5.3 Vehicle Transportation

Vehicles provide transportation for individuals to travel to work, school, public services, and for recreational and commercial purposes. Vehicles also are used for emergency response and for delivering commercial goods that support economic activity. Vehicle delays increase travel time for motorists and can affect quality of life, air quality, and economic growth.

This section describes vehicle transportation in the study area. It then describes impacts on vehicle transportation that could result from construction and operation of the Proposed Action and No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action and any remaining unavoidable and significant adverse impacts.

5.3.1 Regulatory Setting

Laws and regulations relevant to vehicle transportation are summarized in Table 5.3-1.

Table 5.3-1. Regulations, Statutes, and Guidelines for Vehicle Transportation

Regulation, Statute, Guideline	Description
Federal	
Federal Railroad Safety Act of 1970	Gives FRA rulemaking authority over all areas of rail line safety. FRA has designated that state and local law enforcement agencies have jurisdiction over most aspects of highway/rail grade crossings, including warning devices and traffic law enforcement.
Highway Safety Act and the Federal Railroad Safety Act	Gives FHWA and FRA regulatory jurisdiction over safety at federal highway/rail grade crossings.
Railroad-Highway Grade Crossing Handbook (Federal Highway Administration 2007); *Manual on Uniform Traffic Control Devices* (23 USC 109(d))	Guidance document on grade-crossing safety issues, including the selection and placement of warning devices and enforcement of traffic laws. Provides guidelines for traffic control devices that consider delay, roadway classification, average daily traffic, number of trains per day, and train speed at grade crossings.
State	
Washington State Department of Transportation, Design Manual M 22.01.10, November 2015, Chapter 1350, Railroad Grade Crossings	Sets forth requirements and guidance on the design and treatment of state highway-rail grade crossings.
Motor Vehicles, Rules of the Road (RCW 46.61.340)	Sets forth that train traffic has the right-of-way at grade crossings.
Washington Utilities and Transportation Commission	Inspects and issues violations for hazardous materials shipments; track, signal, and train control; and rail operations. WUTC also regulates the construction, closure, or modification of public railroad crossings. In addition, WUTC inspects and issues defect notices if a crossing does not meet minimum standards. However, WUTC has no jurisdiction over public crossings in first-class cities.[a]

Regulation, Statute, Guideline	Description
Local	
Longview Municipal Code 11.40.080 (Railroad Trains Not to Block Streets)	Prohibits trains from using any street or highway for a period of time longer than five minutes, except trains or cars in motion other than those engaged in switching activities.

Notes:

[a] Per RCW 35.01.01, a first-class city is a city with a population of 10,000 or more at the time of organization or reorganization that has adopted a charter.

FRA = Federal Railroad Administration; FHWA = Federal Highway Administration; USC = United States Code; RCW = Revised Code of Washington; WUTC = Washington Utilities and Transportation Commission

5.3.2 Study Area

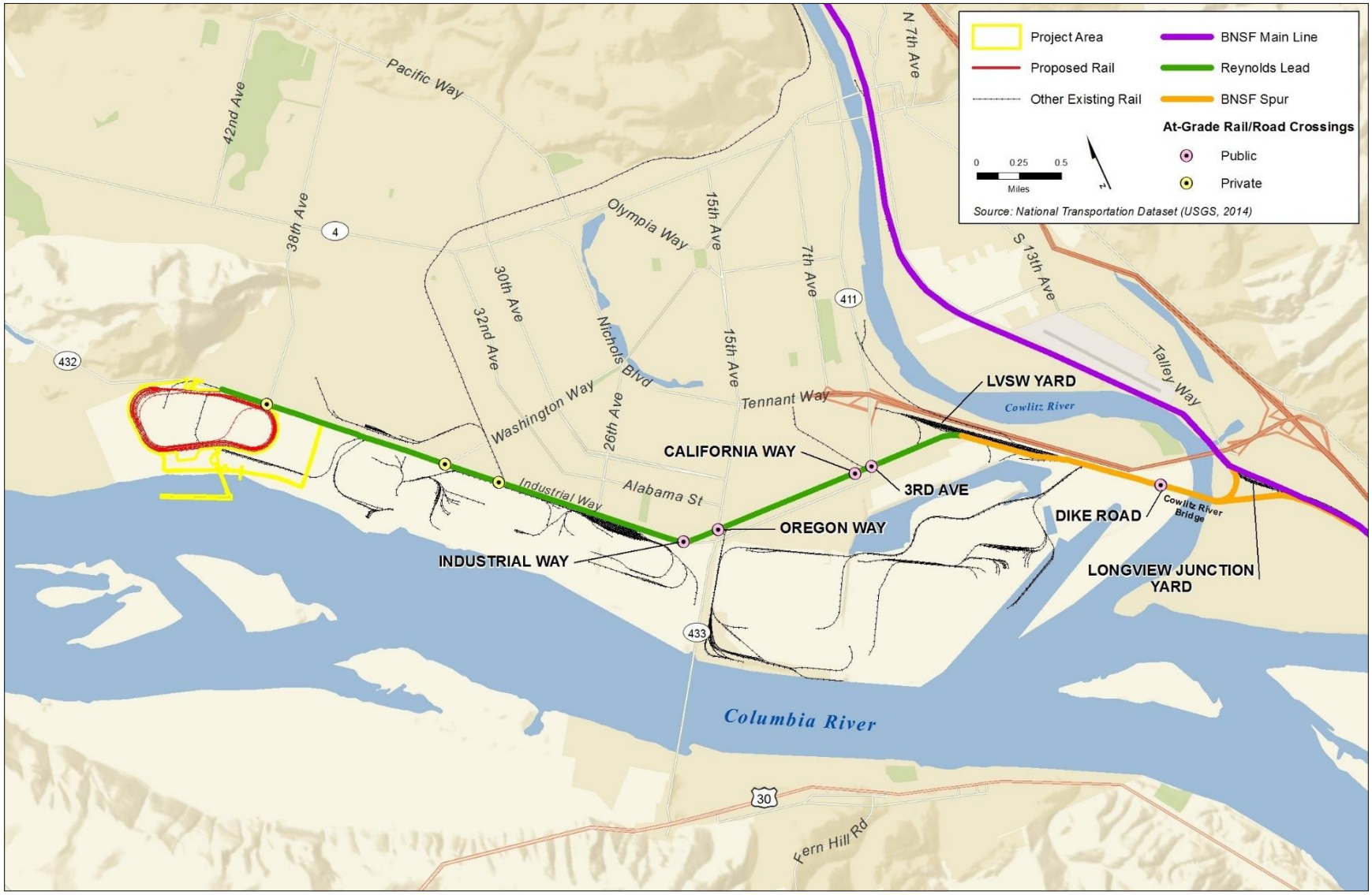
The study area for direct impacts is the project area as shown in Figure 5.3-1. The study area for indirect impacts is active public and private at-grade crossings within Cowlitz County on the Reynolds Lead and BNSF Spur, and all at-grade public crossings on the BNSF main line. A review of at-grade crossings of interest along the BNSF Railway Company (BNSF) main line in Washington State is also considered.

The following are the at-grade rail crossings along the Reynolds Lead and BNSF Spur in the study area. The United States Department of Transportation (USDOT) crossing identification number for the public at-grade rail crossings is also provided. Figure 5.3-1 illustrates the location of these rail crossings.[1]

- Project area access at 38th Avenue, south of Industrial Way (State Route [SR] 432)
- Weyerhaeuser access at Washington Way, south of Industrial Way
- Weyerhaeuser North Pacific Paper Corporation (NORPAC) access, south of Industrial Way
- Industrial Way, west of Oregon Way (SR 433) (101806G)
- Oregon Way, north of the Industrial Way/Oregon Way intersection (101805A)
- California Way, north of Industrial Way (101821J)
- 3rd Avenue (SR 432), north of the 3rd Avenue/Industrial Way intersection (101826T)
- Dike Road, south of Tennant Way (101791U)

[1] The intersections upstream from each of the eight at-grade railroad crossings along the Reynolds Lead and BNSF Spur were also analyzed during the peak vehicle traffic hour.

Figure 5.3-1. Reynolds Lead and BNSF Spur Study Crossings



The following are the at-grade crossings along the BNSF main line in Cowlitz County. Figure 5.3-2 illustrates the locations of these rail crossings.

- Taylor Crane Road, west of Barnes Drive in Castle Rock (092481X)
- Cowlitz Street, west of Pioneer Avenue in Castle Rock (092476B)
- Cowlitz Gardens Road, west of Pacific Avenue in Kelso (092466V)
- Mill Street, west of 1st Avenue in Kelso (092458D)
- S River Road, west of Pacific Avenue in Kelso (092457W)
- Toteff Road/Port Road in Kalama (092446J)
- W Scott Avenue, east of Pekin Road in Woodland (092437K)
- Davidson Avenue, east of Pekin Road in Woodland (092435W)
- Whalen Road, east of Kuhnis Road in Woodland (092434P)

A review of at-grade rail crossings of interest identified by the Washington State Department of Transportation (WSDOT) on the routes for Proposed Action-related trains beyond Cowlitz County was also conducted. These statewide study crossings are at-grade state highway crossings or at-grade crossings near state highways.[2]

5.3.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on vehicle transportation associated with the construction and operation of the Proposed Action and No-Action Alternative. For additional information, see the *SEPA Vehicle Transportation Technical Report* (ICF and DKS Associates 2017).

5.3.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and No-Action Alternative on vehicle transportation in the study area.

- Data provided by the Washington Utilities and Transportation Commission (WUTC)
- USDOT Grade Crossing Inventory, Federal Railroad Administration (FRA)
- *SR 432 Highway Improvements and Rail Realignment Study* (Cowlitz-Wahkiakum Council of Governments 2014)
- Traffic volume data provided in local studies and field-collected data
- Data and information provided by the Applicant

[2] Figure 5.3-6 in Section 5.3.5, *Impacts*, illustrates the statewide study crossings.

Figure 5.3-2. BNSF Main Line in Cowlitz County Study Crossings

5.3.3.2 Impact Analysis

This section describes the methods used to evaluate the potential impacts on vehicle transportation associated with the construction and operation of the Proposed Action and potential impacts under the No-Action Alternative.

The potential vehicle impacts addressed in this analysis include changes in average vehicle delay in a 24-hour period (average vehicle delay), changes in peak hour vehicle delay, changes in vehicle queuing, and changes to vehicle safety.[3] Unlike passenger trains, freight trains do not run on a schedule. Railroad companies evaluate each situation and dispatch trains based on a number of criteria, including available crew, number of cars, cost of fuel, and overall revenue. Analysis and projection of rail impact operations requires analyzing the rail traffic and identifying typical operations. Because freight trains do not operate on a schedule, the 24-hour average vehicle delay was analyzed to represent the potential typical delay for the average driver in the study area. The potential increase in vehicle delay during the PM (afternoon) peak hour was also analyzed to identify the highest potential vehicle delay impacts.

Analysis Scenarios

The following scenarios were analyzed.

- **2018 No-Action**. This scenario represents conditions in 2018 without construction of the coal export terminal. This scenario includes activities currently ongoing and planned for the existing bulk materials terminal in the Applicant's leased area, as described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives*.
- **2018 Proposed Action Construction**. This scenario represents the construction year for the Proposed Action with the most construction vehicle traffic. It assumes the motor vehicle and train volumes from the 2018 No-Action scenario, but with the added traffic and rail growth related to construction of the Proposed Action. It also assumes the planned project area activities included in the 2018 No-Action scenario. This scenario considers that construction materials would be delivered by truck (Truck Delivery), or construction materials would be delivered by rail (Rail Delivery), as described in the *Construction Impact Analysis* subsection.
- **2028 No-Action**. This scenario represents conditions without the coal export terminal in 2028. It includes the motor vehicle and train volumes from the 2018 No-Action scenario, but with added growth to represent estimated 2028 traffic conditions. It also assumes planned bulk product terminal activities and potential future activities for the existing bulk product terminal.
- **2028 Proposed Action**. This scenario represents conditions during full operation of the coal export terminal in 2028. It includes the motor vehicle and train volumes from the 2028 No-Action scenario, but with the added traffic and train growth related to full operation of the coal export terminal. It also assumes the planned and potential expansion of bulk product terminal activities included in the 2028 No-Action scenario. This scenario considers the potential effect of current track infrastructure along the Reynolds Lead and BNSF Spur, and planned track infrastructure improvements along the Reynolds Lead and BNSF Spur.

[3] Indicates changes to vehicle safety conditions at study crossings.

