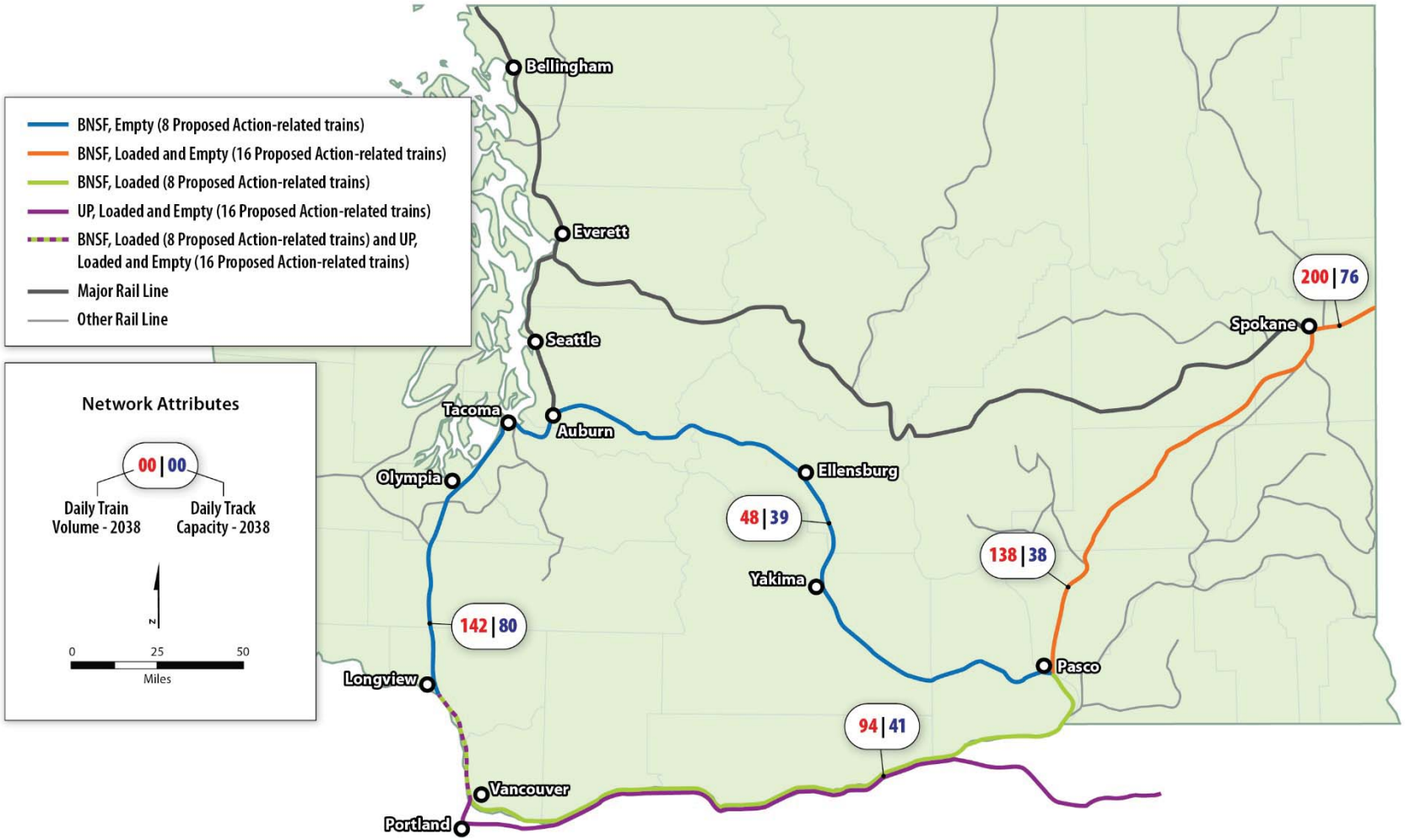
| | | Projected Trains per Day in 2038 | |
|---|---|---|---|
| **Segment** | **Capacity[a]** | **Cumulative No-Action Scenario** | **Cumulative Proposed Action Scenario** |
| Idaho/Washington State Line–Spokane | 76 | 184 | 200 |
| Spokane–Pasco | 38 | 122 | 138 |
| Pasco–Vancouver | 41 | 86 | 94 |
| Vancouver–Longview Junction | 80 | 136 | 142 |
| Longview Junction–Auburn | 80 | 136 | 142 |
| Auburn–Pasco | 39 | 40 | 48 |

Notes:
[a] Projected 2035 capacity without improvements or operational changes per the *Washington State Rail Plan* (Washington State Department of Transportation 2014).

The following sections describe each of the routes in more detail for the Cumulative Proposed Action scenario. It is expected that BNSF would make the necessary investments or operating changes to accommodate the growth in rail traffic, but it is unknown when these actions would be taken or permitted.

- **Idaho/Washington State Line–Spokane**. All Proposed Action-related BNSF trains to and from the Powder River Basin would move over this segment. Projected 2038 capacity without improvements or operational changes is 76 trains per day. The capacity concerns for this segment extend beyond Washington State to Sandpoint, Idaho. This potential constraint is identified in the *Washington State Rail Plan* as a key potential chokepoint. The projected cumulative rail traffic volume in 2038 is 200 trains per day. Without improvements or operating changes, this rail traffic volume 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**



- **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 138 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 94 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.
- **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 48 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, illustrate that rail traffic will increase on BNSF and UP routes beyond Washington State. The existing capacity on BNSF main lines is approximately 30 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.

The existing capacity on UP routes is approximately 18 to 75 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.

### 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.

Two cumulative projects at the Port of Longview (Riverside Refinery and Washington Energy Storage & Transfer) would increase rail traffic on the 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

For the purposes of this assessment, rail safety refers to train derailments and collisions that could lead to a loss of cargo. The analysis used the same methods as the analysis of 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.[6] 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 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.** Two projects at the Port of Longview (Riverside Refinery and Washington Energy Storage & Transfer) would add, on average, 2.6 new rail trips daily on the BNSF Spur. With Proposed Action-related trains, approximately 25.6 trains would operate on the BNSF Spur in 2038. Trains related to the two projects at the Port of Longview would not operate on the Reynolds Lead. Therefore, rail traffic on the Reynolds Lead would be the same in 2038 as 2028.
- **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 6-7 illustrates the estimated accidents per year by scenario. The

[6] 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 2015.

FRA accident reporting threshold was $10,500 in 2015, 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.

**Table 6-7. Predicted Train Accidents per Year by Cumulative Proposed Action Scenario in 2038**

| | | Predicted Accidents Per Year in 2038 | | |
|---|---|---|---|---|
| Route Segment | Miles | Cumulative No-Action Scenario | Cumulative Proposed Action Scenario | Cumulative-Loaded Coal Trains Scenario |
| Idaho/Washington State Line–Spokane | 18.6 | 4.90 | 5.40 | 0.70 |
| Spokane–Pasco | 145.5 | 25.00 | 29.00 | 5.40 |
| Pasco–Vancouver | 221.4 | 27.00 | 30.00 | 8.30 |
| Vancouver–Longview Junction | 34.8 | 6.20 | 6.60 | 1.30 |
| Longview Junction–LVSW Yard (BNSF Spur) | 2.1 | 0.09 | 0.24 | 0.07 |
| LVSW Yard–Project Area (Reynolds Lead) | 5.0 | 0.09 | 0.44 | 0.18 |
| Longview Junction–Auburn | 118.6 | 21.00 | 23.00 | 3.00 |
| Auburn–Yakima | 139.6 | 8.20 | 9.80 | N/A |
| Yakima–Pasco | 89.4 | 5.20 | 6.30 | N/A |

Notes:
N/A = not applicable (loaded coal trains are not assumed to use this segment)

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 Chapter 5, Section 5.1, *Rail Transportation*, LVSW has indicated it would expand capacity to meet projected volume from existing and future customers. 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 increase by roughly a factor of 1.5 to 3.

