31 TRANSPORTATION

31.1 Approach

Transportation infrastructure pertains to the system of roadway, rail, and air modes of travel. The Project construction phase would use existing roads and railways or develop new roads to move people, equipment, goods, and materials to and from construction and operational sites, potentially creating traffic delays and affecting road safety.

There is a range of indicators that can be used to assess road transportation effects including traffic volumes, traffic counts, road accident rates, regional road restrictions, and rail movements. All of these factors ultimately affect road users by either changing the speed of travel or changing the conditions that may affect road safety. In order to simplify the analysis and focus on the direct Project effects of changes in road transportation, the key indicators used to assess the effects of the Project on transportation were potential increased traffic delays and number of collisions. Road traffic volumes and road traffic counts were considered in, and form the basis of, estimating traffic delays and the associated effects (Volume 4 Appendix B Project Traffic Analysis Report). Potential changes in road accident rates, expressed as collision frequencies, were also considered and are included in the Project Traffic Analysis Report.

31.1.1 Regulatory and Policy Setting

Two principal highway systems (Highways 97 and 29) connect the Project to the rest of British Columbia and Canada. These major routes, as well as other highways and rural roads in the region, are under the jurisdiction of the British Columbia Ministry of Transportation and Infrastructure (BCMoTI), subject to the provisions of the B.C. *Transportation Act* (2004). The Act governs public works related to transportation, as well as the planning, design, holding, construction, use, operation, alteration, maintenance, repair, rehabilitation, and closing of provincial highways.

Municipalities are responsible for constructing and maintaining the local area road network within their boundaries. The road hierarchy within the network, which usually includes arterials, collectors, and local roads, is defined in the schedules to the municipality's Official Community Plan.

The forestry, oil and gas, and mining industries use and maintain a network of resource roads throughout the region. In B.C., resource roads are administered by a range of provisions found in several different provincial statutes. As of September 2012, the B.C. government was in the process of developing a single Act — the Natural Resource Road Act — that will define consistent regulations and responsibilities pertaining to use, construction, and maintenance.

Transport Canada ensures compliance with federal safety standards and regulations of railway operations under the *Railway Safety Act* for rail transportation within B.C.

Other key legislation that governs land-based transportation in British Columbia includes:

- *British Columbia Railway Act*

- *British Columbia Transit Act*
- *Industrial Roads Act*
- *Commercial Transport Act*
- *Motor Vehicle Act*
- *Transport of Dangerous Goods Act*

31.1.2 Key Issues and Identification of Potential Effects

Project-related activity has the potential to adversely affect the transportation system within the local assessment area (LAA) by creating greater volumes of traffic and exerting more demand on the existing transportation infrastructure. On the road network, users could experience traffic delays and a higher incidence of collisions. Access to and egress from residential, commercial, and First Nations properties close to the affected roadways could also be impeded.

Issues, concerns, and interests identified during consultation with the public, Aboriginal groups, and government agencies guided the scope of the transportation assessment (Volume 1 Section 9 Information Distribution and Consultation). A summary of key issues identified through consultation and the approaches used to address issues are outlined in Table 31.1.

Table 31.1 Key Issues: Transportation

Key Issues	Approach to Addressing Key Issues
Road transportation	
Historic Project design included a permanent crossing of the Peace River, with potential for long-term public use. Some communities wanted public use of the bridge; other communities expressed concern about changes to the existing road network and travel routes	▪ Upgraded Project design no longer requires a permanent crossing of the Peace River; a temporary construction bridge will be used during early construction ▪ Traffic analysis undertaken to identify base case (future without Project) and future "with Project" forecasts of traffic volumes, and corresponding volume, delay, and safety effects (see Volume 4 Appendix B Project Traffic Analysis Report) ▪ Effects that relate to community or road users summarized in transportation analysis
Interruption of resource industry trucks on Jackfish Lake Road due to road upgrades and Project traffic	
Traffic congestion and delays on the Jackfish Lake Road route to the south bank camp site	
Conflict with non-vehicular use of road system (e.g., pedestrian, cycle)	
Traffic congestion on local roads between Ft .St. John and the north bank camp site	
Slight traffic increase on Highway 29 related to minor camp and commuters driving to the dam site	
Traffic congestion and delays on Highway 29, Jackfish Lake Road, and north bank minor roads	
Delayed turning movements at intersections on Highway 97 in Fort St. John and on Highway 29 South	
Standards to which Project-related road construction would be built	

Key Issues	Approach to Addressing Key Issues
Impeded access to/egress from residences and businesses adjacent to affected routes	▪ Issues were used to identify receptors of concern for inclusion in transportation analysis
Non-road transportation	
Greater demand for air and bus transportation to/from the LAA	▪ Issues informed analysis of air and bus transportation
Potential for additional road delays caused by trains stopping in or passing through Chetwynd, if there is an increase in rail use	▪ Issues were used to inform consultation with rail operator and subsequent analysis
Safety	
Increase in risk of vehicular collisions	▪ Road safety analysis undertaken as part of Project Traffic Analysis, to assess change in collision frequency on key routes in LAA
Frequency and severity of fog and ice on highway and airport could increase, exerting new demands on regional transportation system	▪ The potential for increases in fog frequency and density that may affect road safety were analyzed in relation to the formation of the reservoir and changes in downstream water temperature for sites along Highway 29 (Bear Flat, Farrell Creek, Halfway River/Attachie Flat, and Hudson's Hope), and at the Highway 97 Bridge at Taylor (Volume 2 Appendix K Microclimate Technical Data Report); results were assessed in relation to the Project's effect on road safety ▪ The potential for increases in fog frequency that may affect aviation visibility were assessed in Volume 3 Section 26 Navigation
First Nation Concerns	
Increase in traffic and related effects (noise, smells, vibration, dust) in the various construction and borrow material locations (Project activity zones) may affect Treaty 8 First Nations' enjoyment of the land Increase in Project-related activity could affect harvesting success, as wildlife would be disturbed Increased noise during construction of Site C (e.g., transporting materials) would exacerbate already noisy conditions in Doig River First Nation, Halfway River First Nation, and West Moberly First Nations traditional lands Reduced area available for meaningful practice of Treaty 8 rights; reduced "quiet enjoyment of the land" (Treaty 8 Tribal Association)	▪ Changes to noise and vibrations due to the Project are described in Section 11.12 Noise and Vibration in Volume 2 Section 11 Environmental Background and in Volume 2 Appendix M Noise and Vibration Technical Data Report ▪ Volume 3 Section 24 Harvest of Fish and Wildlife Resources considers changes in reported tenured trapline harvest volumes ▪ Noise and traffic effects on wildlife are assessed in Volume 2 Section 14 Wildlife Resources ▪ First Nations' concern with reduced area for practice of Treaty 8 rights and enjoyment of land is discussed in Volume 3 Section 19 Current Use of Land and Resources for Traditional Purposes and Volume 5 Section 34 Asserted or Established Aboriginal Rights and Treaty Rights, Aboriginal Interests, and Information Requirements
Concerns regarding realignment of Highway 29 limiting access to traditional territory; new roads and Highway 29 realignment could increase access for Treaty 8 First Nations and larger numbers of non-Aboriginal recreational users (Treaty 8 Tribal Association)	▪ First Nations' concern regarding changes to access to traditional territory and greater non-Aboriginal use of traditional lands is discussed in Volume 3 Section 19 Current Use of Lands and Resources for Traditional Purposes ▪ The realignment of Highway 29 and the development of access roads for the Project is described in Section 4 Project Description ▪ Clearing activities are described in Section 4.3 in Volume 1 Section 4 Project Description, and in Volume 1 Appendix A Vegetation, Clearing, and Debris Management Plan

Key Issues	Approach to Addressing Key Issues
Request for description of new connections to existing side roads, including rationale for any proposed abandonment of road sections above the reservoir flood level; access affects maintenance of traditional land use patterns, including hunting, trapping and fishing (McLeod Lake Indian Band)	▪ First Nations' concerns regarding changes to access to traditional territory and potential effects on Aboriginal use of traditional lands are discussed in Volume 3 Section 19 Current Use of Lands and Resources for Traditional Purposes ▪ Traffic volumes and patterns are addressed in Volume 4 Appendix B Project Traffic Analysis Report ▪ Description of new connections to existing roads is described in Section 4.3 in Volume 1 Section 4 Project Description

Potential project interactions with transportation are summarized in Volume 2 Appendix A Project Interactions Matrix, Table 2. As defined in Volume 2 Section 10 Environmental Assessment Methodology, a "2" ranking is assigned where an interaction may result in an adverse effect and the nature of the effect or the effectiveness of mitigation measures is uncertain. These interactions were taken forward through the effects assessment.

Project interactions with a ranking of "2" are summarized in Table 31.2.

Table 31.2 Interactions of the Project with Transportation

Project Activity and Physical Works	Key Aspects	
	Changes to Road Delays	Changes to Road Safety
CONSTRUCTION		
Dam and generating station construction		
Transportation of construction materials and supplies	✓	✓
Reservoir preparation and filling		
Transport of merchantable timber away from the reservoir area by truck	✓	✓
Highway 29 realignment	✓	✓
Construction access roads		
Jackfish Lake Road works, including Project access road	✓	✓
Old Fort Road Realignment, improvements to 240 Road and 271 Road, and extension of 269 Road	✓	✓
Worker accommodation		
Supply and transportation of goods and services for camps	✓	✓
In-community accommodation	✓	✓
Temporary accommodation – northern regional site	✓	✓
Temporary accommodation – southern regional site	✓	✓
Temporary accommodation – dam site	✓	✓
RV Parks	✓	✓
OPERATION		
Reservoir and generating station operations	-	✓

NOTE:
Only Project interactions ranked as "2" in Volume 2 Appendix A Project Interactions Matrix, Table 2 are carried forward to this table. A ✓ indicates that a project component or activity is likely to interact with transportation.

31.1.3 Standard Mitigation Measures and Effects Addressed

With reference to Volume 2 Appendix A Project Interactions Matrix, Table 2, a "1" ranking was given where an adverse effect may result from an interaction, but standard mitigation measures to avoid or minimize the potential effects are available and well understood to be effective, and any residual effect is negligible. A "0" ranking was given where no interaction is predicted between a Project component and a VC. These interactions were not carried forward through the effects assessment. Interactions with a ranking of "1" are discussed in this section, along with the rationale for that ranking.

For construction activities, a "1" ranking was assigned to:

- Construction and improvement of transmission system access roads
- Use of existing CN rail service
- Use of the North Peace Regional airport

The design of Project- related upgrades to public roads would be in accordance with applicable British Columbia and Canadian guidelines, codes, supplements, and technical circulars. Upgrades to provincial and municipal public roads would improve upon existing conditions. Temporary construction service roads will be designed in accordance with applicable standards for operational equipment and other applicable guidelines. Traffic Management Plans will also be developed and adhered to throughout the construction and operations phases (Volume 5 Section 35 Summary of Environmental Management Plans).

