3.1 Vehicle Safety and Delay

This section describes the potential impacts on vehicle safety and delay that could result from construction and operation of the proposed rail line. Vehicle safety refers to the number of accidents that occur on roadways involving passenger cars, trucks, or other motor vehicles. Vehicle delay refers to how long passenger cars, trucks, or other motor vehicles have to slow down or stop on roadways. As a roadway approaches its capacity, or the number of vehicles that a roadway is designed to accommodate, vehicle delay increases and vehicle safety decreases. The proposed rail line would involve construction of new at-grade road crossings where motor vehicles would have to stop and wait while trains pass through the crossing.[1] The new at-grade road crossings would affect both vehicle safety and vehicle delay. The subsections that follow describe the study areas, data sources and methods used to analyze the impacts, the affected environment, and the potential impacts of the Action Alternatives on vehicle safety and delay.

3.1.1 Analysis Methods

This subsection identifies the study areas, data sources, and analysis methods OEA used to analyze vehicle safety and delay.

3.1.1.1 Study Area

The study area for vehicle safety and delay analysis includes both a defined study area for the proposed rail line (project study area) and a study area for downline impacts (downline study area) that would likely experience a project-related increase in rail traffic.

- **Project study area**. For the project study area, OEA considered public roadways in the Uinta Basin (the Basin) that could have increased vehicle traffic as a result of construction and operation of the proposed rail line. The project study area includes the new at-grade road crossings on public roadways that the Action Alternatives would cross between the two terminus points in the Basin at Myton, Utah, and Leland Bench, Utah, and the connection with the existing Union Pacific (UP) rail line near Kyune, Utah.
- **Downline study area.** For the downline study area, OEA considered public at-grade road crossings on existing rail lines that could experience an increase in rail traffic if the Board were to authorize the proposed rail line. The Coalition estimates that rail traffic on the proposed rail line could range from as few as 3.68 trains per day, on average (the low rail traffic scenario), to as many as 10.52 trains per day, on average (the high rail traffic scenario), depending on future market conditions, including future demand for crude oil produced in the Basin. OEA defined the downline study area based on the potential destinations and origins of those trains and the potential routes that they could follow. The downline study area extends from the proposed connection near Kyune to the northern, eastern, and southern edges of the Denver Metro/North Front Range air quality nonattainment area (Appendix C, *Downline Analysis Study Area and Train Characteristics*, Figure C-1). Existing rail lines in this area could experience an increase in rail traffic that would exceed OEA's thresholds for analysis set forth at 49 Code of Federal

[1] An at-grade crossing refers to an intersection where two modes of transportation cross at the same elevation level, so that one mode of traffic (trains) would impede the other (motor vehicles).

Regulations (C.F.R.) § 1105.7(e)(5). UP and BNSF Railway Company (BNSF) own and operate the rail lines in the downline study area that are used for freight and passenger rail service. Light rail passenger lines share some at-grade crossings with the UP rail lines in the Denver, Colorado metropolitan area. Appendix C, *Downline Analysis Study Area and Train Characteristics*, contains additional information about the downline study area.

3.1.1.2 Data Sources

OEA reviewed the following data sources to determine the potential impacts on vehicle safety and delay that could result from construction and operation of the proposed rail line.

Project Study Area

- Annual average daily traffic (AADT) data from the Utah Department of Transportation (UDOT), State of Utah Department of Public Safety Highway Safety Office, *Duchesne County Transportation Master Plan* (2017), UDOT traffic maps (2020a), and *Utah Department of Transportation 2019–2050 Long-Range Transportation Plan* (UDOT 2020b).
- Forecast increases in vehicle traffic from the U.S. Energy Information Administration (2020).
- Project-related construction data, including peak employment during construction and operations, construction material transporting, and locations of temporary construction camps provided by the Coalition.
- Proposed train characteristics, including length and speed, provided by the Coalition.

Downline Study Area

- AADT from UDOT, UDOT traffic maps (UDOT 2020a), Federal Railroad Administration (FRA) database (FRA 2020a), Denver Regional Council of Governments Regional Traffic Count Maps (DRCG 2020), and Colorado Information Marketplace Road Traffic Counts (State of Colorado 2014).
- Forecasted increases in vehicle traffic from the U.S. Energy Information Administration (2020).
- Existing train traffic (average number of trains per day), operating speed, and grade-crossing characteristics, including accident history, for downline rail segments (FRA 2020b).
- Existing train length estimated by OEA (Appendix C, *Downline Analysis Study Area and Train Characteristics*).
- Project-related train traffic (average number of trains per day) and train length estimated by the Coalition (Appendix C, *Downline Analysis Study Area and Train Characteristics*).

3.1.1.3 Analysis Methods

OEA used the following methods to analyze vehicle safety and delay in the project study area and downline study area.

Project Study Area

- **OEA evaluated roadway safety by analyzing the potential for increases in vehicle crashes.** OEA used the estimated vehicle miles traveled (VMT) during construction and operation of the proposed rail line to compare the relative likelihood of each Action Alternative to result in increased vehicle crashes. As VMT increases, OEA estimated the potential for crashes would also increase. OEA described the impacts on roadway safety qualitatively.

- **OEA evaluated potential vehicle delay on roadways by comparing existing roadway volumes and capacity to the estimated increases in vehicle traffic resulting from construction and operation of the proposed rail line.** OEA determined the general roadway capacity for roads in the project study area using Federal Highway Administration (FHWA) guidelines for calculating highway capacity (FHWA 2018). Roadway capacity describes the maximum number of vehicles a roadway can accommodate. OEA collected AADT roadway volumes of the state and county roadways in the project study area from UDOT and other sources. OEA then compared these volumes, where available, and roadway capacities to the estimated increases in vehicle traffic resulting from construction and operation of the proposed rail line to determine the potential impacts on vehicle delay.
- **OEA evaluated safety at public at-grade crossings by estimating future accident frequency.** For new public at-grade crossings that the Coalition would construct as part of any of the Action Alternatives, OEA estimated future accident frequency and the predicted interval between accidents using the *Accident Severity Prediction Formula for Rail-Highway Crossings from the Rail-Highway Crossing Resource Allocation Procedure User's Guide* (FRA 1987). For any grade crossing for which an AADT value could not be located using FRA or state data sources, OEA applied an average AADT value based on collected AADT values for the same road type in Utah. OEA estimated AADT values for analysis year 2026[2] using the available data and annual growth rate of 1.0 percent (U.S. Energy Information Administration 2020).
- **OEA estimated the delay that vehicles would experience at new grade crossings in the project study area as a result of project-related rail traffic.** For new public at-grade crossings that the Coalition would construct as part of any of the Action Alternatives, OEA calculated the time that each crossing would be blocked for each train-crossing event and the average number of vehicles that would be delayed by each crossing event. OEA also calculated the average delay for all vehicles using each crossing in a 24-hour period and the total delay for all crossings associated with each Action Alternative. OEA estimated AADT values as described for the grade crossing safety analysis.