The 2038 predicted number of freight train accidents in Cowlitz County (BNSF main line, BNSF Spur, and Reynolds Lead) is 7.2 per year without Proposed Action-related trains (Cumulative No-Action scenario), and 8.1 with Proposed Action-related trains (Cumulative Proposed Action scenario). The predicted number of loaded coal train accidents is 1.5 per year with Proposed Action-related trains.

Within Washington State, the predicted number of freight train accidents is approximately 98 per year without Proposed Action-related trains, and 110 accidents per year with Proposed Action-related trains. The predicted number of loaded coal train accidents in Washington State is approximately19 per year.

### 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 to be 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 6-8 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 in the immediate area. 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 for 10 years to develop 2038 No-Action Cumulative Proposed Action scenario traffic volumes. Vehicular traffic related to the Proposed Action were added to the 2038 No-Action Cumulative Proposed Action scenario to develop the 2038 Cumulative Proposed Action scenario traffic volumes.

*Trains*

Cumulative rail traffic on the BNSF Spur and Reynolds Lead was developed by adding the rail traffic for all cumulative projects to baseline rail traffic. As described in Section 6.3.3.1, *Rail Transportation*, two reasonably foreseeable actions at the Port of Longview (Riverside Refinery and Washington Energy Storage and & Transfer) would add an average of 2.6 trains daily to the Dike Road crossing on the BNSF Spur. Rail traffic on the Reynolds Lead in 2038 would be the same as 2028. Table 6-8 illustrates the number of trains for each 2038 Cumulative Proposed Action 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) were added to the 2038 projections. 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 6-8 illustrates the assumed number of trains for each 2038 Cumulative Proposed Action scenario on BNSF main line routes in Washington State.

The rail traffic estimates at the study crossings on the BNSF main line in Cowlitz County are based on projections developed for the *Washington State Rail Plan* and data collected between 2010 and 2013. The estimates are intended to provide a "snapshot" of estimated rail traffic volumes to identify potential cumulative traffic.

**Table 6-8. Motor Vehicle and Train Volumes at Study Crossings in 2038**

| Crossing Name (USDOT Crossing ID) | Time Period | 2038 Cumulative No-Action Scenario | | 2038 Cumulative Proposed Action Scenario | |
|---|---|---|---|---|---|
| | | Vehicle | Train | Vehicle | Train |
| **Reynolds Lead and BNSF Spur Study Crossings** | | | | | |
| Project area access at 38th Avenue | Per Day | 300 | 4.0 | 1,400 | 20.0 |
| | Peak Hour | 30 | 1 | 140 | 2 |
| Weyerhaeuser access at Washington Way | Per Day | 4,500 | 4.0 | 4,500 | 20.0 |
| | Peak Hour | 450 | 1 | 450 | 2 |
| Weyerhaeuser NORPAC access | Per Day | 950 | 4.0 | 950 | 20.0 |
| | Peak Hour | 95 | 1 | 95 | 2 |
| Industrial Way (SR 432) (101806G) | Per Day | 12,800 | 4.0 | 13,450 | 20.0 |
| | Peak Hour | 1,280 | 1 | 1,345 | 2 |
| Oregon Way (SR 433) (101805A) | Per Day | 21,800 | 4.0 | 22,050 | 20.0 |
| | Peak Hour | 2,180 | 1 | 2,205 | 2 |
| California Way (101821J) | Per Day | 5,600 | 4.0 | 5,600 | 20.0 |
| | Peak Hour | 560 | 1 | 560 | 2 |
| 3rd Avenue (SR 432) (101826T) | Per Day | 24,150 | 4.0 | 24,350 | 20.0 |
| | Peak Hour | 2,415 | 1 | 2,435 | 2 |
| Dike Road (101791U) | Per Day | 1,300 | 9.7 | 1,300 | 25.7 |
| | Peak Hour | 130 | 1 | 130 | 2 |
| **BNSF Main Line in Cowlitz County Study Crossings** | | | | | |
| Taylor Crane Road in Castle Rock (092481X) | Per Day | 100 | 134.4 | 100 | 142.4 |
| | Peak Hour | 10 | 6.4 | 10 | 8.4 |
| Cowlitz Street in Castle Rock (092476B) | Per Day | 1,650 | 134.4 | 1,650 | 142.4 |
| | Peak Hour | 165 | 6.4 | 165 | 8.4 |
| Cowlitz Gardens Road in Kelso (092466V) | Per Day | 1,000 | 134.4 | 1,000 | 142.4 |
| | Peak Hour | 100 | 6.4 | 100 | 8.4 |
| Mill Street in Kelso (092458D) | Per Day | 3,450 | 134.4 | 3,450 | 142.4 |
| | Peak Hour | 345 | 6.4 | 345 | 8.4 |
| S River Road in Kelso (092457W) | Per Day | 2,550 | 134.4 | 2,550 | 142.4 |
| | Peak Hour | 255 | 6.4 | 255 | 8.4 |
| Toteff Road/ Port Road in Kalama (092446J) | Per Day | 1,650 | 134.4 | 1,650 | 142.4 |
| | Peak Hour | 165 | 6.4 | 165 | 8.4 |
| W Scott Avenue in Woodland (092437K) | Per Day | 3,600 | 134.4 | 3,600 | 142.4 |
| | Peak Hour | 360 | 6.4 | 360 | 8.4 |
| Davidson Avenue in Woodland (092435W) | Per Day | 2,700 | 134.4 | 2,700 | 142.4 |
| | Peak Hour | 270 | 6.4 | 270 | 8.4 |
| Whalen Road in Woodland (092434P) | Per Day | 2,100 | 134.4 | 2,100 | 142.4 |
| | Peak Hour | 210 | 6.4 | 210 | 8.4 |

#### *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 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 a predicted accident probability above 0.04 accident per year under the Cumulative Proposed Action scenario that would be at or below 0.04 accident per year 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 below.

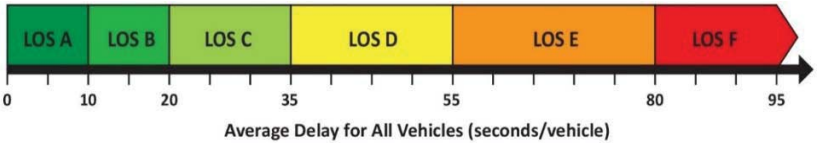
*Average Vehicle Delay*

Table 6-9 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 6-9. Estimated 24-Hour Average Level of Service at Reynolds Lead and BNSF Main Line Study Crossings in 2038 by Scenario[a]**

| Crossing | Cumulative No-Action Scenario | Cumulative Proposed Action Scenario |
|---|---|---|
| Project Area Access at 38th Avenue | A | **F** |
| Weyerhaeuser Access at Washington Way | A | C |
| Weyerhaeuser NORPAC Access | A | B |
| Industrial Way (SR 432) | A | A |
| Oregon Way (SR 433) | A | A |
| California Way | A | B |
| 3rd Avenue (SR 432) | A | B |
| Dike Road | A | C |

Notes:




[a] **Bolded, shaded gray** 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.