The effects of Project use on the existing CN Rail service to deliver materials and equipment during construction was analyzed as part of the transportation of construction materials and supplies in the interaction matrix. The rail subcomponent is ranked as a "1" for the following reasons. Discussions between CN Rail and BC Hydro to date indicate that the Project rail use requirement could be up to one train per day during construction, and that this could be accommodated within existing freight service levels by adding incremental railcars, or adding a train if warranted. Because the Project's potential requirements for rail can be accommodated by an existing rail provider and using existing infrastructure, the assessment of Project changes to rail transportation was not assessed further.

Communities have identified a concern with increased passenger use of the North Peace Regional airport due to the construction workforce travelling between shifts. This was considered in the interaction matrix as a subcomponent of worker accommodation. In the peak Year 5 of construction, maximum passenger volumes are estimated at approximately 100 persons inbound and approximately 100 persons outbound weekly (Volume 4 Appendix B Project Traffic Analysis Report). The region's population and economic growth will also contribute to airport passenger increases. Airport management has indicated that the airport would be able to support this incremental user demand, that added demand would be met by commercial or charter airlines adding flight capacity (e.g., increasing size or frequency of flights), and that the airport management wants increased passenger use of the airport (North Peace Regional airport, Managing Director 2012, pers. comm.). The airport has also recently announced that the airport improvement fee increased by $6 to $18 as of December 2012. Airport improvement fees are a user-pay system, so any Project-related use of the airport would include payment of these fees to support the airport's operations and capital investment

plans (Fisher 2012). Commercial carriers and charter carriers would continue to co-ordinate the timing of arrivals and departures to minimize congestion within the airport facility and on the tarmac, including any additional flights over current schedules. Through these mechanisms, the existing airline, market, and infrastructure could respond to the increased demand, resulting in a Project interaction of “1”.

Regional road restrictions caused by the thawing of the road base during the spring are employed in the Peace region and take effect on the roads that will be used to move people, equipment, goods, and materials. Contractors will be required to abide by road restrictions imposed by the road authority; therefore, any potential consequence related to regional road restrictions was not explicitly considered in the analysis.

For operations activities, a “1” ranking was assigned to activities associated with the operation of the powerhouse, substation, and reservoir, including downstream water management and the maintenance of access roads for the transmission line, because associated traffic volumes would be small.

During operations the local road system would be used for commuting workers, and for equipment and deliveries. Approximately 50% of the 25-person operational workforce would live locally and commute daily to and from the dam site. The incremental volume of road traffic from the operational workforce commuting is negligible compared to background volumes during operations; therefore, transportation effects during operations are deemed a “0” and are not assessed further.

The public have also raised concerns about effects on aviation visibility during operations, caused by increase in fog frequency and density at the North Peace River Regional airport arising from the existence of the reservoir. Potential Project effects on airport operations, land use in the vicinity of the airport, and potential changes in visibility are addressed in Volume 3 Section 26 Navigation.

All other Project activities and works listed in Table 2 of Volume 2 Appendix A Project Interactions Matrix were ranked as “0” either because the activities are minor works and activities that do not interact with transportation, have no overlap in time and space with transportation, or have been evaluated at the Project or component level.

31.1.4 Selection of Key Indicators

The potential to adversely affect transportation will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Road transportation in the LAA proposed for the Project
- The need to develop and use regional road transportation routes for the Project
- Specific transportation plans proposed for the Project
- Local road and rail traffic forecasts
- Assumptions in changes in population, workforce accommodation, and shift schedules

The key aspects were considered using analysis of Project effects on changes to road traffic forecasts, changes in road safety (collisions), and changes in fog that may affect road conditions and safety.

Key indicators for potential transportation effects, as well as rationale for their inclusion, are summarized in Table 31.3. Traffic volumes, regional road restrictions, and hours of fog are all indicators that link to traffic speed (traffic delays) and road safety (number of collisions per year). To streamline the evaluation, the effects assessment identifies changes in traffic volumes and, where appropriate, the number of fog hours, but traffic delay and accident rates (expressed as collision frequencies) are used as the key indicators.

Table 31.3 Key Indicators for Transportation

Key Aspects	Key Indicators	Rationale for Selection of the Key Indicators [a]
Change in local road traffic forecasts (considering road transportation, road use, road development, and transportation plans proposed for the Project)	Road traffic volumes Road traffic counts Regional road restrictions Traffic delays – seconds per vehicle	▪ Project-related traffic could create incremental delays for local drivers, and could change driving conditions ▪ Project-related traffic volume could impede access to and egress from residences and businesses adjacent to route
Change in road safety collisions per year (considering change in local road traffic forecasts and Project road development)	Road accident rates, expressed as number of collisions per year	▪ Project-related traffic could increase risk of collisions over and above base case levels
Change in road safety due to increased fog hours on roads (considering changes during operations due to changed microclimate)	Number of normal and heavy fog hours per year	▪ Fog can result in poor visibility for drivers, which can slow down traffic or increase accidents ▪ The reservoir may cause localized changes in fog conditions due to changes in water temperature

NOTE:
[a] Includes input from consultation with regulators, Aboriginal groups, and the public, as well as regulatory guidelines, policies and programs

31.1.5 Spatial and Temporal Boundaries

31.1.5.1 Spatial Boundaries

The LAA for transportation is defined in the EIS Guidelines as the road and rail networks within the Project activity zone, including the surrounding road networks that would be used during construction. The segment of Highway 97 between Taylor and Dawson Creek was added to the LAA during the assessment because of the potential commuter volumes anticipated from the Peace River Regional District, including Taylor and Dawson Creek. The North Peace Regional airport was added to the assessment, and therefore the LAA, in response to public interest in Project use of the airport.

The Regional Assessment Area (RAA) comprises the Peace River Regional District (PRRD), which encompasses a broader area and its major road networks. Other projects and activities within this larger area would use many of the same major road networks as the Project.

LAA and RAA spatial boundaries are presented in Figure 31.1 and outlined in Table 31.4.

Table 31.4 Spatial Assessment Area for Transportation

Local Assessment Area	Regional Assessment Area
Road and rail network within the Project activity zone and Highway 97 between Taylor and Dawson Creek, and the North Peace Regional airport	Peace River Regional District

31.1.5.2 Temporal Boundaries

The temporal boundary for the assessment is the Project construction and operations phases. During the construction phase, most transportation-related activities would occur. During the operations phase, there would be very little incremental traffic; however, the reservoir water temperatures, and any changes to downstream water temperature, may result in changes to annual fog hours on local roads over baseline conditions without the reservoir.

The timing of the construction phase, construction components, and activities are described in Section 4.3 in Volume 1 Section 4 Project Description. The activities for each Project component that would interact with transportation and the time during which the interactions would occur are as follows:

- Dam, generating station and spillways:
  - Transport of material and equipment: Years 1 to 8
- Reservoir:
  - Reservoir clearing: Years 1 to 4
  - Transport of merchantable timber away from the reservoir area by truck: Years 1 to 4
- Substation and transmission line to Peace Canyon
  - Construction and improvement of access roads: Year 3
- Highway 29 Realignments: Years 2 to 6
- Quarried and Excavated Construction Materials: Years 1 to 8
- Road and Rail Development:
  - Project access road construction: Years 0 to 1
  - Old Fort Road Realignment, improvements to 240 Road and 271 Road, and extension of 269 Road: Years 0 to 1
- Worker Accommodation:
  - Workforce commuting to project site: Years 0 to 8
- Reservoir – Operations: All years

The peak year of Project construction traffic for each specific activity is focused on for the transportation assessment, in order to characterize the year in which the greatest

Project-related activities occur. This is also consistent with the Project Traffic Analysis report (Volume 4 Appendix B Project Traffic Analysis Report).

31.2 Information Sources and Methodology

31.2.1 Literature Review

The following Project and transportation planning information was used as inputs into this assessment:

- Section 4.3 in Volume 1 Section 4 Project Description
- A roads aggregate summary that quantifies the aggregate and rock requirements for the Project, and identifies their likely sources (Volume 1 Appendix C Draft Construction Materials Development Plans)
- Section 11.10 Microclimate in Volume 2 Section 11 Environmental Background
- Volume 4 Appendix B Project Traffic Analysis Report
- Roadway Safety Engineering Study in Volume 4 Appendix B Project Traffic Analysis Report
- Ministry of Transportation and Infrastructure: road restrictions 1991–2011
- Fort St. John road restrictions 1991–2011
- Ministry of Transportation and Infrastructure: traffic count data
- City of Fort St. John: transit ridership data

31.2.2 Interviews

Phone and in-person interviews were carried out between December 2011 and April 2012 with BCMoTI, CN Rail, City of Fort St. John, District of Hudson's Hope, District of Taylor, and Greyhound Canada in Fort St. John. Fort St. John and Hudson's Hope community representatives provided information on growth in traffic volumes and on road and transportation issues.

Volume 4 Appendix A Social Assessment Supporting Documentation, Part 1 Social Assessment Interview Methodology outlines details on interview methodology.

In addition, throughout the planning for Project roads, BC Hydro has worked with BCMoTI to understand their interests, concerns, and requirements with respect to Project road use and road improvements.

31.2.3 Field Investigations

A site visit was carried out in December 2011 to investigate principal routes within the LAA, including Highway 29 North, Highway 97, and the north bank minor roads. In November 2011, a site visit was carried out to Jackfish Lake Road. Traffic counts were undertaken in 2011 and 2012 (described in Volume 4 Appendix B Project Traffic Analysis Report).

In addition, throughout the planning for Project roads, BC Hydro has undertaken technical field investigations to support the planning for Project road development (Section 4.3 in Volume 1 Section 4 Project Description).

31.2.4 Methodology

The baseline for the LAA was assessed using information drawn from the foregoing sources of information and from the Project Traffic Analysis (Volume 4 Appendix B Project Traffic Analysis Report).

For the effects assessment, the delay and safety effects of transportation changes within the LAA were assessed for the construction period. The traffic forecasts and information on delays and accident rates were obtained from the Project Traffic Analysis, which includes the Road Safety Engineering Study Report. The analysis was undertaken for each of the roadways that would be affected by Project transportation activity, specifically on segments of Highway 29, Highway 97, Jackfish Lake Road, and the north bank minor roads.

31.3 Baseline Conditions

31.3.1 Existing Conditions

31.3.1.1 Road Network

Table 31.5 lists the roads in the LAA that would be utilized by Project-related traffic, and the Project activity expected to occur on each road.