Downline Study Area

- **OEA estimated potential increases in rail traffic on existing rail lines.** As described in Section 3.15, *Cumulative Effects*, and Appendix C, *Downline Analysis Study Area and Train Characteristics*, OEA identified regions that could be markets for crude oil produced in the Basin and the routes that trains transporting crude oil could take from the Basin to those regions. Based on the refinery capacity at the potential market regions that OEA identified, OEA estimated the number of loaded and unloaded trains that could move each day on different segments of existing rail lines in the downline study area. Depending on future market conditions, including the future price of crude oil, existing rail lines in the downline study area could experience an increase in rail traffic ranging from 0.4 additional train per day, on average, to 9.5 additional trains per day, on average. Given that there is some uncertainty associated with

[2] OEA used 2026 as the analysis year because it is the latest year in which OEA expects that any of the Action Alternatives would be in full operation.

the estimated distribution of rail traffic and that the estimated traffic is close to the 3-train-per-day threshold on the Denver Northbound route for the low rail traffic scenario, OEA has elected in this case to examine potential downline impacts associated with all estimated project-related rail traffic between and Kyune, Utah, and Denver, Colorado, and within the Denver Metro/North Front Range air quality nonattainment area.

- **OEA evaluated safety at public at-grade crossings in the downline study area by estimating future accident frequency.** OEA estimated future accident frequency and the corresponding predicted interval between accidents using the *Accident Severity Prediction Formula for Rail-Highway Crossings from the Rail-Highway Crossing Resource Allocation Procedure User's Guide* (FRA 1987). OEA estimated accident frequency based on the existing rail traffic volumes and AADT per the FRA grade-crossing database (2020a) and calculated the change in estimated accident frequency with the addition of project-related rail traffic for the analysis year 2026. OEA used the available data and an annual growth rate of 1.0 percent (U.S. Energy Information Administration 2020) to estimate the AADT values for analysis year 2026.
- **OEA estimated the delay that vehicles would experience at grade crossings in the downline study area as a result of project-related rail traffic.** For existing public at-grade crossings in the downline study area, OEA estimated the change in vehicle delay due to project-related rail traffic by estimating delay for existing rail traffic and delay with the addition of project-related rail traffic using the same calculations described for new grade crossings in the project study area. OEA estimated AADT values as described for the grade crossing safety analysis and included Colorado.

Appendix D, *Grade-Crossing Safety and Delay Analysis*, provides additional information regarding the methods OEA used to evaluate vehicle safety and delay impacts at public at-grade crossings.

3.1.2 Affected Environment

This subsection identifies the existing environmental conditions related to vehicle safety and delay in the project study area and downline study area.

3.1.2.1 Project Study Area

Roadway Safety

Nationally, the average vehicle crash rate is approximately 201 crashes per 100 million miles traveled (NHTSA 2019). In the project study area, the crash rate is lower than this estimate. Carbon, Duchesne, and Uintah Counties had less than 110 crashes per 100 million miles traveled, and Utah County had a crash rate above the national average (212 crashes per 100 million miles traveled) in 2018 (Christofferson pers. comm.). Table 3.1-1 shows the total number of crashes in 2018 in Carbon, Duchesne, Uintah, and Utah Counties.

Table 3.1-1. 2018 Crash Total by County

County	Population	Total Number of Crashes	Non-Injury	Injury	Fatal
Carbon	20,512	423	327	94	2
Duchesne	20,259	319	229	86	4
Uintah	36,343	469	356	110	3
Utah	576,496	10,495	7,218	3,238	39

Notes:
Sources: Christofferson pers. comm.; U.S. Census Bureau 2017

The greater number of crashes in Utah County is attributable to Utah County containing a much larger population than the other three counties, and larger urban communities (Provo and south suburban Salt Lake City). The Utah geographic information system (GIS) portal map shows a much greater concentration of crashes in the urban northwest portion of Utah County versus the rural southeast portion, where the proposed rail line would be located (UDOT 2020c).

Roadway Delay

Most of the public roadways in the project study area are two-lane rural highways, with the exception of U.S. Highway 6 (US 6), which includes both two-lane and five-lane sections near the proposed rail line. Existing vehicular traffic data are available for the major routes in the area, including US 6, U.S. Highway 191 (US 191), U.S. Highway 40 (US 40), Federal Aid Route 1300 (9 Mile Canyon Road), and Federal Aid Route 1552 (8000 S/8250 S). To estimate baseline traffic volumes on these roadways, OEA used the latest published UDOT traffic data from 2017 and estimated the 2020 volumes based on the historical growth rate for each of the roadways (Table 3.1-2). US 6 has the greatest AADT in the project study area of approximately 8,866 vehicles per day in 2020, of which 49 percent are trucks.

Table 3.1-2. Annual Average Daily Traffic in 2017 and 2020

Roadway	2017 AADT (vehicles per day)	Estimated 2020 AADT (vehicles per day)
US 6	7,659	8,866
US 191	2,130	2,341
US 40	6,599	6,799
9 Mile Canyon Road	2,508	2,854
8000 S/8250 S	342	377

Notes:
US 6 = U.S. Highway 6; US 191 = U.S. Highway 191; US 40 = U.S. Highway 40; AADT = annual average daily traffic
Source: UDOT 2020a

Using FHWA guidelines for calculating highway capacity, OEA estimated the capacity of the major public roadways in the project study area to be 1,490 vehicles per hour (VPH) per lane (FHWA 2018). To determine the amount of roadway capacity being used, OEA estimated the directional (one-way) design hour volume (a measure of traffic at the daily one-hour peak volume) based on the

AADT values presented in Table 3.1-2 for each of the major roadways.[3] Table 3.1-3 shows the daily design hour volumes and the amount of roadway capacity used for the major roadways in the project study area. The amount of capacity being used varies from 2 percent for 8000 S/8250 S to 45 percent for US 6. The low volume-to-capacity ratio contributes to the general overall safety of the roadways because the number of crashes tends to increase when roadways near capacity.