The *SR 432 Highway Improvements and Rail Realignment Study* completed in September 2014 (Cowlitz-Wahkiakum Council of Governments 2014) developed various design concepts for rail and highway improvements to improve safety, mobility, congestion, and freight capacity. The top concept that emerged from this study was a grade-separated intersection at Industrial Way (SR 432)/Oregon Way (SR 433). This project, called the Industrial Way/Oregon Way Intersection Project and led by Cowlitz County Public Works, is currently in the preliminary design and National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA) environmental compliance phase to address traffic congestion, freight mobility, and safety issues at this intersection. In January 2017, one of two design options advanced to the Environmental Impact Statement would grade-separate the Reynolds Lead crossing with Oregon Way and Industrial Way.

Grade-separating the Industrial Way and Oregon Way at-grade rail crossings on the Reynolds Lead would eliminate motor vehicle delay and vehicle queuing at these two crossings. Trains on the Reynolds Lead would travel beneath these roadways without delaying motor vehicle traffic at these crossings. However, this project was not included in the vehicle transportation analysis because a preferred alternative for the intersection has not been identified and implementation by 2028 is not certain. The other concepts identified in the *Highway Improvements and Rail Realignment Study* were not included in the vehicle transportation analysis for the Proposed Action because funding for implementation has not been secured.

Construction Impact Analysis

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

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

For the vehicle transportation analysis, the barge scenario is the same as the truck scenario because materials would be transferred from barge to truck and delivered to the project area by truck.

The analysis of potential vehicle transportation impacts during the peak construction year is based primarily on information provided by the Applicant, as documented in the *SEPA Vehicle Transportation Technical Report*, including the following.

- The amount of construction material that would be delivered to the project area via truck or rail (applicable to all three construction material delivery scenarios).
- Daily and peak hour estimates of construction truck traffic to deliver materials (applicable to the truck delivery and barge delivery construction material delivery scenarios).

- Average number of daily construction trains (applicable to the rail delivery construction material delivery scenario).
- Daily and peak hour construction worker vehicle traffic (applicable to all three construction material delivery scenarios).

Operations Impact Analysis

Full operations of the coal export terminal (up to 44 million metric tons of coal per year) would add 16 new daily train trips (8 loaded and 8 empty trains), each an average of 6,917 feet (approximately 1.3 miles) long.

Trip Generation and Trip Distribution

Based primarily on estimates provided by the Applicant, approximately 135 employees would be needed to operate the coal export terminal; 50% of the employees would exit and 30% would enter the project area during the PM peak hour.

Construction and operations traffic generated by the Proposed Action was distributed onto the transportation network based on current traffic patterns in the study area. For the construction materials delivered to the project area by truck, it is assumed that 75% of the trucks would arrive from the east using 3rd Avenue, and 25% from the south along Oregon Way. For the construction workers and terminal employees, it is assumed that 60% of the traffic would arrive from the north using Washington Way (35%) and Oregon Way (25%), 15% from the south along Oregon Way, 20% from the east along 3rd Avenue, and 5% from the west along Industrial Way.

Baseline and Future Volumes

The following describes the baseline and future vehicular and train volumes.

Vehicles

Vehicle traffic count data were obtained from recent studies and field-collected turning movement counts. Where recent traffic count data were unavailable, average daily traffic volumes were obtained from the FRA or WUTC databases and estimated PM peak hour traffic volumes were derived from the average daily traffic volumes. Hourly traffic volumes over 3 days were compared at select locations to identify a peak hour, which was identified as 4:00 p.m. to 5:00 p.m. The data also indicated that the PM peak hour (hereafter referred to as peak hour) represents approximately 10% of the daily traffic volumes. This factor was used to convert count data from peak hour to average daily traffic or vice versa.

Traffic volumes in 2018 and 2028 included a combination of background traffic, as well as growth associated with the Proposed Action. Year 2028 background traffic was estimated by developing a linear growth rate between existing and forecast traffic volumes at study crossings along the Reynolds Lead and BNSF Spur. The derived growth rates were applied to the collected count data to develop 2018 and 2028 No-Action scenario traffic volumes. At study crossings along the BNSF main line where forecast traffic volumes were unavailable, data suggest traffic volumes will increase 2% annually. For comparison purposes, a 2% annual growth rate was applied to expand older count data to reflect baseline traffic conditions in the *SR 432 Highway Improvements and Rail Realignment Study* completed in September 2014 (Cowlitz-Wahkiakum Council of Governments 2014). Therefore, at the study crossings along the BNSF main line in Cowlitz County, the 2% annual growth

rate was applied to the collected count data to develop 2018 and 2028 No-Action scenario traffic volumes. Table 5.3-2 illustrates the average daily traffic and peak hour count data for all study crossings.

Trains

The following describes the methods to estimate train volumes on the Reynolds Lead and BNSF Spur, and the BNSF main line in Cowlitz County.

Reynolds Lead and BNSF Spur

Section 5.1, *Rail Transportation*, describes methods to estimate the types, numbers, and speed of trains on the Reynolds Lead and BNSF Spur in 2018 and 2028. As described in Section 5.1, *Rail Transportation*, Longview Switching Company (LVSW) plans to upgrade the Reynolds Lead and BNSF Spur as a separate action should it be warranted by increased rail traffic from current and future customers. Upgrades would include replacing ballast, ties, and rails to provide safer operation and allow increased train speed. LVSW would also install signals and upgrade traffic control and switching systems, which would increase capacity. Impacts with current track infrastructure and with planned track improvements are analyzed.

Table 5.3-2 illustrates the assumed number of trains for each scenario in 2018 and 2028. In summary, Table 5.3-2 shows the following.

- The 2018 Proposed Action Construction (Rail Delivery) scenario would add an average of 1.3 train trips per day in 2018 at study crossings on the Reynolds Lead and BNSF Spur. It was assumed that one Proposed Action-related train could travel during the peak hour. The 2018 Construction (Truck Delivery) scenario would not add any trains to the Reynolds Lead or BNSF Spur.
- The 2028 Proposed Action scenario would add 16 train trips per day to the Reynolds Lead and BNSF Spur. It was assumed that 1 Proposed Action-related train could travel during the peak hour with current track infrastructure on the Reynolds Lead and BNSF Spur, and up to 2 Proposed Action-related trains could travel during the peak hour with planned track infrastructure on the Reynolds Lead and BNSF Spur.

Table 5.3-2. Motor Vehicle and Train Volumes at Study Crossings by Scenario

Crossing Name (USDOT Crossing ID)	Time Period	2018 No-Action Scenario		2018 Proposed Action Construction (Truck Delivery) Scenario		2018 Proposed Action Construction (Rail Delivery) Scenario		2028 No-Action Scenario		2028 Proposed Action Scenario	
		Vehicle	Train	Vehicle	Train	Vehicle	Train	Vehicle	Train	Vehicle	Train
Reynolds Lead and BNSF Spur Study Crossings											
Project area access at 38th Avenue	Per Day	400	2.3	3,250	2.3	2,200	3.6	600	4.0	1,700	20.0
	Peak Hour	40	1	305	1	220	1	60	1	170	1 or 2
Weyerhaeuser access at Washington Way	Per Day	3,200	2.3	3,200	2.3	3,200	3.6	3,800	4.0	3,800	20.0
	Peak Hour	320	1	320	1	320	1	380	1	380	1 or 2
Weyerhaeuser NORPAC access	Per Day	700	2.3	700	2.3	700	3.6	950	4.0	950	20.0
	Peak Hour	70	1	70	1	70	1	95	1	95	1 or 2
Industrial Way-SR 432 (101806G)	Per Day	9,600	2.3	11,500	2.3	10,700	3.6	10,800	4.0	11,450	20.0
	Peak Hour	960	1	1,150	1	1,070	1	1,080	1	1,145	1 or 2
Oregon Way-SR 433 (101805A)	Per Day	13,400	2.3	13,850	2.3	13,850	3.6	16,750	4.0	17,000	20.0
	Peak Hour	1,340	1	1,385	1	1,385	1	1,675	1	1,700	1 or 2
California Way (101821J)	Per Day	3,750	2.3	3,750	2.3	3,750	3.6	5,450	4.0	5,450	20.0
	Peak Hour	375	1	375	1	375	1	545	1	545	1 or 2
3rd Avenue-SR 432 (101826T)	Per Day	16,300	2.3	17,300	2.3	16,650	3.6	20,000	4.0	20,200	20.0
	Peak Hour	1,630	1	1,730	1	1,665	1	2,000	1	2,020	1 or 2
Dike Road (101791U)	Per Day	400	7.1	400	7.1	400	8.4	400	7.1	400	23.1
	Peak Hour	40	1	40	1	40	1	40	1	40	1 or 2
BNSF Main Line in Cowlitz County Study Crossings											
Taylor Crane Road in Castle Rock (092481X)	Per Day	50	55.1	50	55.1	50	56.1	50	72.7	50	80.7
	Peak Hour	5	3.9	5	3.9	5	4.9	5	4.6	5	6.6
Cowlitz Street in Castle Rock (092476B)	Per Day	1,200	55.1	1,200	55.1	1,200	56.1	1,450	72.7	1,450	80.7
	Peak Hour	120	3.9	120	3.9	120	4.9	145	4.6	145	6.6

Crossing Name (USDOT Crossing ID)	Time Period	2018 No-Action Scenario		2018 Proposed Action Construction (Truck Delivery) Scenario		2018 Proposed Action Construction (Rail Delivery) Scenario		2028 No-Action Scenario		2028 Proposed Action Scenario	
		Vehicle	Train	Vehicle	Train	Vehicle	Train	Vehicle	Train	Vehicle	Train
Cowlitz Gardens Road in Kelso (092466V)	Per Day	700	55.1	700	55.1	700	56.1	850	72.7	850	80.7
	Peak Hour	70	3.9	70	3.9	70	4.9	85	4.6	85	6.6
Mill Street in Kelso (092458D)	Per Day	2,550	55.1	2,550	55.1	2,550	56.1	3,000	72.7	3,000	80.7
	Peak Hour	255	3.9	255	3.9	255	4.9	300	4.6	300	6.6
S River Road in Kelso (092457W)	Per Day	1,850	55.1	1,850	55.1	1,850	56.1	2,200	72.7	2,200	80.7
	Peak Hour	185	3.9	185	3.9	185	4.9	220	4.6	220	6.6
Toteff Road/ Port Road in Kalama (092446J)	Per Day	1,200	55.1	1,200	55.1	1,200	56.1	1,450	72.7	1,450	80.7
	Peak Hour	120	3.9	120	3.9	120	4.9	145	4.6	145	6.6
W Scott Avenue in Woodland (092437K)	Per Day	2,650	55.1	2,650	55.1	2,650	56.1	3,100	72.7	3,100	80.7
	Peak Hour	265	3.9	265	3.9	265	4.9	310	4.6	310	6.6
Davidson Avenue in Woodland (092435W)	Per Day	2,000	55.1	2,000	55.1	2,000	56.1	2,350	72.7	2,350	80.7
	Peak Hour	200	4	200	3.9	200	4.9	235	4.6	235	6.6
Whalen Road in Woodland (092434P)	Per Day	1,550	55.1	1,550	55.1	1,550	56.1	1,800	72.7	1,800	80.7
	Peak Hour	155	3.9	155	3.9	155	4.9	180	4.6	180	6.6

Notes:
USDOT = U.S. Department of Transportation

BNSF Main Line in Cowlitz County

Section 5.1, *Rail Transportation*, describes methods to estimate the types, numbers, and speed of trains on the BNSF main line in Cowlitz County in 2018 and 2028. Table 5.3-2 illustrates the assumed number of trains for each scenario in 2018 and 2028.

In summary the table states the following.

- The 2018 Proposed Action Construction (Rail Delivery) scenario would add an average of 0.65 Proposed Action-related train trips per day at study crossings on the BNSF main line in Cowlitz County. It was assumed that one Proposed Action-related train could travel during the peak hour. The 2018 Construction (Truck Delivery) scenario would not add any trains to the BNSF main line in Cowlitz County.
- The 2028 Proposed Action scenario would add 8 Proposed Action-related train trips per day at study crossings on the BNSF main line in Cowlitz County (8 loaded trains would arrive from the south and 8 unloaded trains would travel to the north). It was assumed that up to 2 Proposed Action-related trains could travel during the peak hour.

Railroad Crossing Performance Measures

The following performance measures were used to determine vehicle transportation impacts and are defined below.