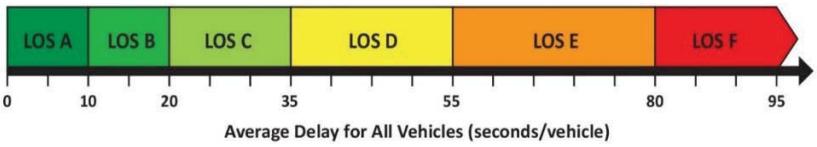
Table 6-10 shows the estimated 24-hour average vehicle delay at the study crossings along the BNSF main line in Cowlitz County. All study crossings would operate at level of service A or B for both scenarios.

**Table 6-10. 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 |

| Crossing | Cumulative No-Action Scenario | Cumulative Proposed Action Scenario |
|---|---|---|
| W Scott Avenue (Woodland) | A | A |
| Davidson Avenue (Woodland) | A | A |
| Whalen Road (Woodland) | A | A |

Notes:



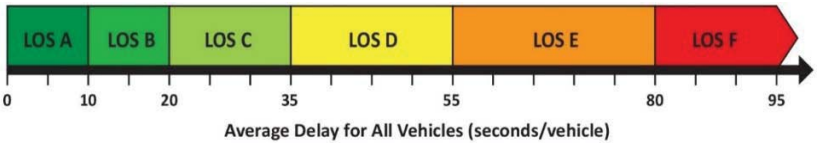

*Peak Hour Vehicle Delay*

Table 6-11 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.

**Table 6-11. Estimated Peak Hour Level of Service at Reynolds Lead and BNSF Spur Study Crossings in 2038 by Scenario[a]**

| Crossing | Cumulative No-Action Scenario | Cumulative Proposed Action Scenario[b] |
|---|---|---|
| Project Area Access at 38th Avenue | B | **F** |
| Weyerhaeuser Access at Washington Way | A | **E** |
| Weyerhaeuser NORPAC Access | A | C |
| Industrial Way (SR 432) | A | D |
| Oregon Way (SR 433) | A | C |
| California Way | A | D |
| 3rd Avenue (SR 432) | B | **E** |
| Dike Road | C | **E** |

Notes:




[a] **Bolded, shaded gray** values indicate a vehicle delay impact (a study crossing that operates below level of service D under the Cumulative Proposed Action scenario that would not otherwise operate below level of service D under the Cumulative No-Action scenario for the same year).

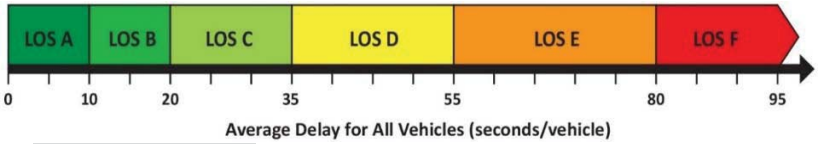
[b] This level of service would occur if 2 Proposed Action-related trains travel during the peak hour.

Table 6-12 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. Under this condition, the level of service at two study crossings would operate below level of service D in 2038.

**Table 6-12. Estimated Cumulative Peak Hour Level of Service at BNSF Main Line Study Crossings in 2038 by Scenario[a]**

| Crossing | Cumulative No-Action Scenario | Cumulative Proposed Action Scenario[b] |
|---|---|---|
| Taylor Crane Road (Castle Rock) | B | D |
| Cowlitz Street (Castle Rock) | C | D |
| Cowlitz Gardens (Kelso) | B | D |
| Mill Street (Kelso) | C | **E** |
| S River Road (Kelso) | C | **E** |
| Toteff Road/Port Road (Kalama) | B | D |
| W Scott Avenue (Woodland) | C | D |
| Davidson Avenue (Woodland) | B | D |
| Whalen Road (Woodland) | B | D |

Notes:




a **Bolded**, **shaded gray** values indicate a vehicle level of service impact (a study crossing that operates below level of service D under the Cumulative Proposed Action scenario that would not otherwise operate below level of service D under the Cumulative No-Action scenario for the same year).

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

### *Vehicle Queuing*

Increased vehicle delay from trains blocking grade crossings can have secondary impacts on nearby intersections. As vehicles begin to queue while waiting for the crossing to open, increased roadway congestion can affect upstream intersections. Table 6-13 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 6-13. Estimated Cumulative Peak Hour Vehicle Queue Lengths in 2038 by Scenario**

| Crossing Name | Road Movement[b] | 2038 No-Action Cumulative Estimated Queue Length at Crossing (feet) | 2038 Cumulative Estimated Queue Length at Crossing (feet) | Intersection Affected by Queue from Crossing | Intersection Movement[c] | 2038 No-Action Cumulative Estimated Queue Length at Intersection (feet) | 2038 Cumulative Estimated Queue Length at Intersection (feet) |
|---|---|---|---|---|---|---|---|
| **Reynolds Lead and BNSF Spur Study Crossings** | | | | | | | |
| Project Area Access at 38th Avenue | Northbound | 40 | 1,100 | Industrial Way/ 38th Avenue | Westbound Left | 20 | 200 |
| | Southbound | 20 | 220 | | Eastbound Right | 20 | 20 |
| Weyerhaeuser Access at Washington Way | Northbound | 580 | 1,200 | Industrial Way/ Washington Way | Westbound Left | 160 | 180 |
| | | | | | Eastbound Right | 40 | 60 |
| | Southbound | 180 | 320 | | Southbound Through | 100 | 300 |
| Weyerhaeuser NORPAC Access | Northbound | 80 | 160 | Industrial Way/ NORPAC Access | Westbound Left | 20 | 20 |
| | Southbound | 20 | 20 | | Eastbound Right | 20 | 20 |
| Industrial Way | Northbound | 380 | 500 | Industrial Way/ Weyerhaeuser | Eastbound Left | 180 | 360 |
| | Southbound | 340 | 880 | | Northbound Through | 260 | 380 |
| Oregon Way | Northbound | 2,220 | 3,220 | Industrial Way/ Oregon Way | Northbound Through | 2,000 | 3,000 |
| | | | | | Eastbound Left | 240 | 300 |
| | | | | | Westbound Right | 100 | 100 |
| | Southbound | 1,320 | 2,820 | Oregon Way/ Alabama Street | Eastbound Right | 120 | 120 |
| | | | | | Westbound Left | 100 | 100 |
| | | | | | Southbound Through | 620 | 2,120 |
| California Way | Northbound | 140 | 280 | Industrial Way/ California Way | N/A | N/A | N/A |
| | Southbound | 200 | 500 | | | | |
| 3rd Avenue | Northbound | 600 | 1,580 | 3rd Avenue/ Industrial Way | Westbound Right | 60 | 100 |
| | | | | | Northbound Through | 200 | 1,180 |
| | | | | Industrial Way/ California Way | Southbound Left | N/A | 160 |
| | Southbound | 1,260 | 3,200 | | Northbound Right | | 80 |
| | | | | | Eastbound Through | | 940 |