Table 3.1-3. Used Roadway Capacity during Peak Hour Traffic Flow

Roadway	One-Way Roadway Capacity (vehicles per hour)	2020	
		One-Way DHV (vehicles per hour)	Roadway Capacity Used (%)
US 6	1,490	665	45
US 191	1,490	180	12
US 40	1,490	510	34
9 Mile Canyon Road	1,490	215	14
8000 S/8250 S	1,490	30	2

Notes:
US 6 = U.S. Highway 6; US 191 = U.S. Highway 191; US 40 = U.S. Highway 40; DHV = design hour volume

3.1.2.2 Downline Study Area

Grade-Crossing Safety

OEA analyzed existing vehicle accident frequency at 231 at-grade crossings in the downline study area. Appendix C, *Downline Analysis Study Area and Train Characteristics*, Figure C-1, displays the locations of the downline grade crossings. In 2026, the existing at-grade crossings for the downline segments would have an average predicted interval ranging from 6.1to 20.4 years between accidents. The individual downline at-grade crossings with the ten lowest predicted intervals between accidents include the Chambers Road crossing for the Denver Eastbound segment with 1.3 years between accidents, to the Tennyson Street crossing for the Kyune to Denver segment with 4.5 years between accidents.

Grade-Crossing Delay

OEA analyzed existing vehicle delay at the 231 at-grade crossings in the downline study area. The average number of vehicles stopped per day at these at-grade crossings ranges from 48 for the Kyune to Denver segment to 2,782 vehicles per day for the Denver East/North segment. The average number of vehicles delayed per day at all downline at-grade crossings is 749. The average total delay for vehicles in a 24-hour period at at-grade crossings on downline segments ranges from 63 minutes per day for the Kyune to Denver segment to 10,415 minutes per day for the Denver East/North segment. The average vehicle delay per crossing for each segment ranges from 0.36 to 24.92 seconds per vehicle. Appendix D, *Grade-Crossing Safety and Delay Analysis*, shows the existing vehicle delay at each downline at-grade crossing for the five segments analyzed.

[3] OEA reviewed local hourly vehicle count data and determined that the peak hour of a roadway in the project study area contains approximately 10 percent of the average daily traffic volumes. OEA then used a conservative 75/25 directional split of the peak hour volume to calculate one-way directional flow design hour volume.

3.1.3 Environmental Consequences

Construction and operation of the proposed rail line could result in impacts on vehicle safety and delay. This subsection first presents the potential impacts that would be the same for all three Action Alternatives and then compares the potential impacts that would be different across the Action Alternatives. For comparison purposes, this subsection also discusses the status of vehicle safety and delay under the No-Action Alternative.

3.1.3.1 Impacts Common to All Action Alternatives

This subsection describes the potential environmental impacts on vehicle safety and delay that would be the same across the three Action Alternatives.

Project Study Area

Construction

During construction of any of the Action Alternatives, the Coalition would move workers, equipment, and construction materials by truck and other vehicles via roadways in the project study area. Construction would also require temporary roadway closures and the realignment of existing roadways. These construction activities could contribute to increased roadway traffic, vehicle accidents, and vehicle delay.

Roadway Safety

Construction vehicle traffic originating in Provo and Salt Lake City would use the major public highways (US 6, US 191, and US 40) to access the construction sites along the proposed rail line. Local traffic, including commuting employees and truck tips to quarries for subballast and landfills to drop off waste, would use a combination of federal and state highways, county roads, and private roads (subject to the permission of the landowner). The increase in traffic volumes from construction activity on these and other roadways in the project study area could affect roadway safety by increasing the number of vehicles on these roads, and thereby, the chance for vehicle crashes.

The proposed rail line would require construction of new roadways, including temporary and permanent access roads and road realignments. OEA is recommending mitigation requiring the Coalition design and construct new roads and road realignments in conformance with the *Utah Department of Transportation Roadway Design Manual* (UDOT 2020d) and other applicable road construction guidance (e.g., county encroachment standards, BLM H-9113-1 Road Design Handbook) to ensure safe roadway conditions and to obtain approvals for construction in UDOT rights-of-ways (VSD-MM-1, VSD-MM-3). If this mitigation is implemented, OEA concludes that impacts on vehicle safety related to new roadways and road realignments would not be significant.

Roadway Delay

Construction of the proposed rail line would require vehicle trips for the movement of materials, equipment, and workers to and from work sites, construction staging areas, and construction camps. These construction-related vehicle trips could increase vehicle delays on local roadways. The level of impacts would depend on the increase in construction vehicle traffic, which would vary by Action Alternative, and the available capacity of the roadways in the project study area (Section 3.1.3.2, *Impact Comparison between Action Alternatives*). In addition, some temporary delays could occur on portions of existing roads during construction due to temporary road closures required for the construction of grade crossings, road relocations, and connection points of temporary access roads to existing roads. To minimize temporary construction impacts on vehicle delay, the Coalition has committed to consulting with tribal and local transportation officials regarding installing detours and associated signs or maintaining at least one open lane of traffic at all times to allow the quick passage of emergency and other vehicles (VM-3). In addition, OEA is recommending a mitigation measure (VSD-MM-2) requiring the Coalition ensure that its employees and contractors comply with speed limits and applicable laws and regulations when operating vehicles and equipment on public roadways. If these measures are implemented, construction of the proposed rail line would not significantly increase vehicle delay in the project study area.

Operations

Roadway Safety and Delay

Operation of the proposed rail line would generate limited additional road traffic, primarily associated with employees commuting. This additional traffic has the potential to contribute to vehicle safety and delay impacts in the project study area by increasing the number of vehicles on roads. Similar to the discussion above for construction, the level of impacts would depend on the amount of operations-related vehicle traffic, which would vary between the Action Alternatives (Section 3.1.3.2, *Impact Comparison between Action Alternatives*).