Table 31.5 Existing Major Highways and Road Segments to be Utilized by the Project

Road Segment	Length (km)	Project Activity
Highway 29 North between Hudson's Hope and Fort St. John	82.2	Road realignment, workforce commuters, log hauling
Highway 29 South between Chetwynd and the Jackfish Lake Road intersection	3.6	Hauling equipment and materials to south bank, workforce commuters, log hauling
Jackfish Lake Road	47.2	Hauling equipment and materials to south bank, workforce commuters Log hauling
Project access road	37	Hauling equipment and materials to south bank, workforce commuters, transmission line construction
North Bank Minor Roads:		
269 Road	0.9	Hauling equipment and materials to north bank, workforce commuters Log hauling
240 Road	1.6	
Old Fort Road	5.6	
271 Road	5.9	
85th Avenue	2.5	
North between Fort St. John and Dawson Creek, and north to intersection with Highway 29	75.6	Hauling equipment and materials to north bank, workforce commuters
Highway 97 South, in Chetwynd and west	63.6	Hauling equipment and materials to south bank, workforce commuters

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

Highway 97 is a main highway of the B.C. Interior highway system, extending from the U.S. border, through the Okanagan to Quesnel, Prince George, Chetwynd, Fort St. John, and on to the Yukon border and Alaska. It serves both industrial and commuter traffic. The transportation assessment focuses on two areas of Highway 97: one between Chetwynd and West Pine Quarry, located 75 km to the west; and the second, the stretch of Highway 97 between Dawson Creek, through to the intersection of Highway 29 near the community of Charlie Lake and west of Fort St. John.

Highway 29 is a regional highway that connects the communities of Tumbler Ridge, Chetwynd, Moberly Lake, Hudson's Hope, and Fort St. John, crossing Highway 97 in Chetwynd and at Charlie Lake. It serves industrial truck traffic and commuter traffic.

Jackfish Lake Road extends north from its junction with Highway 29 near Chetwynd, with public access terminating 30 km southwest of the proposed dam site at its intersection with Petroleum Development Road PDR#69A. Beyond this point, for another 30 km toward the proposed Site C dam site, is a network of resource roads currently leased to, and operated by, oil and gas developers and forestry companies under various lease agreements. This section of road provides primary access for the oil and gas, forestry, and agriculture industries active in the region north of Chetwynd and south of the Peace River, and is used heavily by resource industry truck traffic.

The main road networks in the LAA and surrounding area are illustrated in Figure 31.1. A series of local roads used primarily by residents of the community is situated on the north bank of the Peace River and south of Highway 97 in the vicinity of Fort St. John

(hereinafter referred to as the north bank minor roads), connecting the Highway 97 corridor to the proposed Site C dam site.

Figure 31.2 illustrates the north bank minor roads (the local road networks are described in more detail in Volume 4, Appendix A Social Assessment Supporting Documentation, Part 7 Transportation Baseline).

The following baseline traffic information is drawn from a variety of public sources, and is not stratified according to the road networks identified in Table 31.5. These data are intended to provide a general context only.

31.3.1.2 Traffic Volumes and Traffic Counts

Table 31.6 shows past annual average daily traffic (AADT) at the two BCMoTI permanent count stations in the LAA. Route 97 is one of the key road networks addressed in Table 31.5 above, while Highway 2 lies outside of the LAA, but is an industrial route that extends southeast from Dawson Creek to Grande Prairie in Alberta, and therefore it provides insight into traffic volumes entering the LAA from the east. The variation in traffic volumes between 2006 and 2010 reflects the cyclical nature of economic activity in the region's resource industries amidst fairly constant population growth. Highway 2 serves triple the volume of Highway 97's traffic.

More detailed 2011/2012 traffic data for Highway 97, Highway 29, Jackfish Lake Road. and the north bank minor roads are presented in Volume 4, Appendix A Social Assessment Supporting Documentation Part 7 Transportation Baseline.

All the roads evaluated within the LAA are rural in nature, with a generally high Level of Service, as defined in Section 31.4.1 below and in Volume 4 Appendix B Project Traffic Analysis Report. The Project Traffic Analysis report has determined that Highway 97 has sufficient capacity to absorb additional traffic.

Table 31.6 Annual Average Daily Traffic at BCMoTI Permanent Count Stations on Major Regional Highways, 2006 to 2010

Highway	AADT (vehicles per day)				
	2006	2007	2008	2009	2010
Route 97 – John Hart Highway west of Chetwynd at Willow Flats (P-43-2NS)	1,172	1,097	1,065	997	1,348
Highway 2 North of B.C./Alberta Border (P-43-1NS)	3,505	3,313	3,544	3,613	3,984

NOTES:
Includes all types of traffic
Source: BCMoTI (2011)

31.3.1.3 Road Accident Rates and Road Safety

The frequency of collision and the frequency of victims of collisions for the period 2002 through 2011 for the LAA, PRRD, and B.C. are shown in Figure 31.3. Collision rates and victim collision rates for the same duration and areas are shown in Figure 31.4. Collision data, based on police-reported collision data from the BCMoTI's Collision Information System, are only available for those roads and highways that have a BCMoTI Land Kilometre Inventory (LKI) reference. Included in the PRRD roads are provincial highways

within the BCMoTI's Peace District. The following roads are not included, as collision data are not available from the BCMoTI's Collision Information System: Jackfish Lake Road, 269 Road, 240 Road, Old Fort Road, 271 Road, and 85th Avenue. Within the data, a collision victim is defined as anyone who is killed or injured in a collision, as reported in the RCMP's MV6020 collision report form.

As illustrated in Figure 31.3, the collision frequency trends for the LAA, PRRD, and provincial data are quite similar, with the collision frequency rising from 2002 to a peak in 2006 and then declining to 2010. The trend for the victims of collisions between the three data sets is also quite similar, with the frequency of victims remaining constant from 2002 to 2006, after which there is a decline in collision victims to 2010. In 2011, which is the last full year of data availability, there appears to be a difference in the data, with the B.C. data (collision and victim frequency) continuing to decline, while the LAA and PRRD data (collision and victim frequency) show an increase.

As illustrated in Figure 31.4, collision rates and victim collision rates, defined as collisions per million vehicle kilometres (Coll./MVkm), is higher for the roadways within the LAA over the 10-year analysis period when compared to collision rates for the province or the PRRD. Similarly, the collision rate for the PRRD is higher than the provincial collision rate benchmark over the 10-year analysis period. The exception is in the year 2010, when the collision rates between all three areas become relatively similar. The collision rate trends for the provincial data, the PRRD, and the LAA are somewhat similar, with the collision rates rising in 2002 and remaining high until 2006, after which the collision rates start to decline rapidly to 2010. In 2011, which is the last full year of data availability, there appears to be a difference in the collision rate trend, with the B.C. data (collision and victim frequency) continuing to decline, while the PRRD and LAA data (collision and victim rates) show a meaningful increase.

Within the past five years, several initiatives have been undertaken to help to improve road safety, including:

- Creating four lanes on Highway 97 in the vicinity of Fort St. John
- Shoulder rumble strips on the Highway 97 corridor in Fort St. John
- Intersection improvements at 100th Avenue and 102nd Street in Fort St. John

Heavy industrial traffic loads in the PRRD exacerbate deteriorating road conditions. In the past 10 years, the Province has rehabilitated the secondary road network in the northeast through hard-surfacing of key corridors to improve road safety, support industry growth, and facilitate traffic movement to and from regional service centres. A gravelling program was instituted to restore year-round access to residents whose roads had collapsed under the weight of frequent and heavy industrial traffic. The provincial government has also made major investments by widening Highway 97 in the Fort St. John area (mentioned above) and hard-surfacing subdivision roads to reduce dust and improve access to rural neighbourhoods.

31.3.1.4 Number of Fog Hours

The hours of normal fog (visibility less than 1,000 m) and heavy fog (visibility less than 500 m) respectively for locations near Fort St. John and Taylor and along Highway 29 are outlined in the Microclimate Report (Volume 2 Appendix K Microclimate Technical Data Report). These are the locations where increased fogging on local roads due to the reservoir operation could occur. Baseline climate data were collected at a series of

climate stations installed by BC Hydro throughout the Peace River Valley within the LAA. As the formation of the reservoir would have potentially localized potential temperature change effects, that may increase fog and affect road safety, data collection was undertaken at those climate stations adjacent to the reservoir and river downstream.

The data show that the greatest number of hours of fog and heavy fog occurs during the fall and winter months at all locations. Over the course of the year, the Site C dam location experiences approximately 1,375 hours of fog, and all remaining locations experience between 1,300 to 1,100 hours per year. Heavy fog per year is between 1,075 to 1,275 hours per year for all locations.

31.3.1.5 Regional Road Restrictions

Load restrictions or “road bans” are instituted each spring during the thaw on local and secondary roadways to protect the road base. When a ban is in effect, road users are restricted to a maximum of 70% to 100% of legal axle loading. Commercial and industrial transport companies curtail their trucking during this period to avoid potential financial losses. The movement of oil and gas drilling rigs, log hauling, spring planting, and livestock hauling are all affected by these bans (Volume 4 Appendix B Project Traffic Analysis Report).

The date and length of time that a road ban is in force depends on weather conditions, depth of frost, road conditions, air temperature, and other site-specific factors. The bans have been enforced as early as mid-March and, on rare occasions, have extended into early July. Over the past 10 years, the average road ban has lasted 78 days.

31.3.2 Road Transportation Outlook

In the absence of the Project, future AADT growth in the LAA is expected to occur at the same rate as the average growth rate over the last two decades. This forecast is based on the assumption that economic and industrial growth, driven by ongoing developments in the oil and gas and mining sectors, will proceed at the same pace as it has during the past two decades. Background traffic projections to the year 2035 have been prepared for road segments where Project effects on transportation could occur, including Highway 29, Jackfish Lake Road, the roads of the north bank near the Site C dam site, and Highway 97 (Volume 4 Appendix B Project Traffic Analysis Report). For this evaluation, only the first 25 years of background traffic projections are used.

As shown in Table 31.7, background traffic is predicted to grow on Highway 29 between Fort St. John and Hudson’s Hope at 1.4% annually between 2010 and 2025 (Volume 4 Appendix B Project Traffic Analysis Report). With a large percentage of traffic on Highway 29 continuing to be commuter traffic, it is estimated that daily patterns would continue to be typical of urban travel patterns, with morning and afternoon directional peaks.