| Crossing Name | Road Movement[b] | 2038 No-Action Cumulative Estimated Queue Length at Crossing (feet) | 2038 Cumulative Estimated Queue Length at Crossing (feet) | Intersection Affected by Queue from Crossing | Intersection Movement[c] | 2038 No-Action Cumulative Estimated Queue Length at Intersection (feet) | 2038 Cumulative Estimated Queue Length at Intersection (feet) |
|---|---|---|---|---|---|---|---|
| Dike Road | Northbound | 60 | 180 | None | N/A | N/A | N/A |
| | Southbound | 100 | 240 | | | | |
| **BNSF Main Line in Cowlitz County Study Crossings** | | | | | | | |
| Taylor Crane Road in Castle Rock (092481X) | Eastbound | 20 | 20 | None | N/A | N/A | N/A |
| | Westbound | 20 | 20 | | | | |
| Cowlitz Street in Castle Rock (092476B) | Eastbound | 40 | 60 | None | N/A | N/A | N/A |
| | Westbound | 80 | 100 | | | | |
| Cowlitz Gardens Road in Kelso (092466V) | Eastbound | 20 | 40 | None | N/A | N/A | N/A |
| | Westbound | 20 | 40 | | | | |
| Mill Street in Kelso (092458D) | Eastbound | 140 | 160 | None | N/A | N/A | N/A |
| | Westbound | 180 | 240 | | | | |
| S River Road/ Yew St in Kelso (092457W) | Eastbound | 100 | 120 | Pacific Avenue/S River Road | Southbound Right | 80 | 140 |
| | Westbound | 140 | 200 | | Northbound Left | 40 | 40 |
| Toteff Road/ Port Road in Kalama (092446J) | Eastbound | 60 | 60 | None | N/A | N/A | N/A |
| | Westbound | 60 | 80 | | | | |
| W Scott Avenue in Woodland (092437K) | Eastbound | 80 | 100 | None | N/A | N/A | N/A |
| | Westbound | 160 | 220 | | | | |
| Davidson Avenue in Woodland (092435W) | Eastbound | 100 | 160 | None | N/A | N/A | N/A |
| | Westbound | 60 | 100 | | | | |
| Whalen Road in Woodland (092434P) | Eastbound | 80 | 80 | None | N/A | N/A | N/A |
| | Westbound | 100 | 120 | | | | |

Notes:
[a] Shaded gray values indicate a study crossing or intersection queue that exceeds available storage for the scenario. Shaded black values indicate a queuing impact.
[b] Roadway movement approaching the rail crossing.
[c] Movement at nearby intersection affected by queue from rail crossing; N/A = data not applicable.

### *Vehicle Safety*

An accident prediction analysis was conducted using the FRA GradeDec.Net web-based software. GradeDec.Net contains a predicted accident frequency model based on the U.S. Department of Transportation accident prediction and severity formula. The following sections provide the findings by scenario.

- **Cumulative No-Action scenario.** The predicted accident probability was estimated to be above 0.04 accident per year with existing crossing safety protection at five study crossings along the BNSF main line in Cowlitz County.
    - Mill Street
    - S River Road
    - W Scott Avenue
    - Davidson Avenue
    - Whalen Road
- **Cumulative Proposed Action scenario.** The predicted accident probability was estimated to be above 0.04 accident per year with existing crossing safety protection at the five study crossings along the BNSF main line in Cowlitz County identified in the Cumulative No-Action scenario. In addition, the predicted accident probability was estimated to be above 0.04 accident per year at the 3rd Avenue (SR 432) study crossing along the Reynolds Lead.

### Statewide Study Crossings

Table 6-14 illustrates the 2015 and 2038 estimated trains per day at the statewide study crossings for the cumulative with and without Proposed Action-related trains.

The rail traffic estimates provided in Table 6-14 are based on projections developed for the *Washington State Rail Plan* and data from between 2010 and 2013. The 2035 estimates provided in the plan extrapolated to 2038, and the addition of the rail traffic in Table 6-14, is intended to provide a "snapshot" of estimated rail traffic volumes, which are highly dynamic and fluctuate as a result of changing demand.

Table 6-14 illustrates that rail traffic will increase by 2038 and 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 6-14. Projected Rail Traffic at Statewide Study Crossings in 2038**

| #[a] | Road Crossing | Freight Train Speed[b] | 2015 Estimated Trains Per Day[c] | 2038 Cumulative No-Action Scenario Projected Trains Per Day[c] | 2038 Cumulative Proposed Action Scenario Projected Trains Per Day | % Change Between Cumulative Scenarios |
|---|---|---|---|---|---|---|
| **Spokane County** | | | | | | |
| 1 | Idaho Road | 60 | 70 | 184 | 200 | 9% |
| 2 | McKinzey Road | 60 | 70 | 184 | 200 | 9% |
| 3 | Harvard Road | 60 | 70 | 184 | 200 | 9% |
| 4 | Barker Road | 60 | 70 | 184 | 200 | 9% |
| 5 | Flora Road | 60 | 70 | 184 | 200 | 9% |
| 6 | Pines Road-SR 27 | 60 | 70 | 184 | 200 | 9% |
| 7 | University Road | 60 | 70 | 184 | 200 | 9% |
| 8 | Park Road | 60 | 70 | 184 | 200 | 9% |
| 9 | Pine Street | 35 | 39 | 122 | 138 | 13% |
| 10 | F Street/Cheney-Spangle | 35 | 39 | 122 | 138 | 13% |
| 11 | Cheney-Plaza Road | 35 | 39 | 122 | 138 | 13% |
| **Adams County** | | | | | | |
| 12 | Paha Packard Road | 60 | 39 | 122 | 138 | 13% |
| 13 | Kahlotus Road | 60 | 39 | 122 | 138 | 13% |
| 14 | 1st Street | 50 | 39 | 122 | 138 | 13% |
| 15 | Wilbur/City Road | 50 | 39 | 122 | 138 | 13% |
| **Franklin County** | | | | | | |
| 16 | Eltopia Road W | 60 | 39 | 122 | 138 | 13% |
| 17 | Sagemoor Road | 60 | 39 | 122 | 138 | 13% |
| **Benton County** | | | | | | |
| 18 | East 3rd Avenue | 35 | 34 | 86 | 94 | 9% |
| 19 | Dague Road-East 25th Avenue | 60 | 34 | 86 | 94 | 9% |
| 20 | Perkins Road | 60 | 34 | 86 | 94 | 9% |
| 21 | Bowles Road | 60 | 34 | 86 | 94 | 9% |
| 22 | Cochran Road | 60 | 34 | 86 | 94 | 9% |
| 23 | Finley Road | 60 | 34 | 86 | 94 | 9% |
| 24 | Whitcomb Island | 60 | 34 | 86 | 94 | 9% |
| **Klickitat County** | | | | | | |
| 25 | Maple Street | 45 | 34 | 86 | 94 | 9% |
| 26 | Walnut Street | 45 | 34 | 86 | 94 | 9% |
| 27 | South Dock Grade Road | 55 | 34 | 86 | 94 | 9% |

| # [a] | Road Crossing | Freight Train Speed [b] | 2015 Estimated Trains Per Day [c] | 2038 Cumulative No-Action Scenario Projected Trains Per Day [c] | 2038 Cumulative Proposed Action Scenario Projected Trains Per Day | % Change Between Cumulative Scenarios |
|---|---|---|---|---|---|---|
| **Skamania County** | | | | | | |
| 28 | Indian Crossing | 55 | 34 | 86 | 94 | 9% |
| 29 | Home Valley Park | 55 | 34 | 86 | 94 | 9% |
| 30 | Cemetery Xing | N/A | 34 | 86 | 94 | 9% |
| 31 | Russell Avenue | 20 | 34 | 86 | 94 | 9% |
| 32 | Skamania Landing/Butler Road | 60 | 34 | 86 | 94 | 9% |
| 33 | Walker/Skamania Landing | 60 | 34 | 86 | 94 | 9% |
| 34 | St Cloud Road | N/A | 34 | 86 | 94 | 9% |
| **Lewis County** | | | | | | |
| 35 | SR 506-7th Street | 50 | 50 | 136 | 142 | 4% |
| 36 | Walnut Street – SR 505/603 | 50 | 50 | 136 | 142 | 4% |
| 37 | E Locust Street | 40 | 50 | 136 | 142 | 4% |
| 38 | Main Street | 40 | 50 | 136 | 142 | 4% |
| 39 | Maple Street | 40 | 50 | 136 | 142 | 4% |
| 40 | Big Hanaford Road | 10 | 50 | 136 | 142 | 4% |
| **Yakima County** | | | | | | |
| 41 | Jones Road East | 55 | 7 | 40 | 48 | 20% |
| 42 | Indian Church | 55 | 7 | 40 | 48 | 20% |
| 43 | SR241/Reservation | 55 | 7 | 40 | 48 | 20% |
| 44 | Gulden Road | 55 | 7 | 40 | 48 | 20% |