Operation of the proposed rail line would reduce truck traffic on some local roadways because some freight that is currently transported by truck would move by rail instead. The primary commodity produced in the Basin that would move on the proposed rail line is crude oil. Currently, trucks transport crude oil from production areas in the Basin to refineries in Salt Lake City and the Price River Terminal in Wellington, Utah, where crude oil is loaded onto trains for transport to markets across the country. In the short term, OEA does not expect that the proposed rail line would divert truck transportation of crude oil to rail transportation for the purpose of serving existing oil refineries in Salt Lake City because those refineries currently do not have rail access. However, OEA anticipates that the proposed rail line would eliminate the existing tanker truck traffic transporting crude oil from production areas in the Basin to the Price River Terminal.[4] If the proposed rail line were constructed, the tanker trucks that currently transport crude oil to the Price River Terminal would likely go to the proposed rail line terminals in the Basin instead because the proposed rail line terminals would be significantly closer to oil production areas in the Basin than the Price River Terminal.

Based on information provided by the Coalition, OEA estimates that tanker trucks transport approximately 10,000 barrels of crude oil per day to the Price River Terminal. This corresponds to approximately 17,464 tanker trucks per year. OEA estimates that the average distance between crude oil production areas and new rail terminals in the Basin would be approximate 80 miles less (one way) than the distance to the Price River Terminal. Thus, OEA anticipates that operation of the proposed rail line would reduce tanker truck mileage by approximately 2.8 million miles per year and that may lead to fewer crashes. In addition, the removal of trucks from the road would reduce traffic on US 191 through Indian Canyon and on other roadways along the route from the Basin to

[4] Crude oil from the Uinta Basin has been and may be hauled to other terminals outside the Basin. It is OEA's understanding that Price River Terminal is the most frequent destination and so it has been used in this analysis.

the Price River Terminal, but because traffic on these roads is already low, OEA does not expect that this impact would be significant. Any beneficial transportation impacts of the proposed rail line related to the diversion of truck traffic to rail would be the same for any of the Action Alternatives.

Grade-Crossing Safety and Delay

Operation of the proposed rail line would introduce vehicle safety and delay impacts at new at-grade road crossings. The Coalition would install grade-separated crossings[5] at major public roadways, such as US 191 and Pariette Road, which would avoid the potential for rail–vehicle accidents and delays due to passing trains on these roadways. For smaller roads, the Coalition would install at-grade road crossings, as shown in Figure 3.1-1. These new at-grade road crossings would result in the potential for vehicle accidents and vehicle delays at these crossings. The maps in Appendix A, *Action Alternatives Supporting Information*, show the locations of all proposed at-grade crossings and grade-separated crossings.

To minimize the potential for accidents involving motor vehicles and trains operating on the proposed rail line, the Coalition has committed to consulting with federal, state, and local agencies and the Ute Indian Tribe on the design and location of at-grade crossings. The Coalition has also committed to following standard safety designs for installing proposed warning devices and signs, including the Federal Highway Administration *Manual on Uniform Traffic Control Devices* (FHWA 2009) and other applicable guidance and safety requirements (VM-1, VM-2). Even if these mitigation measures are implemented, however, there would be potential for accidents at at-grade road crossings. To estimate the probability of accidents at each new at-grade road crossing, OEA calculated the accident rate at existing at-grade road crossings on existing rail lines and adjusted that rate to account for road type, train speed, train traffic volume, and other factors specific to the proposed rail line. Appendix D, *Grade-Crossing Safety and Delay Analysis*, contains the predicted accident frequency for each new at-grade road crossing. Across the three Action Alternatives, OEA estimates that the crossing with the highest predicted accident rate would experience an accident approximately once every 29 years under the high rail traffic scenario and approximately once every 47 years under the low rail traffic scenario. The crossing with the lowest predicted accident rate would experience an accident approximately once every 56 to 99 years, depending on the volume of rail traffic.

For any of the Action Alternatives, impacts related to vehicle delay at new at-grade road crossings would be minor. As discussed in Section 3.1.3.2, *Impact Comparison between Action Alternatives*, OEA predicts that the average time required for a train to transit across a new at-grade crossings would range between 3.06 and 3.21 minutes, depending primarily on the length of the train. Under the low rail traffic scenario, an average of 1.30 to 2.42 vehicles would be delayed at each crossing per day, depending on the Action Alternative. Under the high rail traffic scenario, an average of 3.55 to 6.75 vehicles would be delayed at each crossing per day, depending on the Action Alternative.

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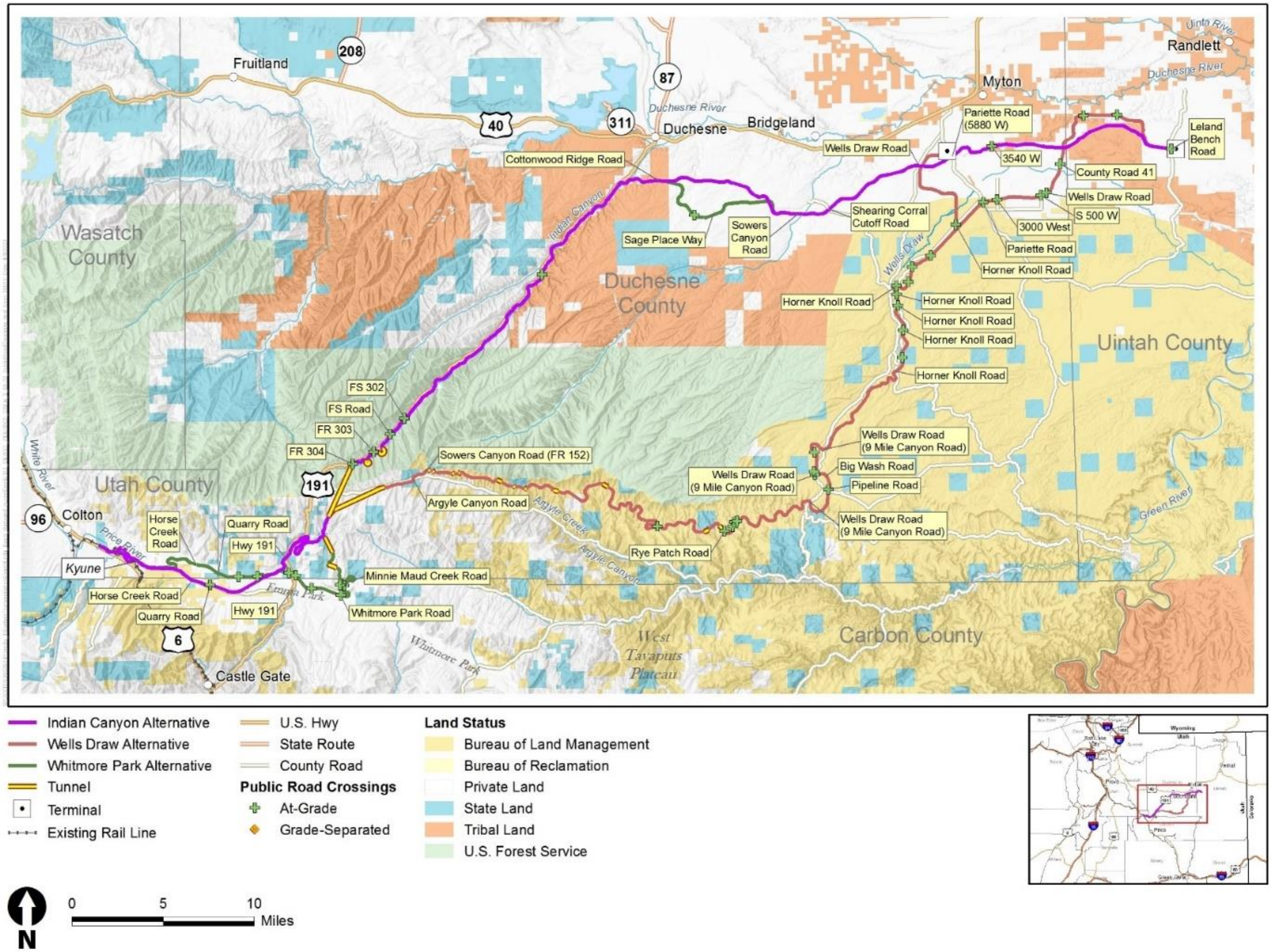
[5] A grade-separated crossing refers to an intersection at which traffic crosses at different elevations, so that vehicular traffic and train traffic are not impeded by each other.