Table 31.7 Annual Average Daily Traffic Forecasts for Highway 29 Background Traffic Projections by Segment

	AADT (vehicles per day)							
Location	**2010**	**2011**	**2012**	**2013**	**2014**	**2020**	**2025**	**Projected AADT Growth Rate (%)**
Highway 29 north of Canyon Drive (Hudson's Hope)	1093	1112	1131	1149	1168	1281	1375	1.4
Highway 29 west of Lynx Creek realignment	699	711	723	735	747	819	879	1.4
Highway 29 east of Farrell Creek realignment	735	748	761	773	786	862	925	1.4
Highway 29 east of Halfway River and Bear Flat realignments	848	862	877	891	906	993	1066	1.4

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

As illustrated in Table 31.8, background AADT is predicted to grow on Jackfish Lake Road at 1.5% annually between 2010 and the year 2025, reflecting growth in industrial traffic related to the resource sector (Volume 4 Appendix B Project Traffic Analysis Report). The heaviest traffic flows would continue to be on the southern portion of this route, with much lower volumes north of the Jackfish Lake Road T-intersection to the Del Rio Pit. Resource industry and agricultural users would continue to be the primary users.

Table 31.8 Annual Average Daily Traffic Forecasts for Jackfish Lake Road Background Traffic Projections by Segment

	AADT (vehicles per day)							
Location	**2010**	**2011**	**2012**	**2013**	**2014**	**2020**	**2025**	**Projected AADT Growth Rate (%)**
Highway 29 to north of Calliou Road (km 0–12)	1,119	1,138	1,158	1,177	1,197	1,313	1,411	1.5
Jackfish Lake Road north of Calliou Road to Old Jackfish Road	559	569	579	589	598	657	705	1.5
Jackfish Lake Road: Old Jackfish to T-Intersection	382	388	395	402	408	448	481	1.5
Jackfish Lake Road: T-Intersection to west end	191	194	197	201	204	224	241	1.5
Jackfish Lake Road: west end to 400 Road @ T line	191	194	197	201	204	224	241	1.5
Project access road: west end to dam site	0	0	0	0	0	0	0	N/A

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

Annual average daily traffic without the Project is predicted to grow on the north bank minor roads at 1.4% annually between 2010 and the year 2025, with the greatest

concentration of traffic on 242 Road west of Old Fort Road, and Old Fort Road south of 242 Road (Table 31.9) (Volume 4 Appendix B Project Traffic Analysis Report). The same mix of residential, commercial, and landfill traffic is expected to continue, reflecting a continuation of the same general level of economic and social activity.

Table 31.9 Annual Average Daily Traffic Forecasts for Local North Bank Minor Roads' Background Traffic Projections

	AADT (vehicles per day)							
Location	**2010**	**2011**	**2012**	**2013**	**2014**	**2020**	**2025**	**Projected AADT Growth Rate (%)**
242 Road west of Old Fort Road	2185	2226	2266	2307	2347	2591	2794	1.4
Old Fort Road south of 242 Road	2281	2323	2366	2408	2451	2705	2917	1.4
Old Fort north of 240 Road	541	551	561	571	581	641	692	1.4
Old Fort south of 240 Road	428	436	444	452	460	507	547	1.4
240 Road west of Old Fort Road	261	266	271	276	281	310	334	1.4
269 Road south of 240 Road	324	330	336	342	348	384	414	1.4
269 Road south of 242 Road	943	961	978	996	1014	1119	1206	1.4
85 Avenue west of 100 Street	1114	1135	1156	1176	1197	1321	1425	1.4

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

In the absence of the Project, Highway 97 North is expected to continue serving as a major transportation corridor within the LAA, with a predicted annual AADT growth rate of 1.4%. Projections of background traffic to the year 2025 for Highway 97 North are provided in Table 31.10.

Table 31.10 Annual Average Daily Traffic Forecasts for Highway 97 North Background Traffic Projections

	AADT (vehicles per day)							
Location	**2010**	**2011**	**2012**	**2013**	**2014**	**2020**	**2025**	**Projected AADT Growth Rate (%)**
At Highway 29 south of Charlie Lake	6,477	6,597	6,718	6,838	6,963	7,710	8,284	1.4
East of 271 Road	13,561	13,813	14,065	14,317	14,570	16,083	17,344	1.4
East of 85th Avenue	14,728	15,002	15,276	15,550	15,824	17,467	18,836	1.4
South of 72nd Street	5,693	5,799	5,905	6,011	6,117	6,752	7,281	1.4

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

Projections of future AADT growth in background traffic for Highway 97 South are provided in Table 31.11, based on a predicted growth rate of 1.5%. Lower traffic volumes are apparent on the rural portions of Highway 97 southwest of Wildmare Road to the west of Chetwynd. The more developed areas closer to Chetwynd on the approach to the intersection with Highway 29 can be seen to have heavier volumes. A large proportion of this would be resource industry traffic (Volume 4 Appendix B Project Traffic Analysis Report).

Table 31.11 Annual Average Daily Traffic Forecasts for Highway 97 South Background Traffic Projections

	AADT (vehicles per day)							
Location	**2010**	**2011**	**2012**	**2013**	**2014**	**2020**	**2025**	**Projected AADT Growth Rate (%)**
West of Wildmare Road	1,169	1,190	1,210	1,230	1,254	1,387	1,474	1.5
West of Highway 29 (urban)	5,947	6,050	6,153	6,257	6,366	6,998	7,498	1.5
Highway 29 north of Highway 97 (urban)	6,981	7,103	7,224	7,346	7,473	8,214	8,802	1.5

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.3.2.1 Road Infrastructure Improvements

The provincial government has committed to improving and maintaining the regional road infrastructure in support of the region's growing resource industry (BCMoTI 2012). In July 2011, the B.C. government announced long-term plans to widen Highway 2 between the Alberta border and Dawson Creek, and Highway 97 North between Dawson Creek and Fort St. John, and allocated $4 million in 2012 fiscal year to prepare seven projects for construction along these routes. Nearest the Project site, improvements underway on Highway 97 include:

- Highway 97: widen to four lanes at the bottom of the South Taylor Hill (2 km)
- Highway 97: construct northbound passing lane at Farmington Fairways

The province has also committed to rehabilitating the existing public road system in northeast B.C. to reduce seasonal road restrictions and to prolong the winter drilling season for oil and gas exploration. Roadways to the Central Interior will also be improved to increase the opportunity for suppliers from this area to provide equipment, facility components, and construction materials to the oil and gas industry in the Peace region.

31.4 Effects Assessment

The effects on transportation are assessed by taking into account the potential for change in the following key aspects:

- Road transportation in the LAA proposed for the Project
- The need to develop and use regional road transportation routes for the Project

- Specific transportation plans proposed for the Project
- Local road and rail traffic forecasts
- Assumptions in changes in population, workforce accommodation, and shift schedules

The effects assessment focuses on road transportation. As stated in the Standard Mitigation Measures and Effects Addressed section, the Project's use of rail and air would be within the existing capacity and infrastructure of the rail network.

An increase in traffic volumes can lead to changes in transportation delay and safety. Road users would generally experience changes in travel times (delays) and collisions in proportion to the incremental traffic volumes attributable to Project construction. Volume forecasts described in terms of AADT for peak years of construction, consistent with standard practice, were used as input information to assess potential delay and safety effects.

Existing traffic was measured and background future traffic forecasts were made over the construction period. Project traffic forecasts were then made using a two-step process. First, traffic generated by the following Project components and activities was calculated: workforce transportation, bulk materials movement, materials and equipment, clearing, transmission lines, Highway 29 realignment, and the Hudson's Hope shoreline protection. Second, traffic from each of these different activities was aggregated along the various roadway segments. This aggregated Project traffic was then added to background traffic to create a forecast of total with Project traffic for comparison with the background traffic.

Traffic operations at important intersections within the various segments were presented in terms of a Level of Service (LOS) scale typically used by the transportation industry, which varies from a LOS A, representing little delay, to LOS F, representing much delay (see Section 31.4.1 below). Safety was presented in terms of collisions per year and total collisions over the Project's construction period (see Volume 4 Appendix B Project Traffic Analysis Report).

Table 31.12 defines the road segments, the Project activities, and timing anticipated on each segment as well as the incremental traffic volumes for key road segments for peak years. Forecasts show that traffic volume changes would vary widely, from less than 2% on Highways 29 and 97 near Chetwynd, to approximately 60% to 80% on Old Fort Road, 240 Road and 269 Road near the Site C dam site.

Table 31.12 Projected Peak Year Traffic Volumes on Key Road Segments in the LAA

Road Segment	Project Activities and Timing	Project-Related Traffic Volume Changes
Highway 29 North		
Highway 29 from Hudson's Hope to Fort St. John	Activities: commuters driving from Hudson's Hope and Fort St. John to Project sites, highway reconstruction and reservoir clearing Timing: Years 2 through 6 Peak Year: 5	In peak year, Project-related traffic would range from 3% of total traffic near Cache Creek (29 out of 1,008 vehicles per day) to 8% on the western approach to Lynx Creek (73 vehicles out of 880 per day)

Road Segment	Project Activities and Timing	Project-Related Traffic Volume Changes
Hudson's Hope	Activities: delivery of riprap and off-site material for shoreline protection via Highway 29, Canyon Drive and Clarke Avenue Timing: Years 5 and 6 Peak Year: 5 (Canyon Drive) and Year 6 (Clarke Avenue)	In peak year, contribution of Project-related traffic would be 6% of total traffic levels on Canyon Drive and 3% on Clarke Avenue Heavy vehicle turning movements onto and off of shoreline protection berm construction access roads
Highway 29 South		
Highway 29 South (Chetwynd to Jackfish Lake Road intersection)	Activities: Project-related commuter traffic from Chetwynd by shuttle to dam site, as deemed necessary; transporting West Pine Quarry riprap, materials, and equipment to south bank dam site; transporting merchantable timber from reservoir clearing operations Timing: Years 0 through 8 Peak Year: 7	In peak year, Project-related traffic would be about 1% of the total traffic on the eastern approach to Chetwynd (90 of 8,407 vehicles per day)
Jackfish Lake Road		
Southern portion of Jackfish Lake Road	Activities: Project-related commuter traffic from Chetwynd by shuttle to dam site, as deemed necessary; transporting West Pine Quarry riprap, materials and equipment to south bank dam site; transporting merchantable timber from reservoir clearing operations Timing: Years 0 through 7 Peak Year: 7	In peak Year 7, Project-related traffic would account for 7% of total traffic (102 of 1,435 vehicles per day) at the southern portion of Jackfish Lake Road; further north between the terminus of Old Jackfish Lake Road and the T intersection, Project traffic would account for 18% of total Maximum frequency of one vehicle every 52 seconds in the peak direction
Northern end of Jackfish Lake Road (T intersection to west end)	Activities: Project-related commuter traffic from Chetwynd by shuttle to dam site, as deemed necessary; transporting West Pine Quarry riprap, materials and equipment to south bank dam site; transporting merchantable timber from reservoir clearing operations Timing: Years 0 through 8 Peak Year: 1	In peak Year 1, Project-related traffic between the T intersection and the west end would comprise 35% of total traffic (108 of 315 vehicles per day)
Project access road	Activities: Project-related commuter traffic from Chetwynd by shuttle to dam site, as deemed necessary; transporting West Pine Quarry riprap, materials and equipment to south bank dam site; transporting merchantable timber from reservoir clearing operations Timing: Years 0 through 8 Peak Year: 7	Between the west end of Project access road and the dam site, project traffic would comprise 100% of all traffic during the peak year Maximum frequency of one vehicle every three minutes