- **Level of service impact:** A study crossing or upstream intersection that would operate below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year.
- **Queuing impact:** An estimated queue length that would extend from a study crossing or upstream intersection that exceeds available storage length (to the nearest intersection) under the Proposed Action that would not otherwise exceed the available storage length under the No-Action scenario from the same year.
- **Vehicle safety impact:** A study crossing that would have a predicted accident probability above 0.075 accident per year under the Proposed Action that would be at or below 0.075 accident per year under the No-Action Alternative.

The following section provides additional information on the performance measures.

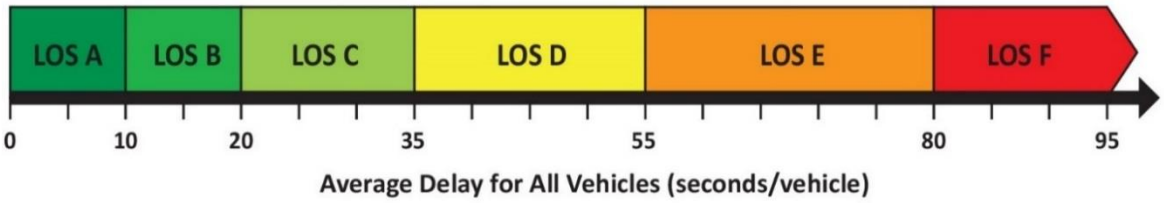
Vehicle Delay

The following describes vehicle delay measures, including level of service, and vehicle queuing.

Level of Service

Level of service represents a "report card" rating (A through F) based on the delay experienced by vehicles at an intersection, or in this case, a railroad crossing, as shown in Figure 5.3-3. Levels of service A, B, and C indicate conditions where traffic moves without substantial delays. Levels of service D and E represent progressively worse operating conditions. Level of service F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity.

Figure 5.3-3. Level of Service



The Cities of Kelso (2015), Longview, and Woodland (2005) and WSDOT (2010) use a peak hour standard of level of service D or better.[4] The transportation element of the *City of Longview Comprehensive Plan* (December 2006) defines a capacity deficiency on arterial segments as a volume-to-capacity ratio of 0.85 or higher (representing a generalized level of service of D or worse). As a conservative approach, level of service D (average delay for all vehicles equal to or less than 55 seconds) was applied as a standard to all study crossings and upstream intersections, regardless of the street functional classification or jurisdiction.

A level of service impact was defined as a study crossing or upstream intersection that operates below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year.

For the peak hour analysis, the traffic operating conditions at study crossings were determined based on the *2000 Highway Capacity Manual* (Transportation Research Board 2000) methods for signalized intersections (the at-grade railroad crossings were assumed to be pretimed traffic signals). The average vehicle delay in the peak hour (in seconds) for a study crossing was determined based on the peak hour number of trains, average train length, train speed, and peak hour traffic volume in both directions. This average vehicle delay in seconds per vehicle was then converted to the applicable level of service designation (Figure 5.3-3) for comparison with the No-Action scenario. For the upstream intersections, traffic operating conditions for the peak hour were determined based on the *2010 Highway Capacity Manual* (Transportation Research Board 2010) methods for signalized and unsignalized intersections. Level of service and delay were reported as the intersection average for signalized intersections and as the worst performing stop-controlled approach for unsignalized intersections.

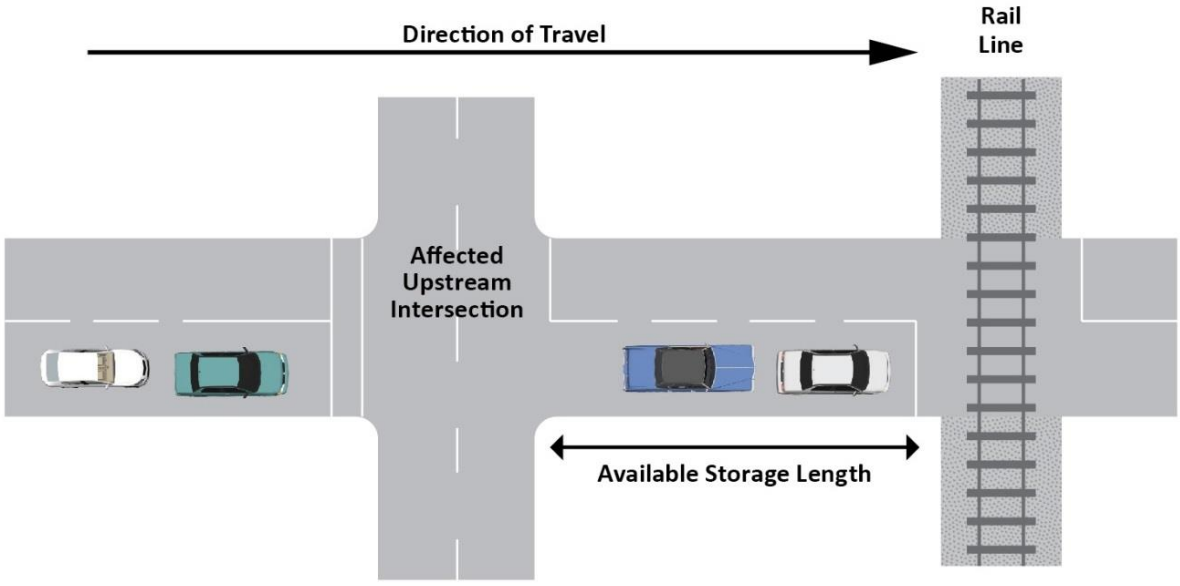
The same methods for the peak hour analysis were used for the 24-hour vehicle delay analysis for study crossings. The average delay per vehicle in a 24-hour period (in seconds) for a study crossing was determined based on the average number of daily trains, average train length, train speed, and average daily traffic volumes in both directions. This average vehicle delay in seconds per vehicle was then converted to the applicable level of service (Figure 5.3-3) to provide a qualitative measure of vehicle delay at study crossings in a 24-hour period for comparison with the No-Action scenario.

[4] Study crossings are also in the Cities of Castle Rock and Kalama. These cities have not adopted a peak hour standard.

Vehicle Queuing

Each study grade crossing has a storage length to store vehicles when the crossing is blocked. The available storage length is the distance between the crossing and the next intersection (upstream intersection), as shown in Figure 5.3-4. As vehicles queue, the distance that vehicles extend back from the crossing while waiting at a blocked crossing increases.

Figure 5.3-4. Vehicle Queuing



A queuing analysis was conducted using SimTraffic™ 8, which estimated the 95th percentile vehicle queue lengths, or the queue length that would not be exceeded in 95% of the queues formed during the peak hour.

A vehicle queuing impact was defined as a queue that would extend from a study crossing that would exceed the available storage length (to an upstream intersection) under the Proposed Action that would not otherwise exceed the available storage under the No-Action scenario for the same year.

Vehicle Safety

Vehicle safety at the Cowlitz County study crossings and statewide crossings was analyzed by estimating future accident frequency and the corresponding predicted interval between accidents with and without the addition of Proposed Action-related rail traffic. The FRA GradeDec.Net model was used to analyze vehicle safety (Federal Railroad Administration 2016). This model accounts for accident history and frequency of trains at existing at-grade crossings, traffic volumes, existing safety devices, and other factors to determine the potential impacts from an increase in rail traffic. Other physical factors that affect the frequency of collisions at a crossing, such as sight distance, approach grade, or vehicle storage between the crossing and upstream intersections, are not captured in this model. This analysis provides a frame of reference for crossings by estimating accident probability, but does not identify these crossings as safe or unsafe.

The *Railroad-Highway Grade Crossing Handbook–Revised Second Edition* (Federal Highway Administration 2007) indicates that grade separation or active devices with automatic gates should be considered as options when certain criteria are met. One criterion is whether the expected accident frequency, as calculated by the U.S. Department of Transportation Accident Prediction formula, exceeds 0.075 per year for active devices with automatic gates, and 0.50 per year for grade separation. For the purpose of this analysis, a vehicle safety impact was defined as a study crossing that would have an expected accident frequency above 0.075 per year under the Proposed Action that would be at or below 0.075 per year under the No-Action scenario.

5.3.4 Existing Conditions

This section describes the existing environmental conditions in the study area related to vehicle transportation that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

5.3.4.1 Study Crossing Characteristics

Table 5.3-3 provides vehicle and train traffic information at the study crossings on the Reynolds Lead and BNSF Spur. This table also presents information for vehicle and train traffic at the study crossings on the BNSF main line in Cowlitz County. Roadway characteristics are also listed, including roadway functional classifications and number of lanes at the crossing. The following describes vehicle safety at study crossings and emergency service providers that would use the study crossings.

Vehicle Safety

Ten years of collision records (2003 to 2013) for the at-grade railroad crossings along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County were obtained from FRA and WSDOT databases. The data identified one vehicle collision involving a train in the study area, at the Washington Way crossing, just south of the Industrial Way intersection. The crossing is ungated, and located less than 50 feet from Industrial Way. The collision involved a vehicle stopped at the traffic signal, beyond the stop bar and on the track, getting struck by a train. The collision resulted in property damage only.

On the BNSF main line, a collision involving a vehicle and a train occurred at the Cowlitz Gardens Road crossing. This crossing is gated and located less than 75 feet from Pacific Avenue. The collision involved an inoperable vehicle stopped on the tracks, getting struck by a train. The collision resulted in property damage only.

Emergency Services

The Cowlitz 2 Fire & Rescue District, the Longview Fire Department, and American Medical Response (AMR) provide emergency medical services and fire protection for the project area. Figure 5.3-5 illustrates the location of fire stations in the vicinity of the project area. Emergency medical service providers from multiple jurisdictions use the Lewis and Clark Bridge for emergency services and to access medical facilities. The Lewis and Clark Bridge/SR 433 is the only practical route for emergency service providers between medical facilities in Kelso-Longview and Rainier and other Oregon communities.

Table 5.3-3. Study Crossing Characteristics

Study Crossing Name (USDOT Crossing ID)	Roadway			Railroad (Trains)		
	Estimated AADT	Functional Classification[a]	Lanes	Protection[b]	Crossings per Day	Average Speed (mph)[c]
Reynolds Lead and BNSF Spur Study Crossings						
Project area access at 38th Avenue	400	Private	2	None	2.3	5 (freight)
Weyerhaeuser access at Washington Way	3,200	Private	4	None	2.3	8 (freight)
Weyerhaeuser NORPAC access	700	Private	2	None	2.3	10 (freight)
Industrial Way- SR 432 (101806G)	9,600	Principal Arterial	2	Overhead Lights	2.3	10 (freight)
Oregon Way- SR 433 (101805A)	13,400	Principal Arterial	4	Gates/ Overhead Lights	2.3	10 (freight)
California Way (101821J)	3,750	Minor Arterial	2	Overhead Lights	2.3	8 (freight)
3rd Avenue- SR 432 (101826T)	16,300	Principal Arterial	4	Gates/ Overhead Lights	2.3	8 (freight)
Dike Road (101791U)	400	Local	2	Overhead Lights	7.1	10 (freight)
BNSF Main Line in Cowlitz County Study Crossings						
Taylor Crane Road in Castle Rock (092481X)	50	Local	2	None	55.1	50 (freight); 50 (passenger)
Cowlitz Street in Castle Rock (092476B)	1,200	Minor Collector	2	Gates/ Overhead Lights	55.1	50 (freight); 50 (passenger)
Cowlitz Gardens Road in Kelso (092466V)	700	Local	2	Gates	55.1	60 (freight); 75 (passenger)
Mill Street in Kelso (092458D)	2,550	Local	2	Gates	55.1	40 (freight); 40 (passenger)
S River Road in Kelso (092457W)	1,850	Local	2	Gates	55.1	40 (freight); 40 (passenger)
Toteff Road/ Port Road in Kalama (092446J)	1,200	Local	2	Gates/ Overhead Lights	55.1	60 (freight); 79 (passenger)
W Scott Avenue in Woodland (092437K)	2,650	Minor Arterial	2	Gates	55.1	60 (freight); 75 (passenger)

	Roadway				Railroad (Trains)	
Study Crossing Name (USDOT Crossing ID)	**Estimated AADT**	**Functional Classification[a]**	**Lanes**	**Protection[b]**	**Crossings per Day**	**Average Speed (mph)[c]**
Davidson Avenue in Woodland (092435W)	2,000	Minor Arterial	2	Gates	55.1	60 (freight); 75 (passenger)
Whalen Road in Woodland (092434P)	1,550	Minor Arterial	2	Gates	55.1	60 (freight); 75 (passenger)