Notes:
[a] See Chapter 5, Section 5.3, *Vehicle Transportation*, Figure 5.3-6, for crossing location.
[b] Washington Utilities Transportation Commission 2015.
[c] Washington State Department of Transportation 2014; projected to 2038
N/A = data not available

Vehicle delay would depend on the speed of the train, length of the train, the traffic volume at the crossing, and the number of lanes at the crossing (for vehicle storage). The traffic volume at the crossing would depend on the time of day. Using existing BNSF train data, trains associated with the cumulative projects are estimated to average approximately 1.2 miles long and would take the following approximate times to pass at study crossings (see Table 6-14 for freight train speeds at study crossings).

- 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 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 upstream to Vancouver, Washington,[7] and the Willamette River upstream 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, ships and barges carrying various cargo (i.e., dry bulk, automobiles, containers, bulk liquids, and other general cargo).

Future vessel traffic volumes 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 presented in Table 6-4. 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 estimated using a

[7] The Port of Vancouver is the furthest upstream port receiving large commercial vessels.

model. 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 indirect impacts on the vessel transportation system along the Columbia River navigation channel due to vessel operations. These impacts could include 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 6-15, the 2038 Cumulative No-Action scenario includes a total of 6,782 vessel transits in the study area. The 2038 Cumulative Proposed Action scenario includes 8,410 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 6-15. 2038 Cumulative Vessel Trips per Year**

| Annual Vessel Transits[a] | 2038 Cumulative No-Action Scenario (Cumulative Projects and Projected Growth Rate) | 2038 Cumulative Proposed Action Scenario |
|---|---|---|
| 2038 Baseline[b] | 4,902 | 4,902 |
| Cumulative Projects | 1,828 | 1,828 |
| No-Action Alternative/Proposed Action | 52 | 1,680 |
| **Total Vessel Transits** | **6,782** | **8,410** |

Notes:
[a] Vessel transits represent one-way trips.
[b] A projected growth rate of 1% per year was applied to the 2014 baseline vessel traffic data.
Source: DNV GL 2016.

### Vessel Incidents in the Project Area

During operations, the Proposed Action would result in direct impacts due to an increased risk of vessel emergency while at Docks 2 or 3. The increased risk of vessel emergency would be related to Proposed Action 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).[8]

### 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 marine 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).

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

[8] 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 6-16 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 6-16. Likelihood of Incident Related to the Proposed Action and Cumulative Projects in 2038**

| | Predicted Annual Incident Frequency | | | | |
|---|---|---|---|---|---|
| Scenario | Collision | Powered Grounding | Drift Grounding | Fire | Total |
| 2028 Proposed Action | 2.91 | 14.40 | 3.60 | 0.0040 | 20.90 |
| 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 6-16, 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, 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. The most frequent incident would 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 6-16, 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 6-17 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 as a result of a grounding incident. The risk of an oil spill due to a grounding were 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 6-17. Likelihood of Different Oil Spill Sizes from Collisions Related to the Proposed Action and Cumulative Projects in 2038**

| Predicted Return Period (Once in…) | Oil Spill Volume (gallons) |
|---|---|
| 222 years | Greater than 0 |
| 224 years | 20,900 gallons or less |
| 381 years | 59,300 gallons or less |
| 444 years | 107,400 gallons or less |
| 2,461 years | 166,500 gallons or less |

Notes:
Source: DNV GL 2016

As shown in Table 6-17 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 also 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 also 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.

Two cumulative projects (Riverside Refinery and Washington Energy Storage & Transfer) would increase rail traffic on the BNSF Spur. Any cumulative project that would add new rail traffic is in this study area (Table 6-3).

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 the Reynolds Lead and BNSF Spur, the cumulative analysis assessed the cumulative projects in the study area that could increase noise levels. As noted above, two cumulative projects at the Port of Longview (Riverside Refinery and Washington Energy Storage & Transfer) would have rail traffic

that would increase rail traffic on the BNSF Spur. A qualitative assessment of the rail traffic associated with these projects was performed to determine potential cumulative noise impacts at noise-sensitive receptors on the Reynolds Lead and BNSF Spur.

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 operations of the coal export terminal is projected to exceed the Washington State noise standard at one residence. Proposed Action-related trains on the Reynolds Lead would have moderate and severe noise impacts per applicable criteria to noise-sensitive receptors. 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.

There are no cumulative projects near the residence where noise levels would be exceeded with coal export terminal operations. 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 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*

Rail traffic on the Reynolds Lead would be the same in 2038 as 2028 (approximately 20 trains per day). Therefore, the 2028 noise levels presented in Chapter 5, Section 5.5, *Noise and Vibration*, would be the same in 2038.

There is the potential for decreased rail noise levels 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, is currently in the preliminary design and NEPA and SEPA environmental review phase to address traffic congestion, freight mobility, and safety issues at this intersection. The 2015 transportation package passed by the Washington State Senate includes $85 million to construct the preferred alternative identified after the conclusion of the NEPA and SEPA processes. If the project grade-separates the Oregon Way and/or Industrial Way crossings of the Reynolds Lead, freight trains on the Reynolds Lead would not be required to sound train horns for public safety, which would decrease rail-related noise levels at these crossings.

Two reasonably foreseeable actions at the Port of Longview (Riverside Refinery and Washington Energy Storage & Transfer) would add approximately 2.6 trains daily to the BNS Spur. Trains would travel from Longview Junction to the Port of Longview and would not travel on the Reynolds Lead. In total, approximately 25.7 trains would travel on the BNSF Spur in 2038. The only noise-sensitive-receiver near the BNSF Spur is Gerhart Gardens Park located north of SR 432. The relative increase in noise exposure level from the addition of 2.6 trains to the BNSF Spur would be approximately 0.5 A-weighted decibels (dBA), which is within measurement error and prediction accuracy. A measurable increase in noise is also unlikely to result due to vehicle-related noise from SR 432 located between the BNSF Spur and the Gerhart Gardens Park, and acoustical shielding provided by a highway embankment. Therefore, no cumulative noise impacts related to rail noise at Gerhart Gardens Park are anticipated.