Road Segment	Project Activities and Timing	Project-Related Traffic Volume Changes
North Bank Minor Roads		
Old Fort Road south of 242 Road	Activities: Project-related traffic commuter traffic from north bank communities and points east; transporting Wuthrich Quarry riprap, materials and equipment to north bank dam site; transporting merchantable timber from reservoir clearing operations; road improvements Timing: Years 0 to 8 Peak Year: 5	In peak year, Project-related traffic would comprise 11% of total daily traffic (326 vehicles of 2,989 vehicles per day)
Old Fort Road north of 240 Road	Activities: Project-related traffic commuter traffic from north bank communities and points east; transporting Wuthrich Quarry riprap, materials and equipment to north bank dam site; transporting merchantable timber from reservoir clearing operations; road improvements Timing: Years 0 to 8 Peak Year: 5	In peak year, Project-related traffic would comprise 65% of total daily traffic (1,155 of 1,786 vehicles per day)
Old Fort Road south of 240 Road	Activities: Transporting Wuthrich Quarry riprap, materials and equipment to north bank dam site; road improvements Timing: Years 1 to 4 Peak Year: 3	In peak year, Project-related traffic would comprise 7% of total daily traffic (38 of 522 vehicles per day)
240 Road west of Old Fort Road	Activities: Project-related traffic commuter traffic from north bank communities and points east; transporting materials and equipment to north bank dam site; transporting merchantable timber from reservoir clearing operations; road improvements Timing: Years 0 to 8 Peak Year: 5	In peak year, Project-related traffic would comprise 79% of total daily traffic (1,154 of 1,459 vehicles per day)
269 Road south of 240 Road	Activities: Project-related traffic commuter traffic from north bank communities and points east; transporting materials and equipment to north bank dam site; transporting merchantable timber from reservoir clearing operations; road improvements Timing: Years 0 to 8 Peak Year: 5	In peak year, Project-related traffic would comprise 75% of total daily traffic (1,154 of 1,532 vehicles per day)
Highway 97 North		
Highway 97 south approach to Highway 29 at Charlie Lake	Activities: Project-related commuters driving from Hudson's Hope and Fort St. John to Project sites, and transporting merchantable timber from reservoir clearing Timing: Years 0 to 8 Peak Year: 5	Project-related traffic would comprise 0.4% of total daily traffic (34 of 7,595 vehicles per day)

Road Segment	Project Activities and Timing	Project-Related Traffic Volume Changes
South of 85th Avenue	Activities: Project-related traffic commuter traffic from north bank communities and points east; transporting materials and equipment to north bank dam site Timing: Years 0 to 8 Peak Year: 5	Project-related traffic would comprise 3% of total daily traffic (532 of 17,725 vehicles per day)
Highway 97 South		
West approach of Highway 97 to Chetwynd	Activities: Transporting West Pine Quarry riprap to south bank dam site Timing: Years 0 to 8 Peak Year: 7	Project-related traffic would constitute 1% of total daily traffic (90 of 8,047 per day)

NOTE:
No activity changes anticipated for 242 Road, west of Old Fort Road
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.1 Effects Assessment — Construction — Changes in Traffic Delays

Standard industry criteria categorize the Level of Service (LOS) on a given roadway, defined as average delay in seconds per vehicle (Table 31.13) (Volume 4 Appendix B Project Traffic Analysis Report). The scale utilizes the letters A through F to categorize the operating conditions of a facility from highest (Level of Service A) to lowest (Level of Service F). As a rule, Level of Service E and F indicate congested operations. The Project Traffic Analysis report assessed the change in LOS that corresponds with the average incremental vehicle delays that would arise from Project traffic for various road segments. These changes are reflected in this analysis.

Table 31.13 Level of Service Criteria

Traffic Signals		Four-Way Stop Control	
LOS	**Delay (seconds per vehicle)**	**LOS**	**Delay (seconds per vehicle)**
A	0 – 10	A	0 – 10
B	>10 - 20	B	>10 – 15
C	>20 – 35	C	>15 – 25
D	>35 – 55	D	>25 – 35
E	>55 – 80	E	>35 – 50
F	>80	F	>50

NOTE:
Source: Transportation Research Board (2000)

31.4.1.1 Highway 29 North

Highway 29 realignment activities, construction traffic volumes, and construction traffic turning movements (driving to and from the highway and gravel pits, and realignment access locations) would result in minor traffic delays during construction (Volume 4 Appendix B Project Traffic Analysis Report). Although no road closures are planned, and sections of single lane alternating traffic are anticipated to be kept to a minimum, increases in truck and commuter traffic during construction would occasionally slow

traffic and change driving conditions. There would also be traffic delays due to occasional platooning (i.e., formation of groups of vehicles behind slow-moving vehicles) on long hills.

Future forecast background peak year daily traffic volumes range from just over 800 vehicles per day west of Lynx Creek to almost 1,000 vehicles per day between Cache Creek and Highway 97 at Charlie Lake.

In the peak year, the contribution of Project traffic to Highway 29 varied from about 8% of the total traffic on the western approach to Lynx Creek (73 of 880 vehicles per day) to 3% of the total traffic on the eastern approach to Cache Creek (29 of 1,008 vehicles per day). Eight-year average traffic volumes dropped to 4% and 2% for Lynx Creek and Cache Creek, respectively.

Similarly for Canyon Drive traffic, the contribution of project traffic varied from about 6% of the total traffic in the peak year to just over 2% for the eight-year average traffic. For Clarke Avenue traffic, the contribution of project traffic varied from about 3% of the total traffic in the peak year to less than 1% for the eight-year average traffic.

The intersection of Farrell Creek and Highway 29 North has the highest volume of turning traffic between Bear Flat and Lynx Creek. Highway 29 realignment activity would increase the average duration of vehicle delays at this intersection by less than one second during the peak year, which would change the LOS at the Farrell Creek Road intersection from A to B at this location. There would be no change in LOS at any other intersection on Highway 29 North. Minor traffic delays arising from an increase in the number of heavy vehicles could occasionally limit passing opportunities on certain segments of the roadway.

In Hudson's Hope, trucks carrying riprap and other off-site material for either the Highway 29 realignment or shoreline protection construction would slow traffic, and potentially impede access and egress at properties in the vicinity of Canyon Drive and Clarke Avenue. Although there would be no increase in vehicle delays at the Clarke Avenue intersection in the peak year, there would be an incremental 0.2 second per vehicle delay at the Canyon Drive intersection.

Table 31.14 summarizes potential traffic delay changes on Highway 29 North.

Table 31.14 Potential Changes in Traffic Delay on Highway 29 North

Road Name	Project-Related Potential Changes in Traffic Delay
Highway 29 from Hudson's Hope to Highway 97 north of Fort St. John	▪ Minor traffic delays at entry points to off-line Highway 29 construction and gravel pits ▪ Decline in LOS from A to B at Farrell Creek Road/Highway 29 intersection due to a one-second incremental delay ▪ Minor traffic delays caused by greater number of heavy vehicles in conjunction with limited passing opportunities in certain segments ▪ Minor traffic delays due to occasional platooning behind slow-moving vehicles on hills
Hudson's Hope	▪ Truck-turning movements at intersections leading to the shoreline protection berm construction site ▪ Incremental 0.2 second per vehicle delay at the Canyon Drive intersection ▪ Potential for impeded access and egress at properties in the vicinity of Canyon Drive and Clarke Avenue

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.1.2 Highway 29 South

Project-related traffic volumes would constitute a small increase in overall traffic levels on this segment of Highway 29. Community representatives expressed concern about construction activities affecting delays at the merge on Highway 29 at the end of the two-lane northbound segment just north of Highway 97 (District of Hudson's Hope Community Representatives 2011, pers. comm.). However, as a result of relatively low volumes on an hourly basis, the results of the Project Traffic Analysis report indicate that Project-related traffic would have minimal incremental delay effects at this location.

Table 31.15 summarizes potential traffic delay changes on Highway 29 South.

Table 31.15 Potential Changes in Traffic Delay on Highway 29 South

Road Name	Project-Related Potential Changes in Traffic Delay
Highway 29 South (Chetwynd to Jackfish Lake Road intersection)	▪ Potential for impeded access and egress from West Fraser Mills (i.e., slower turns into or out of West Fraser Mills)

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.1.3 Jackfish Lake Road

Given the expected increase in traffic volumes on Jackfish Lake Road, public traffic would experience lower speeds, particularly early in the Project when the existing road is being upgraded. There would also be potential for occasional impediments to access to and egress from local properties at the south end of Jackfish Lake Road. To provide context, the Project Traffic Analysis Report calculated vehicular frequency linked to the Project. At the south end of this road, a maximum frequency of one vehicle every 52 seconds in the peak direction was estimated, while at the north end within the resource road section, one vehicle every 183 seconds in the peak direction was estimated. Table 31.16 summarizes potential traffic delay changes on Jackfish Lake Road.

A sensitivity analysis shows that the predicted minor traffic delays would decrease significantly along the southern portions of Jackfish Lake Road if all riprap from the West Pine Quarry to the south bank of the dam site was transported by rail (Volume 4 Appendix B Project Traffic Analysis Report). There would still be a slight increase in the frequency of vehicles (from one vehicle every five minutes in the base case scenario to one vehicle every 3.2 minutes in the peak direction) within the resource road portions at the northeast end during construction of the Project access road.

Table 31.16 Potential Changes in Traffic Delay on Jackfish Lake Road

Road Name	Project-Related Potential Changes in Traffic Delay
Southern portion of Jackfish Lake Road	▪ Public traffic would experience lower speeds early in the Project when the existing road is being upgraded ▪ Potential for impeded access to and egress from local properties ▪ Maximum frequency of one vehicle every 52 seconds in the peak direction, compared to 56 seconds in the background traffic case
Northern end of Jackfish Lake Road (T intersection to west end of Project access road)	▪ Maximum frequency of one vehicle every three minutes in the peak direction, compared to five minutes in the background traffic case

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.1.4 North Bank Minor Roads

Incremental Project traffic in the peak year would result in occasional delays on the north bank minor roads as follows:

- Left-turning traffic from 242 Road onto Old Fort Road northbound: average delays would change from 14 seconds per vehicle to 15 seconds, resulting in a change from LOS B to LOS C
- Left-turning traffic from 240 Road onto Old Fort Road northbound: average delays would change from nine seconds per vehicle to 11 seconds, resulting in a change from LOS A to LOS B
- Left-turning traffic from 240 Road onto 269 Road southbound: average delays would change from nine seconds per vehicle to 10 seconds, resulting in a change from LOS A to LOS B
- Eastbound traffic at the intersection of 85th Avenue and 100th Street: average delays would change from 12 seconds per vehicle to 17 seconds, resulting in a change from LOS B to LOS C

Additional storage and queuing of northbound left-turning traffic onto Highway 97 at the intersection of Old Fort Road and Highway 97 would result in some occasional traffic delay effects.