Figure 3.1-1. Proposed At-Grade Crossings for the Action Alternatives



Like other motor vehicles, emergency vehicles could experience delays at new at-grade crossings. Emergency service vehicles would be subject to the same grade-crossing delays described for all traffic. The estimated maximum time an emergency vehicle could be delayed at any new at-grade crossing would be 3.21 minutes if the vehicle arrived at the same moment as a train of average length approaches the grade-crossing. All of the at-grade crossings in the project study area are located on rural local or collector roads,[6] emergency vehicle use of roads is infrequent, and only a few vehicles per day of all types would experience any delay at a typical grade crossing. Therefore, OEA concludes that emergency vehicles would rarely be delayed and, when delayed, they would be delayed for a relatively short duration.

To ensure that impacts related to safety at at-grade road crossings would be minimized, OEA is recommending additional mitigation measures (VSD-MM-4, VSD-MM-5) requiring the Coalition support Operation Lifesaver educational programs in communities along the proposed rail line to help prevent accidents at highway/rail grade crossings and to adhere to FHWA regulations for grade crossing signage. If these mitigation measures are implemented, OEA concludes that impacts related to safety and delay at at-grade road crossings would not be significant.

Downline Study Area

Grade-Crossing Safety

OEA anticipates that the proposed rail line would increase rail traffic on existing rail lines in the downline study area. Under all of the Action Alternatives, the increase in rail traffic on existing lines would depend on the volume of rail traffic on the proposed rail line, which would depend on future market conditions, including future demand for crude oil produced in the Basin. An increase in rail traffic on existing rail lines would increase the predicted accident frequency at at-grade road crossings on the existing rail lines.

OEA identified five segments of existing rail lines in the downline study area that could experience an increase in rail traffic if the proposed rail line were constructed. Most trains heading into or out of the Basin would travel on the existing 157.4-mile segment of rail line between Kyune and Denver, Colorado, so this rail line segment would experience the greatest increase in rail traffic of any downline segment. The increase in rail traffic on the Kyune to Denver segment could be up to 9.5 additional trains per day, on average, under the high rail traffic scenario, or as few as 3.3 additional trains per day, on average, under the low rail traffic scenario. The predicted accident rate at at-grade road crossings for this segment would increase from an estimated baseline rate of 0.051 accident per year, on average, to 0.054 accident per year under the low rail traffic scenario or 0.064 accident per year under the high rail traffic scenario. This means that the predicted interval between accidents would decrease from one accident approximately every 20 years, on average, under the No-Action Alternative to one accident approximately every 19 years under the low rail traffic scenario or one accident approximately every 16 years under the high rail traffic scenario.

Table 3.1-4 shows the estimated increase in train accidents per year for each segment in the downline study area. Regardless of the volume of rail traffic on the proposed rail line, the potential

[6] Based on classifications in *Federal Highway Administration, Highway Functional Classification Concepts, Criteria and Procedures* (FHWA 2013), rural roads are defined as roads that serve a population of 5,000 or less. Local roads are defined as roads not intended for use in long distance travel, except at the origin or destination end of the trip, due to their provision of direct access to abutting land. Collector roads are major and minor roads that connect local roads and streets with arterials roads.

for accidents at existing at-grade road crossings in the downline study area would not increase significantly. Because downline impacts would occur on existing rail lines that are not owned or operated by the Coalition, and railroads have the right to determine how to operate and route their traffic, any potential increase in the risk of accidents at existing at-grade road crossings in the downline study area would be beyond the Board's control in this proceeding; therefore, OEA is not recommending mitigation to address this potential impact.

Grade-Crossing Delay

The addition of new rail traffic on existing rail lines would increase delay at at-grade road crossings in the downline study area. Table 3.1-5 shows the estimated potential vehicle delay per grade crossing on the five downline segments that OEA identified, as well as the number of crossings on each downline segment that could experience a decrease in the level of service (LOS)[7] designation as a result of increased rail traffic. Appendix D, *Grade-Crossing Safety and Delay Analysis,* provides additional details on grade-crossing delay.

Because it is located in the urban area of Denver, the Denver East/North segment would experience the greatest increase in the number of vehicles delayed of any downline segment, if the proposed rail line were constructed. This segment is part of a heavily used UP mainline that extends north from downtown Denver toward Cheyenne, Wyoming, and would likely be used to transport crude oil trains from the Basin to markets along the Gulf Coast in Texas and Louisiana (Appendix C, *Downline Analysis Study Area and Train Characteristics*). Delays at the two at-grade crossings on this segment currently affect an estimated 5,563 total vehicles per day, on average. This would increase to an estimated 6,347 total vehicles under the low rail traffic scenario or 7,781 total vehicles under the high rail traffic scenario.