***BNSF Main Line Routes in Washington State***

Table 6-18 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 6-18. Estimated 2038 Rail Traffic Cumulative Increase in Noise Exposure Relative to 2015 Conditions by Scenario**

| Route Segment | Cumulative No-Action Scenario $L_{dn}$ Increase | Cumulative Proposed Action scenario $L_{dn}$ Increase |
|---|---|---|
| Idaho/Washington State Line-Spokane | 4.2 | 4.6 |
| Spokane-Pasco | 5.0 | 5.5 |
| Pasco-Vancouver | 4.1 | 4.4 |
| Vancouver-Longview Junction | 4.3 | 4.6 |
| Longview Junction-Auburn | 4.3 | 4.6 |
| Auburn-Pasco | 7.3 | 8.1 |

The estimated cumulative increase compared to existing noise levels is 4.1 dBA to 7.3 dBA without Proposed Action-related trains, and 4.6 dBA to 8.1 dBA with Proposed Action-related trains. The contribution of Proposed Action-related trains would be between 0.3 dBA and 0.8 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. As shown in Section 6.3.3.4, *Vessel Transportation*, vessel traffic is projected to increase approximately 1% annually and vessel traffic related to the cumulative projects was assumed to be in addition to the baseline increase of 1%.

Table 6-19 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 to be similar to the noise exposure from all cumulative vessel noise traffic. The estimated noise exposure from Proposed Action-related vessel traffic would be comparable or less than ambient noise levels at the noise-sensitive receivers and would, therefore, not be expected to result in any cumulative noise impacts at noise-sensitive receivers.

**Table 6-19. Potential Noise Exposure Levels from Vessel Traffic at Various Perpendicular Distances from the Columbia River Navigational Channel**

| Distance (feet) | Day-night sound level ($L_{dn}$) |
|---|---|
| 400 | 44 |
| 600 | 40 |
| 800 | 38 |
| 1000 | 36 |
| 1200 | 34 |
| 1400 | 33 |
| 1600 | 32 |

## 6.3.3.6 Air Quality

This section discusses potential cumulative impacts on air quality.

### Study Area

The study area for the cumulative impacts on local air quality is defined as the project area, Reynolds Lead, and BNSF Spur. The Washington Energy Storage & Transfer and Riverside Refinery cumulative projects are in this study area because these projects would increase rail traffic on the BNSF Spur.

The study area for potential cumulative impacts on air quality statewide includes the anticipated rail routes for Proposed Action-related trains in Washington State and the Columbia River to 3 nautical miles offshore. Any cumulative project that would add new rail traffic (Table 6-3) or vessel traffic (Table 6-4) are in this study area.

## Methods

The following describes the methods to conduct the air quality analysis for the two study areas.

### Reynolds Lead and BNSF Spur

Two cumulative projects at the Port of Longview would add rail traffic to the BNSF Spur (Riverside Refinery and Washington Energy Storage & Transfer). The analysis evaluated emissions from operations of these proposed actions. Air emissions for these projects were estimated for volatile organic compounds (VOCs), carbon monoxide, nitrogen oxide, sulfur dioxide, particulate matter less than 10 micrometers in diameter (PM10), particulate matter less than 2.5 micrometers in diameter (PM2.5), and carbon dioxide equivalent ($CO_2e$[9]) to evaluate the impact on air quality and global warming.

The air quality assessment for the Proposed Action considered on-site activities that would generate potential fugitive emissions of particulate matter, locomotive exhaust emissions that occur during the unloading and movement of coal cars, emissions at the dock during vessel loading, emissions from tugs used to maneuver vessels into the terminal, and emissions from operations (e.g., loader) and maintenance equipment.

The air quality assessment for the proposed Riverside Refinery project considered activities from the refinery operation for both the renewable portion and the conventional micro-refinery operation. For the renewable portion this included estimating emissions from the hot oil heater and production and purification system. This includes such activities as crude oil distillation, petroleum conversion, treating, and product handling. In addition, the transport of crude oil via rail and refined product via vessel was included in the emissions estimate.

The air quality assessment for the Washington Energy Storage & Transfer Project included the processes that would generate emissions, including assumed gas-fired turbines used for refrigeration, fugitive leaks from the storage tanks, and power generation turbines used to load vessels. In addition, the transport via rail and vessel was included in the analysis.

The cumulative air quality impacts are discussed in terms of the relative change in air emissions relative to the current countywide emissions. Greenhouse gas emissions were also estimated for the three cumulative projects and compared to the Washington State greenhouse gas emission goal for 2035.

### Statewide

An assessment of rail and vessel emissions in 2038 under cumulative conditions was also considered. 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.

[9] Carbon dioxide equivalent ($CO_2e$) is a metric used to compare the emissions of the different greenhouse gases based on their global warming potential. It represents the amount of carbon dioxide emission that would cause the same integrated radiative forcing, over a given time horizon, as an emitted amount of a greenhouse gas or a mixture of greenhouse gases. The equivalent carbon dioxide emission is obtained by multiplying the emission of a greenhouse gas by its global warming potential for the given time horizon (Intergovernmental Panel on Climate Change 2013).

## Cumulative Impacts

This section describes the impacts on air quality that could result from the cumulative operations of the three facilities.

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.

### BNSF Spur and Reynolds Lead

Sources of air pollution from the three facilities include stationary source emissions from operation of compressors, oil heaters and distillation processes as well as transportation emissions from rail and vessels servicing the facilities (Table 6-20). Refinery operations represent the largest source of VOC emissions mostly associated with the conventional refinery operation. The largest source of carbon monoxide emissions are from the refrigeration compressors operating for the Washington Energy Storage & Transfer project. Similar levels of nitrogen oxide emissions occur in each of the facilities. Sulfur oxide emissions are largest for the refinery but this is highly dependent on the sulfur content in the crude oil and the sulfur oxides control technology used. The particulate emissions are mostly associated with combustion process and are about twice as high for the refinery operation than the Proposed Action operations.

**Table 6-20. 2038 Estimated Emissions from Proposed Action, Riverside Refinery, and Washington Energy Storage & Transfer Compared to Cowlitz County Total Emissions**

| Emission | Total Emissions (ton/year) | Cowlitz County Total (ton/year)[a] | Percent |
|---|---|---|---|
| VOC | 165.5 | 16,919 | 1.0% |
| CO | 675.0 | 36,142 | 1.9% |
| $NO_X$ | 201.6 | 10,382 | 1.9% |
| $SO_X$ | 33.9 | 1,020 | 3.3% |
| PM10 | 51.0 | 1,872 | 2.7% |
| PM2.5 | 45.3 | 971 | 4.7% |

Notes:
[a] Total Cowlitz County emissions for 2011.
VOC = volatile organic compounds; CO = carbon monoxide; $NO_X$ = nitrogen oxides; $SO_X$ = sulfur oxides; PM10 = particulate matter with a diameter of 10 micrometers or less; PM2.5 = particulate matter with a diameter of 2.5 micrometers or less

The pollutant emission totals in Cowlitz County for the three facilities under maximum production levels are also shown in Table 6-20 with the 2011 Cowlitz County emissions inventory totals. The largest emissions increase for any single pollutant associated with the operation of the three facilities is for sulfur oxide and PM2.5 with increases of approximately 3.3 and 4.7%, respectively, in comparison to the Cowlitz County emissions. The PM2.5 emissions is due mainly to the combustion processes at each facility. Overall, the emissions represent an increase of from 1.0 to 4.7% compared to Cowlitz County emissions.

#### Statewide

The following sections assesses 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.