North bank minor roads with the largest change in traffic volume (i.e., Old Fort Road north of 240 Road), 240 Road (i.e., on Old Fort Road north of 240 Road), 240 Road west of Old Fort Road, and 269 Road south of 240 Road would occasionally experience altered driving conditions, such as travelling at lower speeds or being presented with fewer passive passing opportunities, due to the predicted increase in traffic volumes. At times, residents and businesses operating along these routes would experience impeded access to and egress from their properties.

Table 31.17 summarizes potential traffic delay changes on north bank minor roads.

Table 31.17 Potential Changes in Traffic Delay on North Bank Minor Roads

Road Name	Project-Related Potential Changes in Traffic Delay
269 Road south of 240 Road	▪ Potential for impeded access to and egress from properties
240 Road west of Old Fort Road	▪ One-second increase in delay for drivers turning from 240 Road onto 269 Road southbound – reduced LOS from A to B ▪ Two-second increase in delay for drivers turning from 240 Road onto Old Fort Road northbound – reduced LOS from A to B ▪ Potential for impeded access to and egress from properties
Old Fort Road north of 240 Road	▪ One-second delay for drivers turning from 242 Road onto Old Fort Road northbound – reduced LOS from B to C ▪ Potential for impeded access to and egress from properties
85th Avenue at 100th Street	▪ Five-second increase in delay for eastbound drivers at 100th Street – reduced LOS from B to C ▪ Potential for impeded access to and egress from properties

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.1.5 Highway 97 North

Because of recent upgrades, Highway 97 near and in Fort St. John has sufficient capacity to accommodate growing traffic volumes within the LAA and surrounding area. In light of this, and the fact that a large volume of private and commercial traffic travels this highway daily, the addition of Project-related traffic on Highway 97 near Fort St. John is expected to have a minor delay effect.

The signalized intersection of Highway 97 and Old Fort Road/100th Avenue provides direct access to the Project site via Old Fort Road from central Fort St. John. Southbound traffic making a left turn from 100th Avenue, as well as those executing a westbound left turn from the highway onto Old Fort Road, would experience additional delays of up to seven seconds per vehicle at these intersections during the peak year of the Project, with no change in LOS.

At the intersection of Highway 97 and 100th Street, a change in LOS is predicted to occur for southbound traffic turning left from 100th Street onto Highway 97, where the average delay would change from 19 seconds per vehicle to 21 seconds per vehicle. This would result in a change from LOS B to LOS C. Also, a change in LOS is predicted to occur for westbound traffic turning left from Highway 97 westbound to 100th Street, where average delay would change from 10 seconds per vehicle to 11 seconds per vehicle. This would result in a change from LOS A to B.

The signalized intersection at Highway 97 and 85th Avenue provides direct access to the Project site via 85th Avenue and Old Fort Road from the rest of the PRRD, including Taylor and Dawson Creek. A change in LOS is predicted to occur for westbound traffic turning left from Highway 97 onto 85th Avenue, where the average delay would change from 18 seconds per vehicle to 26 seconds per vehicle. This would result in a change from LOS B to LOS C.

At all other intersections on this segment of Highway 97, there would be shorter delays, and no change in the Level of Service.

Table 31.18 summarizes potential traffic delay changes on Highway 97 North.

A sensitivity analysis was undertaken in the Project Traffic Analysis report on the assumption that all materials and equipment would be transported by road (rather than 97% by rail). The findings show that there would be an incremental six-second delay for westbound left-turning traffic at the intersection of Highway 97 North and 85th Avenue (Volume 4 Appendix B Project Traffic Analysis Report). This would reduce the LOS at this intersection from B under the “with project” scenario, to C with the increased sensitivity loadings.

Table 31.18 Potential Changes in Traffic Delay on Highway 97 North

Road Name	Project-Related Potential Changes in Traffic Delay
Highway 97 at Old Fort Road Intersection	▪ Incremental delays of up to seven seconds per vehicle for southbound traffic turning left onto Highway 97
Highway 97 at 100th Street Intersection	▪ Incremental delays of two seconds per vehicle for southbound traffic turning left onto Highway 97, and one second per vehicle for westbound traffic turning left onto 100th Street ▪ One-second increase in delay for drivers turning from Highway 97 onto 100th Street southbound – reduced LOS from A to B
Highway 97 at 85th Avenue Intersection	▪ Eight-second increase in delay for drivers turning left from Highway 97 onto 85th Avenue – reduced LOS from B to C.

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.1.6 Highway 97 South

Incremental Project-related traffic on Highway 97 South near Chetwynd would not change the existing LOS at the signalized intersection with Highway 29 in Chetwynd. The proximity of frontage road intersections could cause a small amount of traffic disturbance, although this has already been minimized by BCMoTI's imposition of restricted turning movements to right in/right out only (Volume 4 Appendix B Project Traffic Analysis Report).

Community representatives expressed concern about construction activities affecting delays at the access to Tim Hortons on Highway 97 to the east of Highway 29 South (District of Hudson's Hope Community Representatives 2011, pers. comm.). This location can experience high traffic volumes and lineups, which can create localized traffic delays.

However, as a result of relatively low traffic volumes on an hourly basis, the results of the Project Traffic Analysis report indicate that Project-related traffic would have minimal delay effects at this location.

The analysis assumed that all timber cleared and transported to local mills would replace other sources and therefore not be incremental. A sensitivity analysis shows that even if the timber transport was incremental volumes would be relatively low on an hourly basis and no change in the Level of Service would be expected.

Table 31.19 Potential Changes in Traffic Delay on Highway 97 South

Road Name	Project-Related Potential Changes in Traffic Delay
Western approach of Highway 97 to Chetwynd	▪ No delay effects
Eastern approach of Highway 97 to Chetwynd	▪ No incremental traffic expected; therefore, no delay effects
General Highway 97 South	▪ Minimal delays on access to Tim Hortons (near Highway 97 in Chetwynd)

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.2 Mitigation Measures – Changes in Traffic Delays

31.4.2.1 Construction

BC Hydro will implement the following measures during construction to mitigate potential increases in traffic delays resulting from the Project:

- Highway 29 North
  - Develop Traffic Management Plans that will include Traffic Control Plans, Public Information Plans, Incident Plans, and Implementation Plans (See Volume 5 Section 35 Summary of Environmental Management Plans)
- Highway 29 South
  - Based on demand, provide a shuttle bus service or carpooling programs between Chetwynd and the Site C dam site to transport workers and to reduce Project-related private vehicle use on Jackfish Lake Road. Traffic forecasts on Jackfish Lake Road assumed that this will be in place. This service would be available for any commuters who would start from or pass through Chetwynd. If shuttle service is required, work with the District of Chetwynd to identify suitable parking locations for workers using a shuttle service
- Jackfish Lake Road:
  - Equip Project vehicles with radios
- Control access to the dam site via the Project access road 24 hours a day, seven days a week, so that only authorized vehicles are permitted to use the road
- North Bank Minor Roads:
  - Provide carpool programs, such as preferred parking, for regional workforce commuters, to reduce the number of private vehicles commuting to site

Additional mitigation measures will not be required on Highway 97 North or South due to sufficient highway capacity and, for the recent four-lane enhancement of Highway 97 North near Fort St. John. Mitigation measures will not be required in Hudson's Hope, due to low volumes of background vehicle and turning traffic.

31.4.3 Effects Assessment – Construction – Changes in Road Safety

31.4.3.1 Highway 29 North

During early construction years, the number of collisions per year along Highway 29 may increase, due to greater traffic volumes during construction periods, however in the later years of construction the number of collisions per year may decline as a result of the highway improvements. The number of predicted collisions per year would rise by slightly less than 0.8 in Years 0 through 4 compared to the base case, then decline to below base case levels (ranging from -0.9 in Year 5 to -2.9 in Year 8) from Year 4. Over the entire construction period, a net decline of -5.5 collisions would be expected on Highway 29 North as a result of road improvements.

A safety analysis of the three steepest hills on Highway 29 shows that the additional truck traffic associated with Highway 29 realignment activities would have a limited effect

on road safety, due to the small number of trucks on an hourly basis and the short road lengths (Volume 4 Appendix B Project Traffic Analysis Report).

Increased road activity from the Project would increase the number of collisions on Canyon Drive to Peck Avenue by approximately 0.005 per year, and a total of 0.05 over the eight-year construction period (Volume 4 Appendix B Project Traffic Analysis Report).

During public consultation, BC Hydro also heard of concerns about the potential for runaway trucks descending the 10% grade on Canyon Drive. These trucks would be hauling riprap from Portage Mountain for construction of the Hudson's Hope shoreline protection and Highway 29 realignment sections. The historical collision data did suggest that there had been one collision on Canyon Drive over a 10-year time frame that may in part have been due to steep grades, as the collision was attributed to “defective brakes”. A review of site conditions confirms that there is a risk that an increase in the amount of truck traffic on Canyon Drive could affect road safety.

Table 31.20 summarizes the potential changes in road safety on Highway 29 North.

Table 31.20 Potential Changes in Road Safety on Highway 29 North

Road Name	Project-Related Potential Changes in Road Safety
Highway 29 from Hudson’s Hope to Fort St. John	▪ Predicted increase of less than 0.8 collision per year over the base case in Years 0 to 4, then annual declines ranging from -0.9 to -2.9 collisions for the rest of the Project, due to highway geometric and cross-section improvements ▪ Overall, a net decline in predicted collision frequency of -5.5 during the Project
Hudson’s Hope	▪ Predicted increase of 0.05 collisions during the life of the Project ▪ Potential safety risk on Canyon Drive west of Hudson’s Hope associated with the combination of increased truck volumes and the existing grade on Canyon Drive

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.3.2 Highway 29 South

The number of collisions per year on Highway 29 from Highway 97 in Chetwynd to Jackfish Lake Road would rise by approximately 0.01 per year compared to the base case. This translates to a total increase of 0.11 collisions throughout the construction phase.

Potential changes in road safety are summarized in Table 31.21.