Notes:

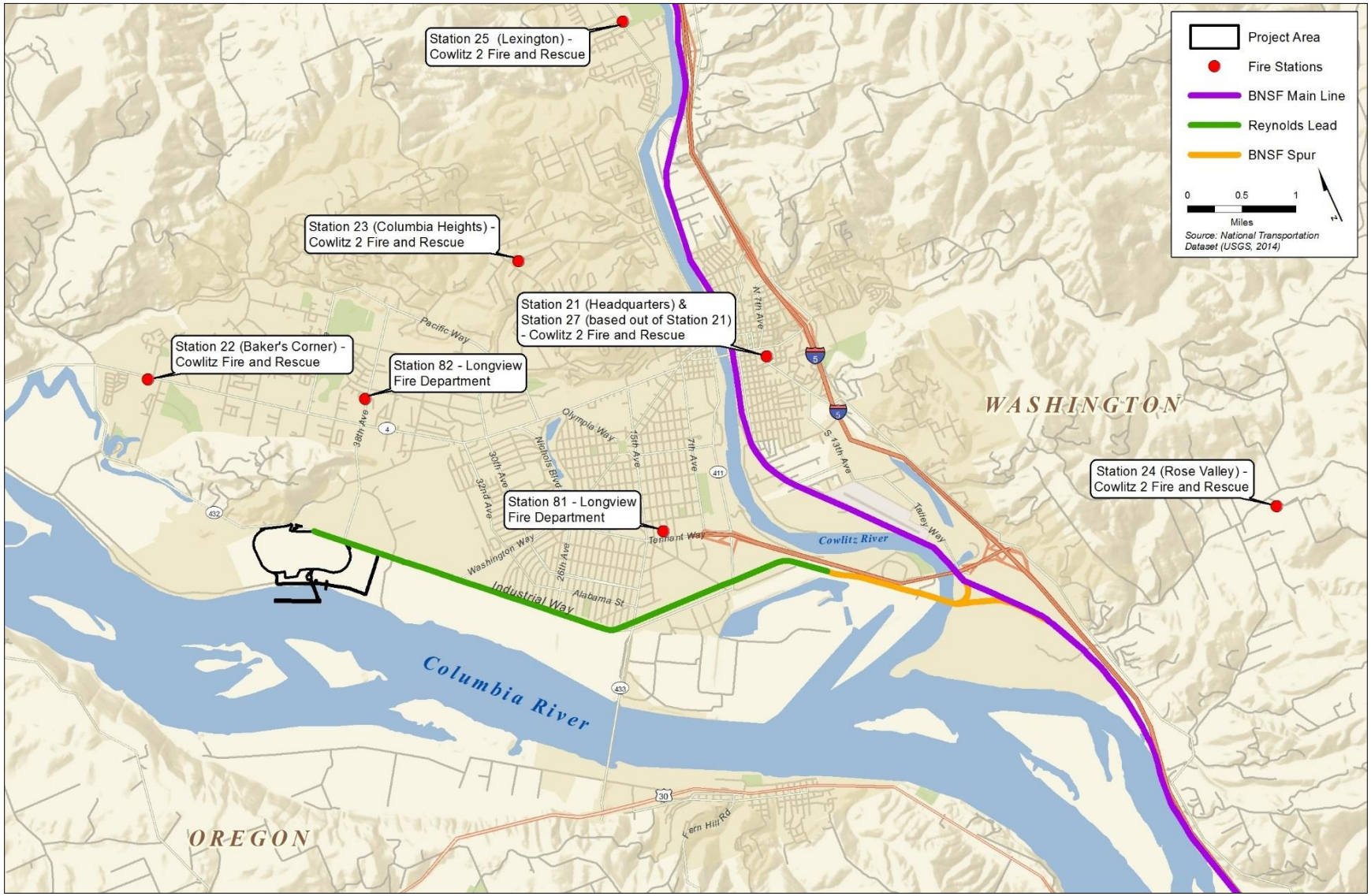
[a] Source: City of Longview 2015; City of Kelso 2015; City of Castle Rock 2006; City of Woodland 2005.

[b] Source: Field observations.

[c] Source: ICF and Hellerworx 2017 (for the Reynolds Lead and BNSF Spur study crossings) and Washington Utilities and Transportation Commission 2015 (for BNSF main line in Cowlitz County crossings).

USDOT = U.S. Department of Transportation; AADT = annual average daily traffic; mph = miles per hour

Figure 5.3-5. Fire Stations in the Kelso-Longview Area



Cowlitz 2 Fire & Rescue

Cowlitz 2 Fire & Rescue serves approximately 34,000 citizens in the City of Kelso and unincorporated Cowlitz County and responds to approximately 4,100 calls per year (Cowlitz 2 Fire & Rescue 2015).

The district is staffed by approximately 120 full-time and volunteer members in five active fire stations, two of which are staffed with full-time emergency medical technicians (EMTs) and paramedic firefighters. Volunteer firefighter EMTs also respond on an on-call basis.

The district includes the following stations and equipment.

- **Station 21 (Headquarters for Cowlitz 2 Fire & Rescue).** Station 21 is staffed with 27 full-time personnel and includes a main response fire engine, a volunteer/reserve-ready fire engine, an advanced life support ambulance, and a reserve-ready advanced life support ambulance. This station includes three rotating shifts 24 hours a day, 7 days a week, 365 days a year. During each shift, at least eight personnel staff a variety of equipment.
- **Station 22 (Baker's Corner).** Station 22 is a volunteer station and includes a main response fire engine, a 3,000-gallon water supply, an emergency medical services (EMS)/wildland response vehicle, and an EMS response ambulance. This is an all-volunteer station that serves as crucial first response before additional help arrives.
- **Station 23 (Columbia Heights).** Station 23 is staffed full time by firefighter/EMT, firefighter/paramedic, and volunteer personnel and includes a main response fire engine, an EMS/wildland response vehicle, an advanced life support ambulance, a basic life support ambulance, and a hazardous materials response apparatus.
- **Station 24 (Rose Valley).** Station 24 is a volunteer station and includes a main response fire engine and an EMS/wildland response vehicle. This is an all-volunteer station that serves as crucial first response before additional help arrives.
- **Station 25 (Lexington).** Station 25 is a volunteer station and includes an initial response fire engine, a 2,000-gallon water supply, and an EMS/wildland response vehicle. This is an all-volunteer station that serves as crucial first response before additional help arrives.
- **Station 27 (Kelso).** Station 27 is a volunteer station and includes a main response fire engine and a 3,000-gallon water supply. This is an all-volunteer station that backs up personnel at Station 21 (Headquarters) when they are on calls.

Longview Fire Department

The Longview Fire Department serves approximately 36,000 citizens spread over 14.7 square miles of urban/suburban development. The department is staffed with 39 full-time EMT/firefighters, and four paramedic/firefighters. Paramedic transport service is provided within the City of Longview by AMR, a private provider. The Longview Fire Department responds to approximately 4,500 calls per year from two fire stations (City of Longview 2015).

The department includes the following stations and equipment.

- **Station 81.** Station 81 is located at 740 Commerce Avenue in Longview. A minimum of six line firefighters and one battalion chief are on duty 24 hours a day. The station includes an aerial ladder truck and a fire engine.
- **Station 82.** Station 82 is located at 2355 38th Avenue in Longview. It has a minimum of three line firefighters on duty 24 hours a day, with a maximum of five firefighters. The station primarily responds to the west end of Longview; however, it responds as backup to Station 81, as needed. The station includes one fire engine.

American Medical Response

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

5.3.4.2 Washington State

As described in Section 5.1, *Rail Transportation*, loaded Proposed Action-related BNSF trains from the Powder River Basin are expected to travel from the Idaho border east of Spokane to the project area in Cowlitz County via Pasco, the Columbia River Gorge, and Vancouver. Empty Proposed Action-related trains are expected to return via Stampede Pass, Pasco, and Spokane. Loaded and empty UP trains to and from the Powder River Basin and Uinta Basin would travel north from Vancouver and return via the same route. WSDOT provided a list of statewide crossings of interest during the scoping process for the Proposed Action for crossings along the expected rail routes. These statewide study crossings are at-grade state highway crossings or at-grade crossings near state highways. Table 5.3-4 summarizes the existing conditions at these study crossings, including existing estimated annual average daily traffic, freight and passenger train speed, and estimated number of trains per day. Figure 5.3-6 illustrates the geographic location of these crossings.

5.3.5 Impacts

This section describes the potential direct and indirect impacts related to vehicle transportation that would result from construction and operation of the Proposed Action and No-Action Alternative. For more detailed information, see the *SEPA Vehicle Transportation Technical Report*.

5.3.5.1 Proposed Action

This section describes the potential impacts that could occur in the study areas as a result of construction and operation of the Proposed Action. During the peak year of construction, the Proposed Action would add an average 1.3 train trips per day to the Reynolds Lead, BNSF Spur, and BNSF main line. The trains would be approximately 6,219 feet long (1.2 miles long). At full operations, the Proposed Action would add 16 unit train trips per day (8 loaded and 8 empty trains) to the Reynolds Lead, BNSF Spur, and BNSF main line. Each unit train would consist of 125 rail cars and 4 locomotives and be approximately 6,917 feet long (1.3 miles long).

Table 5.3-4. Existing Conditions at Statewide Study Crossings

#[a]	Study Crossing	USDOT/FRA Crossing ID[b]	Railroad Milepost[b]	Estimated 2015 AADT[c]	Estimated Freight Train Speed (mph)[b]	Estimated Passenger Train Speed (mph)[b]	Estimated 2015 Trains/Day[d]
Spokane County							
1	Idaho Road	066236B	53.4	2,650	60	70	70
2	McKinzey Road	066239W	56.2	2,600	60	79	70
3	Harvard Road	066240R	56.8	8,400	60	79	70
4	Barker Road	066244T	58.9	13,900	60	79	70
5	Flora Road	066245A	59.9	6,600	60	79	70
6	Pines Road-SR 27	066367E	62.9	29,700	60	79	70
7	University Road	066371U	64.0	2,450	60	79	70
8	Park Road	066377K	66.1	16,400	60	79	70
9	Pine Street	066315M	15.8	750	35	35	39
10	F Street/Cheney-Spangle	065970L	16.4	3,650	35	35	39
11	Cheney-Plaza Road	065971T	16.8	1,050	35	35	39
Adams County							
12	Paha Packard Road	089665U	74.2	100	60	79	39
13	Kahlotus Road	089670R	80.6	300	60	79	39
14	1st Street	089672E	81.8	500	50	60	39
15	Wilbur/City Road	089673L	82.1	550	50	60	39
Franklin County							
16	Eltopia Road W	089699N	129.1	350	60	79	39
17	Sagemoor Road	089700F	134.2	450	60	79	39
Benton County							
18	East 3rd Avenue	090031U	229.2	2,800	35	35	34
19	Dague Road-East 25th Ave	090035W	227.5	800	60	60	34
20	Perkins Road	090036D	226.4	700	60	60	34
21	Bowles Road	090038S	225.7	2,450	60	60	34
22	Cochran Road	090039Y	225.0	100	60	60	34
23	Finley Road	090040T	224.5	3,100	60	60	34
24	Whitcomb Island	090061L	171.9	50	60	60	34

#[a]	Study Crossing	USDOT/FRA Crossing ID[b]	Railroad Milepost[b]	Estimated 2015 AADT[c]	Estimated Freight Train Speed (mph)[b]	Estimated Passenger Train Speed (mph)[b]	Estimated 2015 Trains/Day[d]
Klickitat County							
25	Maple Street	090169V	75.7	850	45	45	34
26	Walnut Street	090168N	75.5	1,400	45	45	34
27	South Dock Grade Road	090164L	74.2	100	55	60	34
Skamania County							
28	Indian Crossing	090159P	65.9	100	55	60	34
29	Home Valley Park	090155M	59.6	50	55	60	34
30	Cemetery Xing	090151K	54.7	50	N/A	N/A	34
31	Russell Avenue	090148C	53.9	350	20	20	34
32	Skamania Landing/Butler Rd	090135B	43.3	100	60	60	34
33	Walker/Skamania Landing	090134U	42.6	150	60	60	34
34	St Cloud Road	090133M	39.7	N/A	N/A	N/A	34
Lewis County							
35	SR 506-7th Street	092484T	77.8	1,400	50	75	50
36	Walnut Street (SR505/603)	092493S	71.6	2,850	50	50	50
37	E Locust Street	092519S	54.2	2,800	40	40	50
38	Main Street	092520L	54.1	2,650	40	40	50
39	Maple Street	092521T	53.8	3,500	40	40	50
40	Big Hanaford Road	092524N	51.8	2,550	10	N/A	50
Yakima County							
41	Jones Road East	099178A	79.4	1,600	55	40	7
42	Indian Church	104523U	63.8	2,450	55	40	7
43	SR241/Reservation	104534G	52.2	2,850	55	40	7
44	Gulden Road	104536V	51.1	300	55	40	7

Notes:

[a] See Figure 5.3-6 for study crossing location.