Across all the at-grade crossings in the downline study area, the largest increase in average delay per vehicle would occur at the crossing of Broadway Street on the Denver East/North segment. At that crossing, average delay would increase from an estimated 21.19 seconds per vehicle under baseline conditions to 24.72 seconds per vehicle under the low rail traffic scenario or 31.03 seconds per vehicle under the high rail traffic scenario.

Regardless of the volume of rail traffic on the proposed rail line, the potential increase in vehicle delay at existing at-grade road crossings in the downline study area would not increase significantly. Because downline impacts would occur on existing rail lines that are not owned or operated by the Coalition, and railroads have the right to determine how to operate and route their traffic, any potential increase in delay at existing at-grade road crossings in the downline study area would be beyond the Board's control in this proceeding; therefore, OEA is not recommending mitigation to address this potential impact.

[7] Level of service (LOS) is a mechanism used to determine how well a roadway is operating from a traveler's perspective. Typically, six levels of service are defined and each is assigned a letter designation from A to F, with LOS A representing the best operating conditions, and LOS F the worst. Appendix D, *Grade-Crossing Safety and Delay Analysis*, provides more information on LOS.

Table 3.1-4. Estimated Increase in Downline Train Accidents per Year

			Estimated Accidents Per Year in 2026				
				Low Rail Traffic Scenario		High Rail Traffic Scenario	
Segment	Length (miles)	Number of Public At-Grade Crossings	Baseline (No Action Alternative)	Increase over Baseline	Total	Increase over Baseline	Total
Kyune to Denver	457.4	91	0.051	0.002	0.054	0.013	0.064
Denver East/North	3.2	2	0.164	0.009	0.172	0.024	0.188
Denver Southbound	16.6	16	0.072	0.001	0.072	0.001	0.073
Denver Eastbound	59	33	0.151	0.001	0.152	0.004	0.155
Denver Northbound	69.2	89	0.049	0.005	0.054	0.013	0.062

Table 3.1-5. Estimated Maximum Potential Vehicle Delay per Grade Crossing on Downline Segments (2026)

			Increase in Trains per Day		Estimated Average Number of Vehicles Delayed per Day[a]			Total Estimated Delay in a 24-Hour Period (minutes per crossing)[b]			Number of Crossings with Project-Related Decrease in LOS	
Segment	Length (miles)	Number of At-Grade Crossings	Low Traffic	High Traffic	Baseline	Low Traffic	High Traffic	Baseline	Low Traffic	High Traffic	Low Traffic	High Traffic
Kyune to Denver	457.4	91	3.3	9.5	48	64	99	63	96	158	0	0
Denver East/North	3.2	2	2.9	8.4	2,782	3,174	3,891	10,415	12,149	15,251	1	1
Denver Southbound	16.6	16	0.4	1.1	460	466	477	1,349	1,371	1,407	0	0
Denver Eastbound	59	33	0.4	1.1	394	403	415	274	297	306	0	0
Denver Northbound	69.2	89	2.5	7.3	62	79	94	92	121	148	0	0

Notes:

[a] Represents an average across all at-grade crossings for each downline segment.

[b] Represents the delay per stopped vehicle times the number of vehicles delayed per day divided by the annual average daily traffic.

[c] Represents the delay per stopped vehicle times the number of vehicles delayed at all crossings.

3.1.3.2 Impact Comparison between Action Alternatives

This subsection compares the potential environmental impacts on vehicle safety and delay across the three Action Alternatives.

Project Study Area

Construction

Construction of the proposed rail line would result in the following impacts on roadway safety and roadway delay.

Roadway Safety

OEA compared the potential impacts on vehicle safety across the three Action Alternatives by comparing the estimated VMT during construction for each Action Alternative because a higher VMT would correspond to a higher potential for vehicle accidents. Table 3.1-6 shows the annual VMT during construction of each of the Action Alternatives. As the table shows, the Whitmore Park Alternative would have the greatest potential to result in increased crashes in any single construction year, while the Wells Draw Alternative would have the potential for the greatest increase in total crashes across the construction period. The rural highways in the project study area have substantial additional capacity (Table 3.1-3). Therefore, if the Coalition's voluntary mitigation measures and OEA's recommended mitigation measures for construction-related travel are implemented (VM-3, VSD-MM-1, VSD-MM-2), OEA concludes that construction of the proposed rail line would not significantly affect roadway safety in the project study area.

Table 3.1-6. Vehicle Miles Traveled during Construction

	Vehicle Miles Traveled[a]		
Year	**Indian Canyon Alternative**	**Wells Draw Alternative**	**Whitmore Park Alternative**
2022	83,125,349	82,096,214	100,670,533
2023	83,125,349	82,096,214	100,670,533
2024	27,784,363	82,096,214	33,648,781
2025	--	82,096,214	--
Total	**194,035,062**	**328,384,855**	**234,989,847**

Notes:

[a] OEA determined VMT based on the estimated number of vehicle trips (Table 3.1-7), and the average trip length during construction of 52 to 86 miles, depending on the type of construction activity (e.g., tunnel construction, employees commuting) and Action Alternative. Appendix M, *Air Quality Emissions and Modeling Data*, includes more information regarding how OEA estimated VMT, trip length, and the number of trips.

VMT = vehicle miles traveled

Roadway Delay

Table 3.1-7 shows the estimated vehicle traffic during construction for each of the Action Alternatives, including total annual trips, average daily trips, and one-way design hour volume (a measure of traffic at the daily one-hour peak volume) during each year of construction. While the Wells Draw Alternative would result in the greatest total number of vehicle trips during construction compared to the other Action Alternatives, the Whitmore Park Alternative would result in the most traffic in any single construction year.