Table 31.21 Potential Changes in Road Safety on Highway 29 South

Road Name	Project-Related Potential Changes in Road Safety
Highway 29 South (Chetwynd to Jackfish Lake Road intersection)	▪ Number of collisions per year would increase by approximately 0.01 per year for Years 1 through 8 ▪ Overall, an increase of 0.11 collisions during the construction phase

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.3.3 Jackfish Lake Road

During the first four years of the Project, the number of annual collisions on the southern portion of Jackfish Lake Road (between Highway 29 South and north of Calliou Road) would increase annually by 0.01 to 0.10. Subsequently, during the remaining years of construction, road improvements on the southern portion of this road would result in reduced annual collisions ranging between -0.003 and -0.04. The net effect throughout the entire construction period would be a total increase of 0.24 collisions on this southern portion of Jackfish Lake Road.

For the middle section of Jackfish Lake Road (between north of Calliou Road and Old Jackfish Lake Road) the number of annual collisions would increase by 0.05 to 0.11. The net effect throughout the entire construction period would be a total increase of 0.64 collisions in this middle portion of Jackfish Lake Road.

At the north end of Jackfish Lake Road (from Old Jackfish Lake Road to the end of Jackfish Lake Road), the number of collisions would rise annually, with increases ranging from 0.34 in the early years to 0.22 in the late construction period. The net effect over the construction period would be an increase of 2.35 collisions on this northern portion of Jackfish Lake Road.

The total increase in collisions on Jackfish Lake Road through the entire construction period is estimated to be 3.23. During public consultation, BC Hydro heard of concerns from Jackfish Lake Road users about the safety of pedestrians and children due to the increase in vehicle traffic during the construction of the dam, about the absence of pavement markings on the sealcoat section of Jackfish Lake Road, about narrow or absent shoulders, and about wanting or having to drive toward the shoulder when large trucks are in the oncoming lane. There is no available collision history associated with these conditions and vehicle operations; however, a review of site conditions confirms that there is a risk that an increase in the amount of truck traffic on Jackfish Lake Road could affect road safety.

Results for the southern and northern portions of Jackfish Lake Road are summarized in Table 31.22.

Table 31.22 Potential Changes in Road Safety on Jackfish Lake Road

Road Name	Project-Related Potential Changes in Road Safety
Southern portion of Jackfish Lake Road (Highway 29 to north of Calliou Road)	▪ A 0.244 increase in collisions during construction of the dam and ancillary works ▪ Potential safety risk to pedestrians and cyclists associated with increase in volume of Project-related vehicles
Middle portion of Jackfish Lake Road (north of Calliou Road to Old Jackfish Lake Road)	▪ A 0.64 increase in collisions during construction of the dam and ancillary works ▪ Potential safety risk to pedestrians and cyclists associated with increase in volume of Project-related vehicles
Northern end of Jackfish Lake Road (T intersection to west end of Project access road)	▪ A 2.35 increase in collisions during construction of the dam and ancillary works ▪ Potential safety risk to pedestrians and cyclists associated with increase in volume of Project-related vehicles
Jackfish Lake Road	▪ A 3.23 increase in collisions during construction of the dam and ancillary works

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.3.4 North Bank Minor Roads

In Years 0 through 2, the number of annual collisions on each of the north bank minor roads is predicted to increase. But in Years 2 through 8, Old Fort Road would experience a lower collision frequency due to road improvements, resulting in a total decline of -2.31 collisions on Old Fort Road between Years 0 and 8. This would be a permanent safety improvement arising from the Project. The predicted number of collisions would increase on all other routes from Years 2 through 8, except on 242 Road, where there would be no net increase or decrease in collisions, as there would be no change in Project-related traffic volume. Total collisions would rise by 1.01 on 269 Road, 1.58 on 85th Avenue, and 1.65 on 240 Road. The net decline in predicted collisions for the north bank minor roads would be 1.93 over the entire construction period. Results are summarized in Table 31.23.

During public consultation, BC Hydro heard of concerns from residents on the north bank about the safety of pedestrians and children due to the increase of vehicle traffic during the construction of the dam, about narrow or absent shoulders, and about wanting or having to drive toward the shoulder when large trucks are in the oncoming lane, particularly associated with Old Fort Road and 271 Road. There is no available collision history associated with these conditions and vehicle operations; however, a review of site conditions confirms that there is a risk that an increase in the amount of truck traffic on Old Fort Road and 271 Road could affect road safety.

Table 31.23 Potential Changes in Road Safety on North Bank Minor Roads

Road Name	Project-Related Potential Changes in Road Safety
Old Fort Road south of 242 Road	▪ Total decline of -2.31 collisions during construction ▪ Potential safety risk to pedestrians and cyclists associated with increase in volume of Project-related vehicles
Old Fort Road north of 240 Road	
Old Fort Road south of 240 Road	
240 Road west of Old Fort Road	▪ Increase of 1.65 collisions during construction
85th Avenue	▪ Increase of 1.58 collisions during construction
269 Road south of 240 Road	▪ Increase of 1.01 collisions during construction
271 Road north of Highway 97 to Wuthrich Quarry access	▪ Potential safety risk to pedestrians and cyclists associated with increase in volume of Project-related vehicles
North bank minor roads	▪ Net increase of 1.93 collisions due to roadway improvements

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.3.5 Highway 97 North

Between Year 0 and 8 of the Project, the number of predicted collisions on Highway 97 between Fort St. John and Dawson Creek is predicted to increase by 25.12, with most of this change (19.84 collisions) occurring on the stretch of Highway 97 between Dawson Creek and Taylor. This analysis does not reflect BCMoTI plans to upgrade this into a four-lane road. In addition to these predicted collisions along the corridor, the number of predicted collisions at the signalized intersections along Highway 97 (85th Avenue, 100th Street, Old Fort Road, 269 Road, 271 Road) is predicted to increase by 0.27 collisions, with most of this increase predicted for the intersection with Old Fort Road (0.14 collisions). Results are summarized in Table 31.24.

Table 31.24 Potential Changes in Road Safety on Highway 97 North

Road Name	Project-Related Potential Changes in Road Safety
Dawson Creek to Taylor	▪ Predicted increase of 19.84 collisions during the entire construction period
Taylor to Fort St. John	▪ Predicted increase of 5.16 collisions during the entire construction period
Fort St. John	▪ Increase of 0.12 collisions during the entire construction period
Highway 97 North Intersections in Fort St. John (85th Avenue, 100th Street, Old Fort Road, 269 Road, and 271 Road)	▪ Increase of 0.27 collisions during the entire construction period
Highway 97 North (Dawson Creek to Fort St. John)	▪ Predicted increase of 25.39 collisions during the entire construction period

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.3.6 Highway 97 South

The number of collisions on Highway 97 South between West Pine Quarry and Wildmare Road outside of Chetwynd is predicted to increase by 3.60 throughout construction. From Wildmare Road to Highway 29 in urban Chetwynd, the increase in collisions is predicted to be 0.19. In addition to these predicted collisions along the

corridor, the number of predicted collisions at the signalized intersections with Highway 29 is predicted to increase by 0.02 between Years 0 and 8. Collectively, the predicted number of collisions on Highway 97 South near Chetwynd would rise by 3.81 over the construction period. Results are summarized in Table 31.25.

Table 31.25 Potential Changes in Road Safety on Highway 97 South

Road Name	Project-Related Potential Changes in Road Safety
Western approach of Highway 97 to Chetwynd	▪ Predicted increase of 3.60 collisions east of Wildmare Road ▪ Predicted increase of 0.19 collisions between Wildmare Road and Highway 29
Highway 97 Intersections in Chetwynd with Highway 29	▪ Increase of 0.02 collisions during the entire construction period
General Highway 97 South	▪ Total predicted increase of 3.81 collisions

NOTE:
Source: Volume 4 Appendix B Project Traffic Analysis Report

31.4.3.7 Sensitivity Analysis

Two alternative scenarios were examined to understand the sensitivity of the predicted change in collisions during construction. The first alternative assumed that 100% of timber harvested would be incremental to base case harvests, rather than replacement of the harvested volume as is assumed in the basic "with Project" scenario. In the alternative harvest volume scenario the total number of predicted collisions within the LAA during the entire construction period would increase by 31.38, compared with 29.03 under the basic "with Project" scenario. The majority of these incremental collisions would be expected on Highway 97 North and Jackfish Lake Road (Volume 4 Appendix B Project Traffic Analysis Report).

The second alternative scenario assumed that all riprap from the West Pine Quarry would be transported by rail rather than by road as in the basic "with Project" scenario. In the alternative West Pine transport scenario, the total number of collisions within the LAA would increase by 22.33 during the entire construction period, compared with 29.03 under the basic "with Project" scenario. ~~during the entire construction period would increase by 29.03, compared with 22.33 under the basic "with Project" scenario.~~ The use of rail would reduce collisions on Highway 29 and Jackfish Lake Road.

31.4.4 Effects Assessment – Operations – Potential Changes in Road Safety

The formation of the reservoir may have localized potential temperature change effects, therefore the analysis of potential effects road safety due to changes in fog, and the climate data collection to support the analysis, was undertaken along roadways adjacent to the reservoir and river downstream. Highway 97 south of Taylor Hill and Jackfish Lake Road are not near the reservoir or river downstream of the Project therefore were not assessed for potential fog changes. The discussion in this section focuses on potential increases in the amount of normal fog (visibility less than 1,000 m) and heavy fog (visibility less than 500 m) in the LAA.

The permanent upgrades to Highway 29 are also assessed in the context of road safety.

31.4.4.1 Highway 29 North

Two key factors were considered in assessing potential Project effects on road safety along Highway 29 North during operations: changes in normal and heavy fog hours per year, and changes in road geometry and cross-section.

The potential for increases in fog frequency and density were assessed in relation to formation of the reservoir for sites along Highway 29 (Bear Flat, Attachie Flat Upper and Lower Terrace, Attachie Plateau, Farrell Creek, and Hudson's Hope). It was determined that, with the reservoir in operation, there would be reduced annual hours of normal fog at four of the six locations along Highway 29 North and a reduction in heavy fog hours per year at all six locations. Attachie Flat Lower Terrace would have the greatest quarterly and annual increases in normal fog, with 10 hours in fall and nine hours total over the year. The potential changes in road safety associated with the predicted small increases in hours of fog are difficult to predict with certainty, but are not anticipated to affect road safety.

The geometry and cross-section of Highway 29 will be changed as a result of the Project, as described in Volume 1 Section 4 Project Description. Currently there are areas of concern along Highway 29, in particular a few of the steeper and more curvilinear portions of the highway where the differential in speed between heavy vehicles and passenger vehicles is more acute, passing opportunities fewer, and "platoons" of vehicles often form. With the Project, a number of these problematic curvilinear areas along Highway 29, typically where the smaller tributaries to the Peace River are crossed by the highway, will be eliminated. At these crossings, the new bridges and highway approach realignments proposed would be constructed to a higher standard than the existing highway, reducing grades and 'flattening' the horizontal curves.