[b] Source: Washington Utilities Transportation Commission 2015.

[c] Source: Washington Utilities Transportation Commission 2015; Federal Railroad Administration 2015.

[d] Washington State Department of Transportation 2014. Linear extrapolation of 2010 and 2035 projected train traffic to 2015 volumes.

USDOT = U.S. Department of Transportation; FRA = Federal Railroad Administration; AADT = annual average daily traffic; Est. = estimated; mph = miles per hour; N/A = data not available

Figure 5.3-6. Statewide Study Crossings

Construction—Direct Impacts

Approximately 180 peak hour motor vehicle trips are estimated as a result of peak construction activities with the rail delivery scenario, or an estimated 260 peak hour motor vehicle trips with the truck delivery scenario. These vehicles would access the project area via the private driveway opposite 38th Avenue or a new driveway on Industrial Way. Parking would be provided for construction workers in the Applicant's leased area. Vehicle transportation in the project area during construction would not have a direct impact on vehicle transportation outside the project area.

Construction—Indirect Impacts

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

Cause Vehicle Delays from Rail Construction Traffic

The rail delivery scenario would add an average of 1.3 train trips per day during the peak construction year (2018). One Proposed Action-related construction train would take between 8 and 9 minutes to pass through the study crossings along the Reynolds Lead and BNSF Spur, and approximately 2 minutes along the BNSF main line in Cowlitz County.

The following describes the estimated 24-hour average and peak hour vehicle delay during the peak construction year.

24-Hour Average Vehicle Delay

All study crossings would operate at level of service A in 2018, indicating the low impact on 24-hour average daily vehicle delay from Proposed Action-related construction trains at the study crossings on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County.

Peak Hour Vehicle Delay

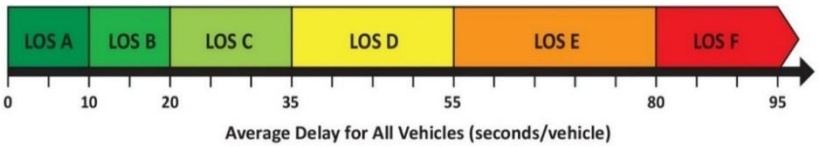
Table 5.3-5 illustrates the estimated peak hour vehicle delay at the study crossings and upstream intersections on the Reynolds Lead and BNSF Spur by scenario in 2018.

Table 5.3-5. Estimated Peak Hour Level of Service at Reynolds Lead and BNSF Spur Study Crossings and Upstream Intersections in 2018 by Scenario

		Proposed Action Construction	
Study Crossing/Upstream Intersection	**No-Action Scenario**	**Truck Delivery Scenario**	**Rail Delivery Scenario[a]**
Study Crossing			
Project Area Access at 38th Avenue	B	B	**F**
Weyerhaeuser Access at Washington Way	A	A	D
Weyerhaeuser NORPAC Access	A	A	D
Industrial Way	A	A	D
Oregon Way	A	A	D
California Way	A	A	**E**
3rd Avenue	B	B	**E**
Dike Road	C	C	C

Study Crossing/Upstream Intersection	No-Action Scenario	Proposed Action Construction	
		Truck Delivery Scenario	Rail Delivery Scenario[a]
Upstream Intersection			
Industrial Way/38th Avenue	A	B	B
Industrial Way/Washington Way	B	B	B
Industrial Way/NORPAC Access	C	C	C
Industrial Way/Weyerhaeuser Access	C	C	C
Industrial Way/Oregon Way	C	D	D
Industrial Way/California Way	C	C	C
3rd Avenue/Industrial Way	B	B	B
Dike Road/Frontage Road	A	A	A

Notes:



[a] The Proposed Action would result in this level of service only if a Proposed Action-related construction train travels during the peak hour. **Bolded, shaded gray** values indicate a vehicle level of service impact (a study crossing or upstream intersection that operates below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year).

Table 5.3-5 illustrates the following.

- The truck delivery scenario would have the same vehicle delay (level of service) at the study crossings as the No-Action scenario. The truck delivery scenario would not have a level of service impact at the study crossings on the Reynolds Lead and BNSF Spur.
- If a Proposed Action-related construction train travels during the peak hour, three study crossings, one of which would access the project area, would operate below level of service D. The rail delivery scenario would result in a level of service impact at these three study crossings on the Reynolds Lead if a Proposed Action-related construction train travels during the peak hour.

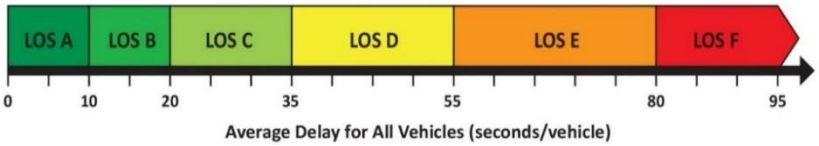
Table 5.3-6 illustrates the estimated peak hour vehicle delay at the BNSF main line study crossings in Cowlitz County by scenario.

Table 5.3-6. Estimated Peak Hour Level of Service at BNSF Main Line Study Crossings in 2018 by Scenario

Study Crossing	No-Action Scenario	Proposed Action Construction	
		Truck Delivery Scenario	Rail Delivery Scenario[a]
Taylor Crane Road (Castle Rock)	A	A	C
Cowlitz Street (Castle Rock)	A	A	C
Cowlitz Gardens (Kelso)	A	A	B
Mill Street (Kelso)	B	B	C
S River Road (Kelso)	B	B	C

Study Crossing	No-Action Scenario	Proposed Action Construction	
		Truck Delivery Scenario	Rail Delivery Scenario[a]
Toteff Road/Port Road (Kalama)	A	A	B
W Scott Avenue (Woodland)	A	A	B
Davidson Avenue (Woodland)	A	A	B
Whalen Road (Woodland)	A	A	B

Notes:



[a] The Proposed Action would result in this level of service only if a Proposed Action-related construction train travels during the peak hour.

Table 5.3-6 illustrates the following.

- The truck delivery scenario would have the same vehicle delay (level of service) as the No Action scenario. The truck delivery scenario would not have a level of service impact at study crossings on the BNSF main line in Cowlitz County.
- If a Proposed Action-related construction train travels during the peak hour, all study crossings would operate at a level of service C or better. The rail delivery scenario would not have a level of service impact at study crossings on the BNSF main line in Cowlitz County.

Queuing

Increased vehicle delay from trains blocking grade crossings can affect upstream intersections. As vehicles begin to queue while waiting for the crossing to open, roadway congestion can affect upstream intersections. Table 5.3-7 illustrates estimated 2018 peak hour queue lengths if a Proposed Action-related construction train travels during the peak hour. Table 5.3-7 also illustrates the queue length under the No-Action scenario for comparison.

Two queue lengths under the rail delivery scenario would exceed the available storage length that would not be exceeded under the No-Action scenario if a Proposed Action-related construction train travels during the peak hour as described below.

- Vehicles traveling southbound on Oregon Way would queue on Oregon Way at the Reynolds Lead crossing if a Proposed Action-related construction train travels during the peak hour. Because the queue length on Oregon Way would exceed the available storage length (extend to Alabama Street) that would not be exceeded under the No-Action scenario, the rail delivery scenario would result in a queuing impact at this crossing.
- On the BNSF main line, vehicles traveling westbound on S River Road would queue approximately 100 feet if a Proposed Action-related construction train travels during the peak hour, which is 40 feet more than the available storage length. Because the queue would exceed the available storage length that would not be exceeded under the No-Action scenario, the rail delivery scenario would result in a queuing impact at this crossing.

Table 5.3-7. Estimated 2018 Peak Hour Vehicle Queue Lengths by Scenario[a]

Study Crossing	Road Movement[b]	2018 No-Action	2018 Truck	2018 Rail	Upstream Intersection Affected by Queue from Study Crossing	Intersection Movement[c]	2018 No-Action	2018 Truck	2018 Rail
		Estimated Study Crossing Queue Length (feet)					Estimated Upstream Intersection Queue Length (feet)		
Reynolds Lead and BNSF Spur Study Crossings									
Project Area Access at 38th Avenue	NB	40	1,180	1,640	Industrial Way/ 38th Avenue	WBL	20	80	60
	SB	**40**	**80**	**60**		EBR	20	20	60
Weyerhaeuser Access at Washington Way	NB	100	180	500	Industrial Way/ Washington Way	WBL	80	100	120
						EBR	**120**	**160**	**40**
	SB	**140**	**160**	**120**		SBT	40	40	80
Weyerhaeuser NORPAC Access	NB	40	40	120	Industrial Way/ NORPAC Access	WBL	20	20	20
	SB	**20**	**20**	**20**		EBR	20	20	20
Industrial Way	NB	**400**	**400**	**460**	Industrial Way/ Weyerhaeuser	EBL	140	140	240
	SB	280	320	980		NBT	280	280	360
Oregon Way	NB	**800**	**1,180**	**1,760**	Industrial Way/ Oregon Way	NBT	260	260	2,240
						EBL	**180**	**240**	**240**
						WBR	**560**	**960**	**100**
	SB	160	160	**880**	Oregon Way/ Alabama Street	EBR	N/A	N/A	100
						WBL			100
						SBT			180
California Way	NB	80	80	220	Industrial Way/ California Way	N/A	N/A	N/A	N/A
	SB	120	140	520					
3rd Avenue	NB	**1,080**	**1,120**	**2,100**	3rd Avenue/ Industrial Way	WBR	80	80	120
						NBT	**720**	**760**	**1,740**
					Industrial Way/ California Way	SBL	120	140	140
	SB	260	260	1,040		NBR	60	60	80
						EBT	480	520	1,500
Dike Road	NB	40	40	60	None	N/A	N/A	N/A	N/A
	SB	40	40	40					

Study Crossing	Road Movement[b]	2018 No-Action Estimated Study Crossing Queue Length (feet)	2018 Truck Estimated Study Crossing Queue Length (feet)	2018 Rail Estimated Study Crossing Queue Length (feet)	Upstream Intersection Affected by Queue from Study Crossing	Intersection Movement[c]	2018 No-Action Estimated Upstream Intersection Queue Length (feet)	2018 Truck Estimated Upstream Intersection Queue Length (feet)	2018 Rail Estimated Upstream Intersection Queue Length (feet)
BNSF Main Line in Cowlitz County Study Crossings									
Taylor Crane Road (Castle Rock)	EB	20	20	20	None	N/A	N/A	N/A	N/A
	WB	20	20	20					
Cowlitz Street (Castle Rock)	EB	40	40	40	None	N/A	N/A	N/A	N/A
	WB	40	40	60					
Cowlitz Gardens Road (Kelso)	EB	20	20	20	None	N/A	N/A	N/A	N/A
	WB	20	20	20					
Mill Street (Kelso)	EB	80	80	100	None	N/A	N/A	N/A	N/A
	WB	100	100	120					
S River Road (Kelso)	EB	40	40	80	Pacific Avenue/ S River Road	SBR	N/A	N/A	40
	WB	60	60	**100**		NBL			40
Toteff Road/Port Road (Kalama)	EB	40	40	40	None	N/A	N/A	N/A	N/A
	WB	40	40	60					
W Scott Avenue (Woodland)	EB	40	40	60	None	N/A	N/A	N/A	N/A
	WB	100	100	120					
Davidson Avenue (Woodland)	EB	60	60	60	None	N/A	N/A	N/A	N/A
	WB	40	40	40					
Whalen Road (Woodland)	EB	40	40	40	None	N/A	N/A	N/A	N/A
	WB	60	60	60					

Notes:

[a] **Shaded gray** values indicate a study crossing or upstream intersection queue that would exceed the available storage for the scenario. **Shaded black** values indicate a Proposed Action queuing impact.