Table 3.1-7. Vehicle Traffic during Construction

		Action Alternative		
Year[a]	Traffic Characteristics	Indian Canyon	Wells Draw	Whitmore Park
2022	Annual trips	1,335,386	1,183,745	1,519,498
	AADT	3,659	3,243	4,163
	One-way DHV (vehicles per hour)	274	243	312
2023	Annual trips	1,335,386	1,183,745	1,519,498
	AADT	3,659	3,243	4,163
	One-way DHV (vehicles per hour)	274	243	312
2024	Annual trips	446,348	1,183,745	507,887
	AADT	3,659	3,243	4,163
	Maximum VPH per lane	274	243	312
2025	Annual trips	--	1,183,745	--
	AADT	--	3,243	--
	One-way DHV (vehicles per hour)	--	243	--
Total Annual Trips		3,117,120	4,734,980	3,546,883

Notes:
[a] Construction of the Indian Canyon Alternative and Whitmore Park Alternative would take up to 2 years 4 months, and construction of the Wells Draw Alternative would take up to 4 years.
AADT = average annual daily traffic; DHV = design hour volume

To determine the potential impacts on roadway delay, OEA compared the available capacity on the roadways in the project study area to the estimated construction vehicle traffic. The distribution of construction vehicle traffic on the roadways in the project study area is unknown. Therefore, to compare the increase in project-related construction traffic to roadway capacity, OEA assumed that all construction traffic would be routed on US 6, which is the busiest roadway in the project study area. Table 3.1-8 shows the baseline used roadway capacity on US 6 for all years of construction and the used roadway capacity during peak hour traffic flow under each of the Action Alternatives.

Table 3.1-8. Used Roadway Capacity during Peak Hour Traffic Flow on US 6 during Construction

	Used Roadway Capacity (%)						
		Indian Canyon Alternative		Wells Draw Alternative		Whitmore Park Alternative	
Year	Baseline	Increase	Total	Increase	Total	Increase	Total
2022	49	18	68	16	66	21	70
2023	52	18	70	16	68	21	73
2024	54	18	73	16	71	21	75
2025	57	--	57	16	73	--	57

The Whitmore Park Alternative would result in the largest increase in used roadway capacity in any given year (21 percent), followed by the Indian Canyon Alternative (18 percent), and the Wells Draw Alternative (16 percent). Under any of the Action Alternatives, there would be adequate roadway lane capacity remaining during each year of construction. Because US 6 is the busiest of the major roadways in the project study area (Table 3.1-2), OEA anticipates that all roadways used by construction vehicles would have substantial excess capacity during each year of construction. In addition to using the major roadways in the study area, construction traffic could be routed on smaller, local roads, such as those that pass through the communities of Randlett, Myton, and Fort Duchesne (e.g., Leland Bench Road, 7500 E, AR-88, and Sandwash Road/6000 W/5888 W) near the northern end of the proposed rail line. These smaller roads could see localized increases in traffic during the construction period. With implementation of the Coalition's voluntary mitigation measures and OEA's recommended mitigation measures for construction-related travel (VM-3, VSD-MM-1, VSD-MM-2), OEA concludes that construction of any of the Action Alternatives would not significantly affect vehicle delay in the project study area.

Operations

Operation of the proposed rail line would result in the following impacts on roadway safety, roadway delay, grade-crossing safety, and grade-crossing delay.

Roadway Safety

Table 3.1-9 shows the annual VMT during operations of the Action Alternatives under the low and high rail traffic scenarios. Annual VMT estimates include reduced mileage anticipated for crude oil trucking that would be expected with rail terminals located in the Basin, as discussed previously. Based on VMT, OEA predicts that the Wells Draw Alternative could result in slightly greater impacts on vehicle safety than the other two Action Alternatives. This is because the Wells Draw Alternative would require more employees to operate and would have longer commuting distances, both of which contribute to higher VMT and may lead to increased crashes. Because roadways in the project study area have substantial additional capacity (Table 3.1-3), OEA does not anticipate that operation of any of the Action Alternatives would significantly affect roadway safety on roadways in the project study area, if the Coalition's voluntary mitigation measures and OEA's recommended mitigation measures are implemented (VM-1, VSD-MM-1).

Table 3.1-9. Annual Vehicle Miles Traveled during Operations

	Vehicle Miles Traveled[a]		
Scenario	Indian Canyon Alternative	Wells Draw Alternative	Whitmore Park Alternative
Low rail traffic	-902,385	-15,409	-835,637
High rail traffic	1,002,046	2,346,551	1,135,542

Notes:

[a] OEA determined VMT based on the estimated number of vehicle trips (Table 3.1-10), and the average trip length during operations of 52 to 80 miles, depending on the Action Alternative, and accounting for reduced crude oil trucking mileage due to anticipated rail terminals that would be closer to crude oil production areas. Appendix M, *Air Quality Emissions and Modeling Data*, includes more information regarding how OEA estimated VMT, trip length, and the number of trips.

VMT = vehicle miles traveled

Roadway Delay

Table 3.1-10 shows the estimated vehicle traffic during operations for each of the Action Alternatives, including total annual trips, average daily trips, and one-way design hour volume of traffic under the low rail traffic scenario and high rail traffic scenario. The Wells Draw Alternative would result in a greater number of vehicle trips during operations than the Indian Canyon

Alternative and Whitmore Park Alternative and, therefore, would result in the greatest impacts on vehicle safety and delay. However, under any of the Action Alternatives, the one-way design hour traffic volumes would be relatively low and would lead to little addition to vehicle delay on roadways in the project study area. Using the same methodology as described for construction, OEA estimates that the used roadway lane capacity during peak hour traffic flow for US 6 would increase by less than 1 percent under both the low rail traffic scenario and the high rail traffic scenario for each Action Alternative. If the Coalition's voluntary mitigation measures and OEA's recommended mitigation measures are implemented (VM-1, VSD-MM-1), OEA concludes that operation of the proposed rail line would not significantly affect roadway delay in the project study area.

Table 3.1-10. Vehicle Traffic during Operations by Action Alternative

	Action Alternative		
Traffic Characteristics	**Indian Canyon**	**Wells Draw**	**Whitmore Park**
Low Rail Traffic Scenario			
Annual trips	1,572	12,522	1,572
AADT	4	34	4
One-way DHV (vehicles per hour)	<1	3	<1
High Rail Traffic Scenario			
Annual trips	38,072	52,672	38,072
AADT	104	144	104
One-way DHV (vehicles per hour)	8	11	8

Notes:
AADT = average annual daily traffic; DHV = design hour volume

Grade-Crossing Safety

Table 3.1-11 shows the estimated overall predicted accident frequency by Action Alternative under the low rail traffic scenario and high rail traffic scenario. Under the low rail traffic scenario, the Indian Canyon Alternative would result in the lowest per-crossing impact on vehicle safety with an average of one estimated accident every 91 years per crossing. The Whitmore Park Alternative and Wells Draw Alternative would follow with an average of one estimated accident every 90 and 83 years per crossing, respectively. Similarly, under the high rail traffic scenario, the Indian Canyon Alternative would result in the lowest per-crossing impact on vehicle safety with one accident every 52 years, followed by Whitmore Park Alternative and Wells Draw Alternative, at 51 and 48 years between accidents, respectively.