##### *Vessels*

As shown in Section 6.3.3.4, *Vessel Transportation*, vessel trips in the study area are projected to increase by 24% by 2038 compared to existing conditions, and air emissions would increase similarly with the exception of nitrogen oxide. The Maritime Air Pollution from Ships Annex VI, to which the United States is a signatory, requires compliance with Tier III nitrogen oxide mission standards for marine vessel engines built on or after January 1st, 2016 that operate in the North American emission control area. Assuming all vessels by 2038 comply with the requirement, nitrogen oxide emissions would decrease by about 34% relative to current Columbia River vessel emissions. Therefore, while cumulative vessel traffic in 2038 is projected to increase air emissions by about 24%, 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. There are no cumulative projects in this study area that 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 eastern Washington between Spokane and Pasco. The *SEPA Coal Technical Report* (ICF International 2016b) provides the methods and assumptions to perform the modeling. The same assumptions for coal dust emission rates for PM2.5 and PM10 and deposition were applied.

Because potential coal dust impacts in the Columbia River Gorge were not estimated for Proposed Action-related trains, air quality modeling was completed for the coal trains passing through the Columbia Gorge using the same approach for the Proposed Action in Cowlitz County and eastern Washington, as described in Chapter 5, Section 5.7, *Coal Dust*. Meteorological data from the National Climatic Data Center for The Dalles, Oregon Airport for 2014 was used to model the coal dust impacts in the Columbia River Gorge.

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:[10]

- Proposed Action (Cowlitz County, Washington): 8 loaded coal trains per day
- Gateway Pacific Terminal (Whatcom County, Washington): 9 loaded coal trains per day
- 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.

[10] For more information on these projects, see Table 6 -2.

### BNSF Main Line in Cowlitz County

Table 6-21 presents the estimated maximum PM10 and PM2.5 concentrations at 50 and 100 feet on the BNSF main line in Cowlitz County in comparison to ambient air quality standards. The estimated concentrations exceed the 24-hour and annual PM2.5 ambient air quality standard less than 100 feet from the rail line.

**Table 6-21. Estimated Maximum PM10 and PM2.5 Concentrations—BNSF Main Line in Cowlitz County**

| Pollutant | Averaging Period | Distance from Rail Line (feet) | Modeled Impact (µg/m³) | Background (µg/m³)[a] | Total Concentration (µg/m³)[b] | NAAQS (µg/m³) |
|---|---|---|---|---|---|---|
| PM10 | 24 hours[c] | 50 | 96 | 28 | 124 | 150 |
| | | 100 | 73.6 | 28 | 102 | 150 |
| PM2.5 | 24 hours[d] | 50 | 14.4 | 21 | **35.4** | 35 |
| | | 100 | 12.2 | 21 | 33.2 | 35 |
| | Annual[e] | 50 | 6.7 | 5.9 | **12.6** | 12 |
| | | 100 | 5.4 | 5.9 | 11.3 | 12 |

Notes:
[a] Background concentrations are monitoring design values for Woodland, Washington (Northwest International Air Quality Environmental Science and Technology Consortium 2015).
[b] **Bolded, shaded gray** indicates an estimated total concentration that would exceed the NAAQS.
[c] The PM10 24-hour modeled impact is 3-year average of the 2nd high concentration from each year.
[d] The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations.
[e] Modeled impact is the annual average over the 3 modeled years.
PM10 = particulate matter with a diameter of 10 micrometers or less; PM2.5 = particulate matter with a diameter of 2.5 micrometers or less ; µg/m³ = microns 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 Cowlitz County at varying distances. The average maximum monthly coal dust deposition is estimated to be above the trigger level for sensitive areas less than 100 feet from the rail line. The maximum monthly deposition is estimated to be above the trigger level less than 150 feet from the rail line.

**Table 6-22. Estimated Average Maximum and Maximum Monthly Coal Dust Deposition—BNSF Main Line in Cowlitz County**

| Distance (feet) | Average Maximum Monthly Deposition ($g/m^2$/month) | Maximum Monthly Deposition ($g/m^2$/month)[a] | Trigger Level for Sensitive Areas ($g/m^2$/month)[b] |
|---|---|---|---|
| 50 | **2.2** | **3.3** | 2.0 |
| 100 | 1.4 | **2.3** | 2.0 |
| 150 | 1.0 | 1.8 | 2.0 |
| 200 | 0.7 | 1.3 | 2.0 |
| 250 | 0.5 | 1.0 | 2.0 |

Notes:
[a] **Bolded, shaded gray** indicates an estimated deposition would be higher than the trigger level for sensitive areas.
[b] Source: New Zealand Ministry of Environment 2001
$g/m^2$/month = grams per cubic meter per month

### BNSF Main Line in the Columbia River Gorge

Table 6-23 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 6-23. Estimated Maximum PM10 and PM2.5 Concentrations—BNSF Main Line in Columbia River Gorge**

| Pollutant | Averaging Period | Distance from Rail Line (feet) | Modeled Impact ($\mu g/m^3$) | Background ($\mu g/m^3$)[a] | Total Concentration ($\mu g/m^3$) | NAAQS ($\mu g/m^3$) |
|---|---|---|---|---|---|---|
| PM10 | 24 hours[b] | 100 | 59.2 | 86 | 145.2 | 150 |
| PM2.5 | 24 hours[c] | 100 | 9.9 | 19 | 28.9 | 35 |
| | Annual[d] | 100 | 3.2 | 6.1 | 9.3 | 12 |

Notes:
[a] Background concentrations are monitoring design values for The Dalles, Oregon.
[b] The PM10 24-hour modeled impact is 3-year average of the 2nd high concentration from each year.
[c] The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations.
[d] Modeled impact is the annual average over the 3 modeled years.
PM10 = particulate matter with a diameter of 10 micrometers or less; PM2.5 = particulate matter with a diameter of 2.5 micrometers or less; $\mu g/m^3$ = microns 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 the Columbia River Gorge at varying distances. The average maximum monthly coal dust deposition is estimated to be above the trigger level for sensitive areas within 200 feet from the rail line. The maximum monthly deposition is estimated to be at the trigger level at 250 feet from the rail line.

**Table 6-24. Estimated Average Maximum and Maximum Monthly Coal Dust Deposition—BNSF Main Line in Columbia River Gorge**

| Distance (feet) | Average Maximum Monthly Deposition ($g/m^2$/month) | Maximum Monthly Deposition ($g/m^2$/month) | Trigger Level for Sensitive Areas ($g/m^2$/month)[a] |
|---|---|---|---|
| 100 | **4.0** | **4.6** | 2.0 |
| 150 | **2.7** | **3.4** | 2.0 |
| 200 | 1.9 | **2.6** | 2.0 |
| 250 | 1.5 | 2.0 | 2.0 |

Notes:
[a] **Bolded, shaded gray** indicates an estimated deposition would be higher than the trigger level for sensitive areas.
[b] Source: New Zealand Ministry of Environment 2001
$g/m^2$/month = grams per cubic meter per month

### BNSF Main Line in Eastern Washington

Table 6-25 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 6-25. Estimated Maximum PM10 and PM2.5 Concentrations—BNSF Main Line in Eastern Washington**

| Pollutant | Averaging Period | Distance from Rail Line (feet) | Modeled Impact ($\mu g/m^3$) | Background ($\mu g/m^3$)[a] | Total Concentration ($\mu g/m^3$)[b] | NAAQS ($\mu g/m^3$) |
|---|---|---|---|---|---|---|
| PM10 | 24 hours[c] | 100 | 77.4 | 101 | **178.4** | 150 |
| PM2.5 | 24 hours[d] | 100 | 9.0 | 24.2 | 33.2 | 35 |
| | Annual[e] | 100 | 6.7 | 5.9 | **12.6** | 12 |

Notes:
[a] Background for PM10 is the maximum high second high 24-hour average over the 3-year period (2012¬–2014) from Kennewick or Spokane. The background PM2.5 from the Spokane monitor from the 2012–2014 period.
[b] **Bolded, shaded gray** indicates an estimated total concentration that would exceed the NAAQS.
[c] The PM10 24-hour modeled impact is 3-year average of the 2nd high concentration from each year.
[d] The PM2.5 24-hour modeled impact is the 3-year average of the 98th percentile of the daily maximum concentrations.
[e] Modeled impact is the annual average over the 3 modeled years.
PM10 = particulate matter with a diameter of 10 micrometers or less; PM2.5 = particulate matter with a diameter of 2.5 micrometers or less; $\mu g/m^3$ = microns per cubic meter; NAAQS = National Ambient Air Quality Standards

Table 6-26 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 trigger level at 100 feet from the rail line. The estimated maximum monthly deposition is above the trigger level at 100 feet but less than the trigger level at 200 feet from the rail line.