[b] Roadway movement approaching the rail crossing; NB = northbound; SB = southbound; EB = eastbound; WB = westbound

[c] Movement at upstream intersection affected by queue from rail crossing; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; EBL= eastbound left; EBR= eastbound right; EBT= eastbound through; WBL= westbound left; WBR= westbound right; WBT= westbound through

Cause Delay to Emergency Vehicle Response

The vehicle delay analysis in the previous subsection illustrates how the average vehicle delay for all vehicles, including emergency vehicles, would be affected during the peak construction year. Average vehicle and peak hour delay would increase for all vehicles under the rail delivery scenario because trains transporting construction materials would operate on the Reynolds Lead, BNSF Spur, and BNSF main line. Total gate downtime is estimated to be up to 12 minutes longer per day at public crossings along the Reynolds Lead and BNSF Spur, and up to 2 minutes longer per day along the BNSF main line in Cowlitz County compared to the 2018 No-Action scenario. In a 24-hour period, the Proposed Action would increase the probability of an emergency response vehicle being delayed by 1% at study crossings along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County.

The impact on emergency vehicle response would depend on the location of the origin and destination of the response incident in relation to the at-grade crossings along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County. The potential for a Proposed Action related construction train to affect emergency response would also depend on whether the dispatched emergency vehicle would need to cross the rail line and the availability of alternative routes if a Proposed Action-related construction train occupies the crossings at the time of the call.

Increase Predicted Accident Probability at Study Crossings

The FRA GradeDec.Net model was used to calculate the predicted accident probability at the study crossings in Cowlitz County. The analysis concluded that while the accident probability would increase if construction materials are delivered by rail, none of the study crossings in Cowlitz County would be above the benchmark used for the analysis (0.075 accident per year) with existing crossing safety protection; therefore, Proposed Action-related trains would not have a vehicle safety impact. The *SEPA Vehicle Transportation Technical Report* provides additional information.

Operations—Direct Impacts

Approximately 135 employees would be needed to operate the coal export terminal at full operations in 2028. Operations would occur 24 hours per day, 7 days per week. Approximately 50% of the employee-related vehicle trips would exit the project area and 30% of the employee-related vehicle trips would enter the project area during the peak hour, which would result in 41 inbound and 68 outbound trips during the peak hour.

These vehicles would access the project area via the existing private driveway opposite 38th Avenue or at a new driveway on Industrial Way approximately 0.5 mile west of the existing 38th Avenue driveway.

Vehicle transportation in the project area during construction would not have a direct impact on vehicle transportation outside the project area.

Operations—Indirect Impacts

All vehicle transportation impacts during operations would occur outside the project area and, therefore, are considered indirect impacts.

Cowlitz County

The Proposed Action would add 16 train trips per day at study crossings along the Reynolds Lead and BNSF Spur. The Proposed Action would add 8 train trips per day at study crossings along the BNSF main line in Cowlitz County (8 trains would travel from the south to Longview Junction and 8 trains would travel to the north from Longview Junction). One Proposed Action-related train could travel during the peak hour on the Reynolds Lead and BNSF Spur with current track infrastructure on the Reynolds Lead and BNSF Spur. Up to 2 Proposed Action-related trains could travel during the peak hour on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County with planned track infrastructure.

This section presents vehicle delay impacts with current and planned track infrastructure on the Reynolds Lead and BNSF Spur. Planned track improvements would increase the average train speed from:

- 8 miles per hour (mph) to 10 mph at the Weyerhaeuser access crossing opposite Washington Way
- 10 mph to 15 mph at the Weyerhaeuser NORPAC access crossing
- 10 mph to 20 mph at the Industrial Way and Oregon Way crossings
- 8 mph to 15 mph at the California Way and 3rd Avenue crossings.

Improvements would not change average train speed at the crossing opposite 38th Avenue and the Dike Road crossing.

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

Cause Vehicle Delays from Rail Traffic

The following describes the vehicle delay from Proposed Action-related trains.

A Proposed Action-related train would take between 8 and 10 minutes to pass at the public study crossings along the Reynolds Lead with current track infrastructure, and between 4 and 6 minutes at the public study crossings with planned track infrastructure. Proposed Action-related trains would take about 8 minutes at the Dike Road crossing along the BNSF Spur, and around 2 minutes to pass at the study crossings along the BNSF main line in Cowlitz County. Overall, the 16 Proposed Action-related trains would increase the total gate downtime over 130 minutes during an average day at the public study crossings along the Reynolds Lead and BNSF Spur, and up to 20 minutes during an average day along the BNSF main line in Cowlitz County. The following describes the 24-hour average and peak hour vehicle delay from Proposed Action-related trains.

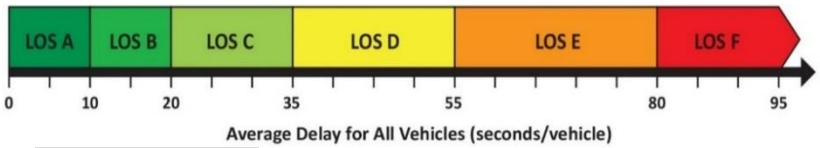
24-Hour Average Vehicle Delay

Table 5.3-8 shows the estimated 24-hour average delay per vehicle and level of service at the study crossings along the Reynolds Lead and BNSF Spur in 2028.

Table 5.3-8. Estimated 24-Hour Average Level of Service at Reynolds Lead and BNSF Lead Study Crossings in 2028 by Scenario[a]

		Proposed Action	
Study Crossing	**No-Action**	**Current Track Infrastructure**	**Planned Track Infrastructure**
Project Area Access at 38th Avenue	A	**F**	**F**
Weyerhaeuser Access at Washington Way	A	D	C
Weyerhaeuser NORPAC Access	A	C	B
Industrial Way	A	C	A
Oregon Way	A	C	A
California Way	A	D	B
3rd Avenue	A	D	B
Dike Road	A	C	C

Notes:



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

As shown, most study crossings would operate at or above level of service D with current track infrastructure on the Reynolds Lead, and at or above level of service C with planned track infrastructure on the Reynolds Lead. The exception is the study crossing opposite 38th Avenue, which would operate at level of service F. The Proposed Action would result in a level of service impact at this crossing.

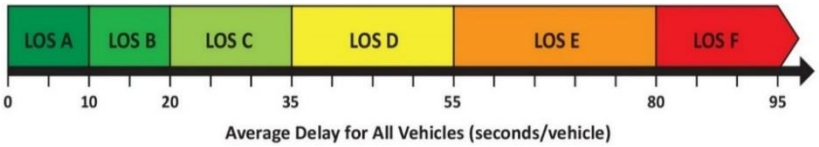
Table 5.3-9 shows the estimated 24-hour average delay per vehicle and level of service at the study crossings along the BNSF main line in Cowlitz County. All study crossings would operate at a level of service A with Proposed Action-related trains, indicating a low impact on the 24-hour average daily vehicle delay from Proposed Action-related trains. Consequently, the Proposed Action would not result in a level of service impact at the study crossings on the BNSF main line in Cowlitz County.

Table 5.3-9. Estimated 24-Hour Level of Service at BNSF Main Line Study Crossings in 2028 by Scenario

	Scenario	
Study Crossing	**2028 No-Action**	**2028 Proposed Action**
Taylor Crane Road (Castle Rock)	A	A
Cowlitz Street (Castle Rock)	A	A
Cowlitz Gardens (Kelso)	A	A
Mill Street (Kelso)	A	A
S River Road (Kelso)	A	A
Toteff Road/Port Road (Kalama)	A	A
W Scott Avenue (Woodland)	A	A

Study Crossing	Scenario	
	2028 No-Action	2028 Proposed Action
Davidson Avenue (Woodland)	A	A
Whalen Road (Woodland)	A	A

Notes:



[a] The Proposed Action would result in this level of service only if two Proposed Action-related trains travel during the peak hour.

Peak Hour Vehicle Delay

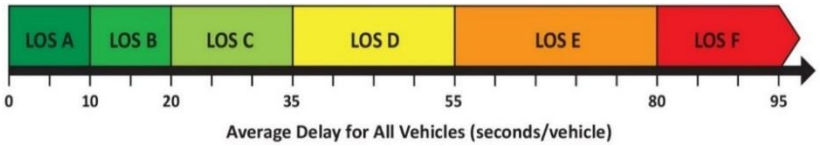
Table 5.3-10 illustrates the estimated peak hour vehicle delay at the study crossings and upstream intersections on the Reynolds Lead and BNSF Spur in 2028 by scenario. As shown, the increased rail activity associated with the Proposed Action would increase average delay per vehicle during the peak hour, with forecasted level of service dropping below D at six of the study crossings on the Reynolds Lead with current track infrastructure.

Table 5.3-10. Estimated Peak Hour Level of Service at Reynolds Lead and BNSF Spur Study Crossings and Upstream Intersections in 2028 by Scenario[a]

Study Crossing/Upstream Intersection	No-Action	Proposed Action		
		Current Track Infrastructure: 1 Peak Hour Train	Planned Track Infrastructure: 1 Peak Hour Train	Planned Track Infrastructure: 2 Peak Hour Trains
Study Crossing				
Project Area Access at 38th Avenue	B	**F**	**F**	**F**
Weyerhaeuser Access at Washington Way	A	**E**	D	**E**
Weyerhaeuser NORPAC Access	A	D	B	C
Industrial Way (SR 432)	A	**E**	B	C
Oregon Way (SR 433)	A	**E**	B	C
California Way	A	**E**	C	D
3rd Avenue	B	**F**	C	**E**
Dike Road	C	D	D	**E**
Upstream Intersections				
Industrial Way/38th Avenue	B	B	B	B
Industrial Way/Washington Way	B	B	B	B
Industrial Way/NORPAC Access	C	C	C	C
Industrial Way/Weyerhaeuser Access	C	C	C	C

Study Crossing/Upstream Intersection	No-Action	Proposed Action: Current Track Infrastructure: 1 Peak Hour Train	Proposed Action: Planned Track Infrastructure: 1 Peak Hour Train	Proposed Action: Planned Track Infrastructure: 2 Peak Hour Trains
Industrial Way/Oregon Way	D	D	D	D
Industrial Way/California Way	C	C	C	C
3rd Avenue/Industrial Way	C	C	C	C
Dike Road/Frontage Road	A	A	A	A

Notes:



[a] The Proposed Action would result in this level of service only if a Proposed Action-related train travels during the peak hour. **Bolded, shaded gray** values indicate a vehicle delay impact (a study crossing or upstream intersection that operates below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year).

Table 5.3-10 illustrates the following.

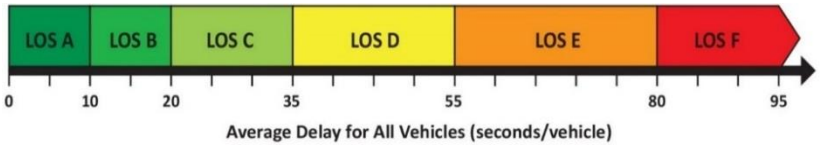
- If no track improvements are made to the Reynolds Lead to increase the average train speed from 10 mph to up to 25 mph and decrease gate downtime at the study crossings, the peak hour level of service would be below level of service D at six of the eight study crossings. The Proposed Action would result in a level of service impact at these six study crossings if a Proposed Action-related train travels during the peak hour.
- If track improvements are made to the Reynolds Lead, and one Proposed Action-related train travels during the peak hour, one study crossing (project area access at 38th Avenue) would operate below level of service D. The Proposed Action would result in a level of service impact at this study crossing if a Proposed Action-related train travels during the peak hour.
- If track improvements are made to the Reynolds Lead and 2 Proposed Action-related trains travel during the peak hour, four of the eight study crossings would operate below level of service D. The Proposed Action would result in a level of service impact at these four study crossings if two Proposed Action-related trains travel during the peak hour.

Table 5.3-11 illustrates the estimated peak hour vehicle delay at the BNSF main line study crossings in Cowlitz County in 2028 by scenario. The peak hour level of service at two study crossings (Mill Street and S River Road in Kelso) on the BNSF main line in Cowlitz County would operate below level of service D in 2028 if 2 Proposed Action-related trains travel during the peak hour. The Proposed Action would result in a level of service impact at these two study crossings if 2 Proposed Action-related trains travel during the peak hour.