Table 3.1-11. Estimated Overall Predicted Accident Frequency by Action Alternative[a]

		Low Rail Traffic Scenario		High Rail Traffic Scenario	
Action Alternative	Number of At-Grade Crossings	Overall Predicted Accident Frequency (per year)	Overall Predicted Intervals between Accidents (years)	Overall Predicted Accident Frequency (per year)	Overall Predicted Intervals between Accidents (years)
Indian Canyon	8	0.088	11.3	0.153	6.5
Wells Draw	27	0.324	3.1	0.559	1.8
Whitmore Park	17	0.190	5.3	0.331	3.0

Notes:
[a] Predicted frequencies and intervals are the sums for all crossings for each Action Alternative.

To ensure that impacts related to safety at at-grade road crossings would be minimized, the Coalition has committed to designing new crossings in consultation with federal, state, and local agencies and the Ute Indian Tribe, to follow standard safety designs for installing proposed warning devices and signs, and to ensure that operators using the rail line comply with federal safety requirements imposed by FRA regarding train operations on the rail line (VM-1, VM-2). In addition, OEA is recommending mitigation measures requiring the Coalition support Operation Lifesaver educational programs in communities along the proposed rail line to help prevent accidents at highway/rail grade crossings and to adhere to FHWA regulations for grade crossing signage (VSD-MM-4, VSD-MM-5). If these mitigation measures are implemented, OEA concludes that impacts related to safety at new at-grade road crossings would not be significant under any of the Action Alternatives.

Grade-Crossing Delay

Table 3.1-12 shows the estimated average delay by Action Alternative under the low rail traffic scenario and high rail traffic scenario. Overall, the Wells Draw Alternative would result in the greatest impact on vehicle delay per crossing followed by the Indian Canyon Alternative, then the Whitmore Park Alternative. Even with such estimated increases in delays, the LOS designation for all new grade crossings along any Action Alternative would be at LOS A, an acceptable LOS with free-flowing traffic. Appendix D, *Grade-Crossing Safety and Delay Analysis*, shows the vehicle delay for each proposed at-grade crossing under the Action Alternatives. If the Coalition's voluntary mitigation measures and OEA's recommended mitigation regarding safe rail operations and the design of new at-grade road crossings is implemented (VM-1, VM-2, VSD-MM-4, VSD-MM-5), OEA concludes that impacts related to vehicle delay at at-grade road crossings would not be significant. Some minor increase in vehicle delay at new at-grade road crossings would, however, be unavoidable.

Table 3.1-12. Estimated Average Increase in Grade-Crossing Delay per Crossing by Action Alternative

		Low Rail Traffic Scenario		High Rail Traffic Scenario	
Action Alternative	Number of At-Grade Crossings	Average Number of Vehicles Delayed per Day[a]	Average Delay in 24-Hour Period (minutes)[b]	Average Number of Vehicles Delayed per Day	Average Delay in 24-Hour Period (minutes)[b]
Indian Canyon	8	1.30	4.07	3.62	11.10
Wells Draw	27	2.42	7.67	6.75	20.89
Whitmore Park	17	1.27	3.99	3.55	10.88

Notes:

[a] An average across all at-grade crossings for each Action Alternative.

[b] An average across all at-grade crossings of delay per stopped vehicle times the number of vehicles delayed.

Downline Study Area

Impacts on vehicle safety and delay in the downline study area would depend on the volume of rail traffic moving on the proposed rail line. The volume of rail traffic on the proposed rail line would, in turn, depend on future market conditions, including future demand for crude oil produced in the Basin. Because the volume of rail traffic on the proposed rail line would be the same for any of the Action Alternatives, downline impacts would be the same, and insignificant, across the three Action Alternatives.

3.1.3.3 No-Action Alternative

Under the No-Action Alternative, the Coalition would not construct and operate the proposed rail line. There would be no increased vehicular traffic as a result of rail line construction activities and there would be no risk of train-related accidents or potential for vehicle delay at at-grade road crossings in the project study area. In the downline study area, the risk of accidents and vehicle delay at at-grade road crossings would not change from baseline conditions.

Under the No-Action Alternative, crude oil produced in the Basin would continue to be transported by truck. Crude oil that currently moves to the Price River Terminal and/or other existing rail terminals by truck would continue to move by truck, and the benefits of the proposed rail line in terms of prevented vehicular accidents would not be realized. If the proposed rail line were not constructed, truck traffic on local roadways could increase in the future, depending on future market conditions, including the price of crude oil. In the absence of a rail alternative to trucking, OEA expects that truck traffic would be most likely to increase along US 191 and other roads on the route between oil production areas in the Basin and the Price River Terminal. Increased truck traffic would increase the risk of traffic accidents and traffic delays along this route.

3.1.4 Mitigation and Unavoidable Environmental Effects

Any of the Action Alternatives would result in impacts on vehicle safety and vehicle delay. In the project study area, impacts would result from the installation of new at-grade road crossings along the Action Alternatives. In the downline study area, impacts would result from increased probability of accidents and increase vehicle delay at existing at-grade road crossings on rail lines that could experience an increase in rail traffic if the proposed rail line were constructed.

Across the three Action Alternatives, the Wells Draw Alternative would involve constructing the most at-grade road crossings and would result in the greatest potential for vehicle accidents and vehicle delays at those new crossings. Because it is the longest Action Alternative, the Wells Draw Alternative would also result in the highest construction-related VMT during the construction period. Because it is the shortest Action Alternative and would require the fewest new at-grade road crossings, the Indian Canyon Alternative would result in the least impacts on vehicle safety and delay.

If the Coalition's voluntary mitigation measures and OEA's recommended mitigation measures are implemented, OEA concludes that impacts on vehicle safety and delay would not be significant (Chapter 4, *Mitigation*). Some impacts, including potential for accidents and delay at new at-grade road crossings in the project study area and an increased potential for accidents and delay at existing road crossings in the downline study area, would be unavoidable.