**Table 6-26. Estimated Average Maximum and Maximum Monthly Coal Dust Deposition—BNSF Main Line in Eastern Washington**

| Distance (feet) | Average Maximum Monthly Deposition ($g/m^2$/month) | Maximum Monthly Deposition ($g/m^2$/month)[a] | Trigger Level for Sensitive Areas ($g/m^2$/month)[b] |
|---|---|---|---|
| 100 | **2.3** | **2.8** | 2.0 |
| 200 | 0.8 | 1.6 | 2.0 |

Notes:
[a] **Bolded, shaded gray** indicates an estimated deposition would be higher than the trigger level for sensitive areas.
[b] Source: New Zealand Ministry of Environment 2001
$g/m^2$/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 6-27 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, Coal Market Assessment* (ICF International 2016c), 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 6-27.
- **Cumulative No-Action Scenario.** None of the planned coal export terminals in Table 6-27 would be constructed.

**Table 6-27. Planned and Existing Pacific Northwest and Western Canada Coal Export Terminals**

| Terminal | Location | Assumed Online Year | Capacity (MMT/year) |
|---|---|---|---|
| **Planned** | | | |
| Proposed Action | Washington | 2025 | 44 |
| Gateway Pacific Terminal | Washington | 2030 | 48 |
| Coyote Island/Morrow Point | Oregon | 2030 | 8 |
| Fraser Surrey Docks | British Columbia | 2018 | 4 |
| Westshore Terminals Expansion | British Columbia | 2017 | 3 |
| Ridley Terminals Expansion | British Columbia | 2016 | 13 |
| Neptune Terminals Expansion | British Columbia | 2018 | 6 |
| **Total Planned** | | | **126** |
| **Existing** | | | |
| Westshore Terminals | British Columbia | Existing | 33 |
| Neptune | British Columbia | Existing | 12 |
| Ridley | British Columbia | Existing | 12 |
| **Total Existing** | | | **57** |
| **Total Planned and Existing** | | | **183** |

Notes:
MMT/year = million metric tons per year

The greenhouse gas emissions from the construction and operation of the other six planned coal export terminals 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 emissions. The analysis assumed each coal export terminal would operate at full capacity for a total export tonnage of 183 million metric tons.

## Cumulative Impacts

The coal market assessment found that the operation of the planned coal export terminals in Table 6-27 would increase the domestic coal prices and decrease domestic coal consumption, resulting in a decrease in domestic greenhouse gas emissions. Natural gas consumption would increase as it would be used as a substitute for coal. Therefore, the net domestic greenhouse gas emissions would decrease. However, internationally, Asian coal displacement coupled with induced demand[11] from reduced international coal prices would outweigh any reduction in domestic emissions and would result in an increase in international greenhouse gas emissions. Induced demand under the Cumulative Proposed Action scenario would be higher than the Past Conditions (2014) scenario[12] due to the effects of all coal export terminals.

[11] 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 126 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.

[12] As described in Chapter 5, Section 5.8.1, *Greenhouse Gas Emissions*, the Past Conditions (2014) scenario represents the state of the energy markets as of 2014 and therefore, assumes no climate policies enacted. Consequently, it does not include the Clean Power Plan effective in late 2015.

Table 6-28 illustrates the total net greenhouse gas emissions in 2038 in million metric tons of $CO_2e$ for the Cumulative Proposed Action scenario compared to the Cumulative No-Action scenario.

**Table 6-28. Total Net Greenhouse Gas Emissions in 2038 for the Cumulative Proposed Action Scenario[a]**

| Area | Net Emissions (Million Metric Tons $CO_2e$) |
|---|---|
| Cowlitz County | 0.038 |
| Washington State | 0.290 |
| United States | -24.4 |
| International[b] | 86.9 |
| **Total** | **62.5[c]** |

Notes:
[a] Net emissions compared to the Cumulative No-Action scenario (i.e. no coal export terminals)
[b] Outside the United States
[c] United States plus International
$CO_2e$ = carbon dioxide equivalent

Within Cowlitz County, greenhouse gas emissions would be approximately 0.038 million metric ton of $CO_2e$ greater than the Cumulative No-Action scenario where none of the planned coal export terminals would be constructed. Within Washington State, greenhouse gas emissions would be approximately 0.290 million metric ton of $CO_2e$ greater than emissions in the Cumulative No-Action scenario. Emissions would decrease by approximately 24.4 million metric tons in the United States due to switching from coal to natural gas for power plants. Outside of the United States, greenhouse gas emissions would be approximately 86.9 million metric tons of $CO_2e$ greater than emissions in Cumulative No-Action scenario. This cumulative analysis assumes all planned coal export terminals would be built. It is based on the climate policy from early 2015 and provides an estimate of potential net greenhouse gas emissions with all the planned export terminals identified in Table 6-25.

World Resources Institute maintains an online database of global greenhouse emissions that is developed using a consistent method to estimate emissions for the key greenhouse gases. It is based on inventory data provided by EPA, the U.S. Department of Energy, the Food, and Agriculture Organization of the United Nations, and the International Energy Agency. In 2012, global emissions were estimated to be 43,286.1 million metric tons of $CO_2e$ (World Resources Institute 2015) and total U.S. emissions were estimated to be 6,545.1 million metric tons of $CO_2e$ (U.S. Environmental Protection Agency 2015). In 2012, Ecology reported that Washington State contributed total emissions of 92.0 million metric tons of $CO_2e$ (Washington State Department of Ecology 2016). State-level greenhouse gas emissions for the Proposed Action would represent approximately 0.32% of total Washington State emissions if all coal export terminals are constructed. RCW 70.235.020, sets the following greenhouse gas statutory reduction levels.

- By 2020, reductions to 1990 emission levels
- By 2035, reductions to 25% below 1990 levels
- By 2050, reductions to 50% below 1990 levels or 70% below Washington State's expected emissions that year

To meet these reductions, Washington State must reduce emissions to 88.4 million metric tons per year by 2020, 66.3 million metric tons by 2035, and approximately 44.2 million metric tons by

2050.[13] The state-level greenhouse gas emissions from the Cumulative Proposed Action scenario would add an additional 0.290 million metric tons of $CO_2e$ per year. Starting from 2012 statewide emissions levels of 92.0 million metric tons of $CO_2e$, additional emissions from the Cumulative Proposed Action scenario are equivalent to 1.1% of the 25.7 million metric tons of $CO_2e$ needed to meet Washington State's statutory reductions of 25% below 1990 levels by 2035.

[13] Total emissions needed to reach the Washington State statutory reductions were calculated based on the required reduction from the most recently available statewide inventory of 88.4 million metric tons $CO_2e$ in 1990. (Washington State Department of Ecology 2016).