Table 5.3-11. Estimated Peak Hour Level of Service at BNSF Main Line Study Crossings in 2028 by Scenario[a]

Study Crossing	No-Action	Proposed Action (2 Peak Hour Trains)
Taylor Crane Road (Castle Rock)	B	D
Cowlitz Street (Castle Rock)	C	D
Cowlitz Gardens (Kelso)	B	C
Mill Street (Kelso)	C	**E**
S River Road (Kelso)	C	**E**
Toteff Road/Port Road (Kalama)	B	C
W Scott Avenue (Woodland)	B	D
Davidson Avenue (Woodland)	B	D
Whalen Road (Woodland)	B	D

Notes:



[a] The Proposed Action would result in this level of service only if two Proposed Action-related trains travel during the peak hour. **Bolded**, **shaded gray** values indicate a vehicle level of service impact (a study crossing that operates below level of service D under the Proposed Action that would not otherwise operate below level of service D under the No-Action scenario for the same year).

Vehicle Queuing

Increased vehicle delay from trains blocking grade crossings can have secondary impacts on nearby intersections. As vehicles begin to queue while waiting for the crossing to open, increased roadway congestion can affect upstream intersections. Table 5.3-12 illustrates the estimated 2028 peak hour queue length if a Proposed Action-related train travels during the peak hour. While the Proposed Action-related trains would increase queue lengths at study area crossings, queue lengths would already be exceeded at all of these crossings except the southbound movement at Oregon Way.

Table 5.3-12 illustrates estimated queue lengths with Proposed Action-related trains would be shorter with planned improvements to the Reynolds Lead because these improvements would allow Proposed Action-related trains to travel at higher speeds, which would decrease gate downtime at the study crossings. Four queue lengths would exceed the available storage length that would not be exceeded under the 2028 No-Action scenario and would represent a Proposed Action-related queuing impact.

- Vehicles traveling southbound on Oregon Way would queue at the Oregon Way crossing if a Proposed Action-related train travels during the peak hour. The estimated queue length (1,160 feet) would exceed available storage length (700 feet) with current track infrastructure on the Reynolds Lead. The estimated queue length would not exceed available storage length with planned track infrastructure on the Reynolds Lead.

Table 5.3-12. Estimated Vehicle Queue Lengths—2028 Operations (Peak Hour)[a]

Study Crossing Name	Road Movement[b]	2028 No-Action	2028 Current Infras.	2028 Planned Infras.	Upstream Intersection Affected by Queue from Study Crossing	Intersection Movement[c]	2028 No-Action	2028 Current Infras.	2028 Planned Infras.
		Estimated Queue Length at Study Crossing (feet)					Estimated Queue Length at Upstream Intersection (feet)		
Study Crossings along the Reynolds Lead and BNSF Spur									
Project Area Access at 38th Avenue	NB	40	1,380	1,180	Industrial Way/ 38th Avenue	WBL	20	**220**	**280**
	SB	**40**	**220**	**300**		EBR	20	80	60
Weyerhaeuser Access at Washington Way	NB	240	680	560	Industrial Way/ Washington Way	WBL	100	120	100
						EBR	**160**	**660**	**540**
	SB	**160**	**660**	**540**		SBT	40	140	90
Weyerhaeuser NORPAC Access	NB	60	180	120	Industrial Way/ NORPAC Access	WBL	20	20	20
	SB	**20**	**40**	**20**		EBR	20	20	20
Industrial Way	NB	**360**	**480**	**400**	Industrial Way/ Weyerhaeuser	EBL	160	360	160
	SB	280	1,300	540		NBT	240	360	280
Oregon Way	NB	**1,180**	**2,200**	**1,620**	Industrial Way/ Oregon Way	NBT	380	1,880	1,080
						EBL	**320**	**400**	**340**
						WBR	**940**	**1,960**	**1,380**
	SB	220	**1,160**	440	Oregon Way/ Alabama Street	EBR	N/A	260	N/A
						WBL		340	
						SBT		460	
California Way	NB	100	260	260	Industrial Way/ California Way	N/A	N/A	N/A	N/A
	SB	160	820	420					
3rd Avenue	NB	**1,300**	**3,220**	**1,380**	3rd Avenue/ Industrial Way	WBR	80	**240**	100
						NBT	**920**	**2,860**	1,020
					Industrial Way/ California Way	SBL	**160**	**200**	180
	SB	440	1,700	760		NBR	80	**140**	80
						EBT	700	2,620	780
Dike Road	NB	40	60	40	None	N/A	N/A	N/A	N/A
	SB	40	40	40					

Study Crossing Name	Road Movement[b]	2028 No-Action	2028 Current Infras.	2028 Planned Infras.	Upstream Intersection Affected by Queue from Study Crossing	Intersection Movement[c]	2028 No-Action	2028 Current Infras.	2028 Planned Infras.
		Estimated Queue Length at Study Crossing (feet)					Estimated Queue Length at Upstream Intersection (feet)		
Public At-Grade Crossings along the BNSF Main Line in Cowlitz County									
Taylor Crane Road (Castle Rock)	EB	20	20	20	None	N/A	N/A	N/A	N/A
	WB	20	20	20					
Cowlitz Street (Castle Rock)	EB	40	60	60	None	N/A	N/A	N/A	N/A
	WB	80	80	80					
Cowlitz Gardens Road (Kelso)	EB	20	40	40	None	N/A	N/A	N/A	N/A
	WB	20	40	40					
Mill Street (Kelso)	EB	100	180	180	None	N/A	N/A	N/A	N/A
	WB	160	240	240					
S River Road (Kelso)	EB	80	120	120	Pacific Avenue/S River Road	SBR	60	100	100
	WB	**120**	**180**	**180**		NBL	40	40	40
Toteff Road/Port Road (Kalama)	EB	40	60	60	None	N/A	N/A	N/A	N/A
	WB	60	80	80					
W Scott Avenue (Woodland)	EB	60	100	100	None	N/A	N/A	N/A	N/A
	WB	140	200	200					
Davidson Avenue (Woodland)	EB	100	120	120	None	N/A	N/A	N/A	N/A
	WB	60	80	80					
Whalen Road (Woodland)	EB	60	60	60	None	N/A	N/A	N/A	N/A
	WB	80	80	80					

Notes:

[a] **Shaded gray** values indicate a study crossing or upstream intersection with a queue that would exceed available storage for the scenario. **Shaded black** values indicate a Proposed Action-related impact.

[b] MVMT= Roadway movement approaching the rail crossing; NB = northbound; SB = southbound; EB = eastbound; WB = westbound

[c] MVMT= Movement at nearby intersection affected by queue from rail crossing; NBL = northbound left; NBR = northbound right; NBT = northbound through; SBL = southbound left; SBR = southbound right; SBT = southbound through; EBL = eastbound left; EBR = eastbound right; EBT = eastbound through; WBL = westbound left; WBR = westbound right; WBT = westbound through; N/A = data not available

- Vehicles making a left-turn from Industrial Way to the Applicant's leased area at 38th Avenue would queue on Industrial Way if a Proposed Action-related train travels during the peak hour. The estimated queue length (220 feet) would exceed the available storage length (180 feet) with current track infrastructure on the Reynolds Lead.
- Vehicles traveling westbound on Industrial Way to 3rd Avenue eastbound would be blocked by the queue on 3rd Avenue at the Reynolds Lead crossing if a Proposed Action-related train travels during the peak hour. The estimated queue length on Industrial Way (240 feet) would exceed the available storage length (170 feet) with current track infrastructure on the Reynolds Lead. The estimated queue length would not exceed available storage length with planned track infrastructure on the Reynolds Lead.
- Vehicles traveling northbound on California Way to Industrial Way eastbound would be blocked by the queue on 3rd Avenue at the Reynolds Lead crossing if a Proposed Action-related train travels during the peak hour. The estimated queue length on Industrial Way (140 feet) would exceed the available storage length (100 feet) with current track infrastructure on the Reynolds Lead. The estimated queue would not exceed available storage length with planned track infrastructure on the Reynolds Lead.

Cause Delay to Emergency Vehicle Response from Rail Traffic

The vehicle delay analysis in the previous subsection illustrates how the average vehicle delay for all vehicles, including emergency vehicles, would be affected during full export terminal operations in 2028. Average vehicle and peak hour delay would increase with the Proposed Action-related trains because more trains would operate at study crossings. Because vehicle delay would increase, emergency vehicle delay would also increase at grade crossings if an emergency vehicle was blocked at a grade crossing occupied by a Proposed Action-related train.

Proposed Action-related trains would increase total gate downtime over 130 minutes during an average day at the public study crossings along the Reynolds Lead and BNSF Spur, and up to 20 minutes during an average day at the study crossings along the BNSF main line in Cowlitz County.

In a 24-hour period, Proposed Action-related trains would increase the probability of emergency response vehicles being delayed by the following.

- 10% at study crossings along the Reynolds Lead and BNSF Spur with current track infrastructure
- 5% at study crossings along the Reynolds Lead and BNSF Spur with planned track infrastructure
- 1% at study crossings along the BNSF main line in Cowlitz County

The impact would depend on the location of the origin and destination of the response incident in relation to the at-grade crossings along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County. The potential for the Proposed Action-related trains to affect emergency response would also depend on whether the dispatched emergency vehicle would need to cross the rail line and the availability of alternative routes if a Proposed Action-related train occupies the crossing at the time of the call.

Increase Predicted Accident Probability at Study Crossings

The analysis concluded that while the accident probability would increase with Proposed Action-related trains (8 empty and 8 loaded trains per day), none of the study crossings on the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County would be above the benchmark used for the analysis (0.075 accident per year) with existing crossing safety protection, and therefore Proposed Action-related trains would not have a vehicle safety impact at the study crossings in Cowlitz County. The *SEPA Vehicle Transportation Technical Report* provides additional information.

Statewide (Beyond Cowlitz County)

Increase Vehicle Delay on BNSF Main Line Routes beyond Cowlitz County

Table 5.3-13 shows the estimated baseline trains per day in 2028 at the statewide study crossings, and the estimated number of trains per day with Proposed Action-related trains in 2028. Figure 5.3-6 illustrates the rail routes and statewide study crossings.

As shown in Table 5.3-13, the Proposed Action would add 16 trains per day to the study crossings in Spokane, Adams, and Franklin Counties (between the Washington State-Idaho border east of Spokane and Pasco) and would increase daily rail traffic by approximately 13% and 22%, depending on location. Between Pasco and Cowlitz County (study crossings in Benton, Klickitat, and Skamania Counties), the Proposed Action would add 8 trains per day and increase daily rail traffic by approximately 14%. At the Lewis County study crossings, the Proposed Action would add 8 trains per day and increase daily rail traffic by approximately 10%, and between Auburn and Pasco (Yakima County study crossings), the Proposed Action would increase daily rail traffic by approximately 44%.

Vehicle delay at crossings would depend on the speed of the train, length of the train, the traffic volume at the crossing, and number of lanes at the crossing. The traffic volume at the crossing would vary depending on the time of day. Proposed Action-related trains would be approximately 1.3 miles long and would take the following approximate times to pass (see Table 5.3-13 for freight train speeds at study crossings).[5]

- 10 mph: 8.5 minutes
- 20 mph: 4.75 minutes
- 30 mph: 3.25 minutes
- 40 mph: 2.75 minutes
- 50 mph: 2.25 minutes
- 60 mph: 2.0 minutes

[5] Assumes gate closing 30 seconds before a Proposed Action-related train would pass through the crossing and 12 seconds after the Proposed Action-related train passes the crossing.

Table 5.3-13. 2028 Conditions at Statewide Study Crossings

#[a]	Study Crossing	Estimated Freight Train Speed[b]	2015 Estimated Trains Per Day[c]	2028 Projected Baseline Trains Per Day[c]	2028 Projected Trains Per Day with Proposed Action	2028 Increase in Trains Per Day with Proposed Action	Estimated Daily Gate Downtime from Proposed Action-Related Trains
Spokane County							
1	Idaho Road	60	70	106	122	13%	32 minutes
2	McKinzey Road	60	70	106	122	13%	32 minutes
3	Harvard Road	60	70	106	122	13%	32 minutes
4	Barker Road	60	70	106	122	13%	32 minutes
5	Flora Road	60	70	106	122	13%	32 minutes
6	Pines Road-SR 27	60	70	106	122	13%	32 minutes
7	University Road	60	70	106	122	13%	32 minutes
8	Park Road	60	70	106	122	13%	32 minutes
9	Pine Street	35	39	56	72	22%	48 minutes
10	F Street/Cheney-Spangle	35	39	56	72	22%	48 minutes
11	Cheney-Plaza Road	35	39	56	72	22%	48 minutes
Adams County							
12	Paha Packard Road	60	39	56	72	22%	16 minutes
13	Kahlotus Road	60	39	56	72	22%	16 minutes
14	1st Street	50	39	56	72	22%	36 minutes
15	Wilbur/City Road	50	39	56	72	22%	36 minutes
Franklin County							
16	Eltopia Road W	60	39	56	72	22%	16 minutes
17	Sagemoor Road	60	39	56	72	22%	16 minutes

#[a]	Study Crossing	Estimated Freight Train Speed[b]	2015 Estimated Trains Per Day[c]	2028 Projected Baseline Trains Per Day[c]	2028 Projected Trains Per Day with Proposed Action	2028 Increase in Trains Per Day with Proposed Action	Estimated Daily Gate Downtime from Proposed Action-Related Trains
Benton County							
18	East 3rd Avenue	35	34	48	56	14%	24 minutes
19	Dague Road-East 25th Avenue	60	34	48	56	14%	16 minutes
20	Perkins Road	60	34	48	56	14%	16 minutes
21	Bowles Road	60	34	48	56	14%	16 minutes
22	Cochran Road	60	34	48	56	14%	16 minutes
23	Finley Road	60	34	48	56	14%	16 minutes
24	Whitcomb Island	60	34	48	56	14%	16 minutes
Klickitat County							
25	Maple Street	45	34	48	56	14%	20 minutes
26	Walnut Street	45	34	48	56	14%	20 minutes
27	South Dock Grade Road	55	34	48	56	14%	17 minutes
Skamania County							
28	Indian Crossing	55	34	48	56	14%	17 minutes
29	Home Valley Park	55	34	48	56	14%	17 minutes
30	Cemetery Xing	N/A	34	48	56	14%	N/A
31	Russell Avenue	20	34	48	56	14%	38 minutes
32	Skamania Landing/Butler Road	60	34	48	56	14%	16 minutes
33	Walker/Skamania Landing	60	34	48	56	14%	16 minutes
34	St Cloud Road	N/A	34	48	56	14%	N/A

#[a]	Study Crossing	Estimated Freight Train Speed[b]	2015 Estimated Trains Per Day[c]	2028 Projected Baseline Trains Per Day[c]	2028 Projected Trains Per Day with Proposed Action	2028 Increase in Trains Per Day with Proposed Action	Estimated Daily Gate Downtime from Proposed Action-Related Trains
Lewis County							
35	SR 506-7th Street	50	50	73	81	10%	18 minutes
36	Walnut Street – SR 505/603	50	50	73	81	10%	18 minutes
37	E Locust Street	40	50	73	81	10%	22 minutes
38	Main Street	40	50	73	81	10%	22 minutes
39	Maple Street	40	50	73	81	10%	22 minutes
40	Big Hanaford Road	10	50	73	81	10%	68 minutes
Yakima County							
41	Jones Road East	55	7	11	19	42%	17 minutes
42	Indian Church	55	7	11	19	42%	17 minutes
43	SR241/Reservation	55	7	11	19	42%	17 minutes
44	Gulden Road	55	7	11	19	42%	17 minutes

Notes:
[a] See Figure 5.3-6 for study crossing location.
[b] Source: Washington Utilities Transportation Commission 2015.
[c] Washington State Department of Transportation 2014.
N/A = data not available

Vehicle delay would increase between the Washington State-Idaho border and Cowlitz County because the Proposed Action would add 8 or 16 trains daily (depending on location) to existing BNSF main line routes as shown in Figure 5.3-6. Proposed Action-related trains would also be longer (approximately 1.3 miles long) than the average BNSF freight train length (approximately 1.2 miles long). Vehicle delay at crossings would be higher if a Proposed Action-related train travels during a period with higher traffic volumes (such as the peak traffic hour) than a period with lower traffic volumes (such as at night).

Assuming Proposed Action-related trains travel at the same freight train speeds identified in Table 5.3-13, the five study crossings with the largest increase in daily vehicle delay compared to baseline 2028 conditions would be the following.

- Big Hanaford Road, Lewis County (8 Proposed Action-related trains daily, 10 mph)
- Pine Street, Spokane County (16 Proposed Action-related trains daily, 35 mph)
- F Street/Cheney-Spangle, Spokane County (16 Proposed Action-related trains daily, 35 mph)
- Cheney-Plaza Road, Spokane County (16 Proposed Action-related trains daily, 35 mph)
- Russel Avenue, Skamania County (8 Proposed Action-related trains daily, 20 mph)

When factoring in existing annual average daily traffic, the five study crossings with the largest increase in vehicle delay compared to the baseline 2028 conditions would be the following.

- Pines Road-SR 27, Spokane County (16 Proposed Action-related trains daily)
- Park Road, Spokane County (16 Proposed Action-related trains daily)
- Barker Road, Spokane County (16 Proposed Action-related trains daily)
- Harvard Road, Spokane County (16 Proposed Action-related trains daily)
- Flora Road, Spokane County (16 Proposed Action-related trains daily)

The combination of high annual average daily traffic and 16 Proposed Action-related trains per day would cause these study crossings to have the highest increase in vehicle delay per vehicle at study crossings.

Because the frequency of train traffic on BNSF routes would increase from Proposed Action-related trains, the probability of an increase in emergency response time at all at-grade crossings would also increase because at-grade crossings would be blocked more frequently. Table 5.3-13 illustrates the estimated gate downtime increase from Proposed Action-related trains. The vehicle delay impact would only occur if an emergency vehicle experienced a delay related to a Proposed Action-related train that would occur on average 8 or 16 times a day, depending on location. The potential for the Proposed Action-related train to affect emergency response would also depend on whether the dispatched emergency vehicle would need to cross the rail line and the availability of alternative routes if a Proposed Action-related train occupies the crossing at the time of the emergency call.

Increase Predicted Accident Probability beyond Cowlitz County

The FRA GradeDec.Net model was used to calculate the predicted accident probability at the statewide study crossings. The accident probability was estimated to be above the benchmark used for the analysis (0.075 accident per year) with existing crossing safety protection at three of the 44 statewide study crossings without Proposed Action-related trains.

Proposed Action-related trains would increase the accident probability at all at-grade crossings because 8 or 16 Proposed Action-related trains would pass at each crossing depending on location, and the Proposed Action would not change crossing protection at the study crossings. The accident probability analysis found that none of the statewide study crossings would have a predicted accident probability above the benchmark used for the analysis with Proposed Action-related trains that would be at or below the benchmark used for the analysis without Proposed Action-related trains. Therefore, Proposed Action-related trains would have not have a vehicle safety impact at the statewide study crossings. The *SEPA Vehicle Transportation Technical Report* provides additional information.

5.3.5.2 No-Action Alternative

Under the No Action Alternative, the Applicant would not construct the Proposed Action and impacts on vehicle transportation related to construction and operation of the Proposed Action would not occur. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses, including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

The following describes vehicle transportation conditions in 2018 and 2028. More detailed information is provided in the *SEPA Vehicle Transportation Technical Report*.

2018 Conditions

Vehicle transportation conditions in 2018 would be as follows.

- **24-hour average vehicle delay.** All study crossings would continue to operate at level of service A.
- **Peak hour vehicle delay.** All study crossings would operate level of service C or better (Tables 5.3-5 and 5.3-6).
- **Vehicle queuing.** Vehicle queues extending from six study crossings (all along the Reynolds Lead) would affect seven nearby intersections (Table 5.3-7). Vehicle queues at these intersections would exceed the available storage length at six approaches during the peak hour. These queues could potentially block other movements at upstream intersections and affect vehicle delay.
- **Vehicle safety.** Predicted accident probability was found to be below the benchmark used for the analysis with existing crossing safety protection at the study crossings.

2028 Conditions

The Applicant's anticipated planned growth would require approximately 2 trains per day on the Reynolds Lead and BNSF Spur by 2028 for approximately 4 trains per day. The following provides a summary of vehicle transportation conditions in 2028.

- **24-hour average vehicle delay.** All study crossings would operate at level of service A (Tables 5.3-8 and 5.3-9).
- **Peak hour vehicle delay.** Study crossings on the Reynolds Lead would operate at level of service A or B. Study crossings on the BNSF Spur and BNSF main line study crossings would operate at level of service B or C (Tables 5.3-10 and 5.3-11).
- **Vehicle queuing.** Vehicle queues extending from five study crossings (six along the Reynolds Lead and one along the BNSF main line) would affect eight nearby intersections. Vehicle queues at these intersections would exceed the available storage length at four approaches. These queues could potentially block other movements at these intersections (Table 5.3-12).
- **Vehicle safety.** Predicted accident probability was estimated to be below the benchmark used for the analysis with existing crossing safety protection at the study crossings.

5.3.6 Required Permits

No permits related to vehicle transportation would be required for the Proposed Action.

5.3.7 Proposed Mitigation Measures

This section describes the proposed mitigation measures that would reduce impacts related to vehicle transportation from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action.

5.3.7.1 Voluntary Mitigation

The Applicant has committed to implementing the following measure to mitigate impacts on vehicle transportation.

- To mitigate the safety impacts from increased rail traffic, before beginning operations, the Applicant will fund installation of crossing gates at the Reynolds Lead crossing of Industrial Way and replace the existing active warning devices at the Reynolds Lead crossing of Industrial Way with shoulder-mounted light-emitting diode (LED) lights and gates.
- To mitigate the safety impacts from increased rail traffic, the Applicant will hold safety review meetings before beginning operations. Representatives of LVSW, City of Longview, WUTC, and other interested parties will be invited with the objectives of recommending safety improvements at the public crossings on the Reynolds Lead and determining what is necessary to create a quiet zone under federal rules.

5.3.7.2 Applicant Mitigation

The Applicant will implement the following mitigation measures to mitigate vehicle transportation impacts.

MM VT-1. Notify Local Agencies about Operations on the Reynolds Lead and BNSF Spur.

To address vehicle delay impacts at grade crossings on the Reynolds Lead and BNSF Spur, the Applicant will notify Cowlitz County, City of Longview, Cowlitz Fire District, City of Rainier (Oregon), Port of Longview, and Cowlitz-Wahkiakum Council of Governments before each identified operational stage (Stage 1a, Stage 1b, and Stage 2) that will change average daily rail traffic on the Reynolds Lead and BNSF Spur. The Applicant will prepare a memorandum to document the changes to average daily rail traffic. The memorandum will be submitted to these agencies at least 6 months before the change in average daily rail traffic.

5.3.7.3 Other Measures to Be Considered

Other measures that could be implemented to mitigate impacts on vehicle transportation that occur as a result of project-related elements outside the control of the Applicant, include the following. These measures are provided for consideration by agencies, organizations, and others for permitting or planning.

- To improve vehicle delay and safety, the Industrial Way/Oregon Way Intersection Project partners[6] should continue working to identify a preferred alternative to reduce vehicle delay and improve vehicle safety at the Industrial Way/Oregon Way intersection. Grade-separation of the intersection was recommended in the *SR 432 Highway Improvements and Rail Realignment Study* (Cowlitz-Wahkiakum Council of Governments 2014). These agencies should also continue to evaluate alternatives to reduce vehicle delay and improve vehicle safety at the other public at-grade crossings along the Reynolds Lead and BNSF Spur, including the concepts identified in the *SR 432 Highway Improvements and Rail Realignment Study*.
- Although the analysis of Proposed Action-related trains did not identify a vehicle safety impact at the California Way and Dike Road crossings, if determined to be necessary in the future, crossing gates should be considered at these two at-grade crossings to improve vehicle safety. Vehicle safety could be improved with crossing gates.

5.3.8 Unavoidable and Significant Adverse Environmental Impacts

With current track infrastructure on the Reynolds Lead and BNSF Spur, the following crossings would operate below level of service D if one Proposed Action-related train travels during the peak hour in 2028.

- Project area access opposite 38th Avenue (private crossing)
- Weyerhaeuser access opposite Washington Way (private crossing)
- Industrial Way

[6] The project partners include Cowlitz County, Cowlitz Economic Development Council, CWCOG, City of Longview, City of Kelso, and Port of Longview.

- Oregon Way
- California Way
- 3rd Avenue

With planned track improvements to the Reynolds Lead and BNSF Spur, the following crossings would operate below level of service D if two Proposed Action-related trains travel during the peak hour in 2028.

- Project area access opposite 38th Avenue (private crossing)
- Weyerhaeuser access opposite Washington Way (private crossing)
- 3rd Avenue
- Dike Road

On the BNSF main line in Cowlitz County, the following crossings would operate below level of service D if two Proposed Action-related trains travel during the peak hour in 2028.

- Mill Street
- South River Road

Increased gate downtime at these crossings from Proposed Action-related trains would increase the probability of emergency response vehicles being delayed.

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