31.4.4.2 North Bank Minor Roads

The potential for increases in fog frequency and density were assessed in relation to formation of the reservoir and changes in downstream water temperature for the location of the Site C dam, near the north bank minor roads. The results show a predicted annual decrease in both normal fog hours (-18) and heavy fog hours (-20) at the Site C location (Volume 2 Appendix K Microclimate Technical Data Report). Extrapolating these results to the nearby north bank minor roads, there would be an expected improvement in road safety, but the improvement is not possible to quantify.

31.4.4.3 Highway 97 North

The potential for increases in fog frequency and density were assessed in relation to Project-induced changes in water temperature downstream from Site C, and a related increase in both normal fog and heavy fog annually, where Highway 97 crosses the Peace River at Taylor, and adjacent low-lying stretches of the highway in the valley at Taylor, and the ascent out of the valley on the south Taylor hill.

The model results predict that the bridge across the Peace River in Taylor would potentially have an increase of eight hours of normal fog and 118 hours of heavy fog annually. The greatest quarterly increase for normal fog would be in spring at seven hours. The increase in heavy fog would be split almost evenly between spring and fall, with increases of 46 and 41 hours, respectively. The determination of normal fog or heavy fog in the model is based on metres of visibility and a change of 1 or 2 m might

cause fog to be reclassified as heavy fog; however, the model cannot provide greater specificity to characterize what visible changes drivers might experience at this location.

The model used for fog has limitations regarding predictions at the Taylor Bridge, due to site-specific factors such as the width of the river. The model's limitations regarding predicting the results of fog at this location are discussed in Volume 2 Appendix K Microclimate Technical Data Report.

Due to the limitations of the model, it cannot be predicted with certainty what the effects of a 118-hour increase would be on driving visibility, driving conditions, and overall road safety at these locations.

31.4.5 Mitigation Measures – Changes in Road Safety

31.4.5.1 Construction

BC Hydro will implement the following measures during construction to mitigate potential increases in collision frequency:

- Highway 29 North
  - Between Hudson's Hope and Bear Flat, realign sections of Highway 29 previously discussed during construction of the dam, incorporating geometric and cross-section improvements
  - On Canyon Drive west of Hudson's Hope, construct a paved brake check before the start of the 10% grade, and make it a mandatory requirement for Project-related trucks to stop and check vehicle brakes
  - Explore opportunities for constructing, and install if feasible, either arrestor beds or runaway lanes, or both, on Canyon Drive above Hudson's Hope
- Jackfish Lake Road
  - Strengthen the road base and hard-surface 31 km of Jackfish Lake Road, which may require the widening of some sections
  - Examine the feasibility of widening the shoulders along the first 30 km of Jackfish Lake Road to meet current BCMoTI rural collector standards, potentially including two 1.5 m wide paved shoulders
- North Bank Minor Roads
  - Hard-surface 240 Road and the portion of 269 Road south of the intersection with 240 Road
  - Realign a portion of Old Fort Road south of 240 Road
  - Potentially widen shoulders or add a path on Old Fort Road between Highway 97 and the realigned segment, and between the end of the realigned segment and the gravel pit entrance and km 5.5
  - Widen shoulders or add a path on 271 Road between the Wuthrich Quarry and Highway 97
  - Conduct intersection lighting calculations to determine if illumination is warranted and then, in collaboration with BCMoTI, consider installing intersection lighting

31.4.6 Summary of Mitigation Measures

A summary of mitigation for traffic delay and safety effects is presented in Table 31.26. Even with the implementation of mitigation measures, there would be a net increase in traffic volume during construction, and potential for residual adverse effects. Mitigation measures may reduce the increase in predicted traffic collisions, and assist in management of delay times and collision frequency over the construction period; however, project effects on delays and safety would not be eliminated entirely.

31.5 Summary of Effects Assessment and Mitigation Measures

31.5.1 Summary Table

A summary of the potential effects of the Project on transportation, associated mitigation measures, expected effectiveness of proposed mitigation, and responsibility for implementation is shown in Table 31.26.

With mitigation, there would be residual adverse effects on traffic delay and, on some routes, road safety. Mitigation and forward planning to deal with the predicted increase in traffic volumes will limit adverse effects, but increases in traffic delay would remain and, on some routes, the number of collisions would increase. Therefore, the project effect on transportation is considered further in the residual effects assessment.

1 **Table 31.26 Project Effects and Mitigation Measures on Transportation**

Project Phase and Key Routes	Potential Effect	Mitigation		
		Measures	Effectiveness	Responsibility
Construction				
Highway 29 North	Minor traffic delays Decline in Level of Service on some roads and at some intersections Potential for impeded access to and egress from properties on some roads Higher collision frequency	▪ Implement Traffic Management Plans to include Traffic Control Plans, Public Information Plans, Incident Plans, and Implementation Plans ▪ Between Hudson's Hope and Bear Flat, realign sections of Highway 29 that would be inundated by the reservoir, incorporating geometric and cross-section improvements ▪ On Canyon Drive west of Hudson's Hope, construct a paved brake check before the start of the 10% grade, and make it a mandatory requirement for Project-related trucks to stop and check vehicle brakes ▪ Explore opportunities for constructing, and install if feasible, either arrestor beds or runaway lanes, or both, on Canyon Drive above Hudson's Hope	▪ Implementation of Traffic Management Plans requires contractors to proactively consider how to manage public traffic through their work sites ▪ Public traffic will receive information via Traffic Management Plan pre- and during-construction so it can effectively manage driving trips, thereby reducing potential traffic delays ▪ Realignment of Highway 29 between Hudson's Hope and Bear Flat would lead to improved traffic safety and reduced travel times ▪ Requiring truck drivers to use a brake check on Canyon Drive would minimize the risk of runaway trucks on the descent toward Hudson's Hope, improving road safety ▪ Making available an arrester bed or runaway lane would minimize or eliminate the risk of a runaway truck on the descent toward Hudson's Hope, improving road safety Residual adverse effects would remain due to general increase in traffic.	▪ BC Hydro and its contractors ▪ BCMoTI (potentially)
Highway 29 South		▪ Shuttle bus between Chetwynd and dam site, as deemed necessary. Work with District of Chetwynd to identify suitable parking locations for workers using shuttles.	▪ Implementing a shuttle bus system may reduce traffic volumes on Highway 29 (depending on the location of the shuttle bus), improving road safety	▪ BC Hydro and its contractors ▪ BCMoTI (potentially)

Project Phase and Key Routes	Potential Effect	Mitigation		
		Measures	Effectiveness	Responsibility
Jackfish Lake Road		▪ Equip Project vehicles travelling on Project access road with radios ▪ Control access to Project access road at north end of Jackfish Lake Road ▪ Strengthen road base and hard-surface 31 km of Jackfish Lake Road, widening where required ▪ Examine the feasibility of widening the shoulders along the first 30 km of Jackfish Lake Road to meet current BCMoTI rural collector standards, potentially including two 1.5 m wide paved shoulders	▪ Implementing a shuttle bus system would reduce traffic volumes on Jackfish Lake Road, improving road safety ▪ Equipping Project vehicles with radios allows drivers to communicate road and traffic conditions and improves construction efficiency (by notifying other Project vehicles of work progress and status) ▪ Controlling access to Project access road would improve safety on that road, since only authorized construction vehicles would be permitted ▪ Improved road base and surface would improve reliability of the road, increase road safety and potentially improve on construction productivity (more road available for a greater period of time) ▪ Wider road shoulders would improve road safety and increase safety for pedestrians and cyclists Residual adverse effects would remain due to general increase in traffic.	▪ BC Hydro and its contractors

Project Phase and Key Routes	Potential Effect	Mitigation		
		Measures	Effectiveness	Responsibility
North Bank Minor Roads		▪ Carpool program ▪ Use of conveyor belt for transport of materials from 85th Avenue Industrial Lands to dam site ▪ Hard-surface 240 Road and the portion of 269 Road south of the intersection with 240 Road ▪ Realign a portion of Old Fort Road south of 240 Road ▪ Potentially widen shoulders or add a path on Old Fort Road between Highway 97 and the realigned segment, and between the end of the realigned segment and the gravel pit entrance at km 5.5 ▪ Widen shoulders or add a path on 271 Road between the Wuthrich Quarry and Highway 97 ▪ Conduct intersection lighting calculations to determine if illumination is warranted and then, in collaboration with BCMoTI, consider installing intersection lighting	▪ Implementing carpool incentives may reduce traffic volumes, improving travel times for others, improving road safety, and reducing infrastructure requirements at dam site parking lot ▪ Conveyor belt option reduces hauling traffic between 85th Avenue and dam site ▪ Improved road base and surface would improve reliability of the road, increase road safety, potentially improve on construction productivity (more road available for greater period of time), and reduce dust ▪ A realigned Old Fort Road would improve road safety and improve travel times ▪ Wider road shoulders would improve road safety and increase safety for pedestrians and cyclists Residual adverse effects would remain due to general increase in traffic.	▪ BC Hydro and its contractors
Operations				
Taylor Bridge and approaches	Higher accident rate due to poor visibility during fog	If required based on the outcome of monitoring, minimize fog-related collisions and maintain overall road safety by giving consideration to the following: ▪ illumination on, and on the approaches to, the Taylor Bridge ▪ changeable message signs which are visible in dense fog ▪ radio broadcasts and other forms of public communication	If required, proposed mitigation measures would be expected to reduce fog-related collisions. Potential for residual adverse effects on road safety if Project is confirmed to increase fog conditions	▪ BC Hydro and its contractors

31.5.2 Other Mitigation Options Consider

A number of highway alignment alternatives were developed for each of the segments on Highway 29 and evaluated as part of a multiple account evaluation process. Characteristics evaluated included relative safety, environmental effects (including those on fish, wildlife, and habitat), social effects (including those on property, heritage, and agriculture) and costs of each alternative (Section 4.3.4.2 Alternate Highway Alignments in Volume 1 Section 4 Project Description).

Similarly, BC Hydro conducted a multiple account evaluation to determine the preferred south bank access road, considering the relative safety, environmental effects, social effects, and the costs of various options (Section 4.3.7.2 Alternate Access Routes Considered in Volume 1 Section 4 Project Description).

Options for the transport of materials from the 85th Avenue Industrial Lands to the dam site included consideration of on-road and off-road truck transport, as well as the selected option of a conveyor. The selected option of a conveyor would offload materials into a large hopper or to a stockpile close to the hopper. Trucks would then be loaded directly from the hopper or by front-end loader from the stockpile and transport the material to the placing location within the dam site (Section 4.3.5.2 85th Avenue Industrial Lands in Volume 1 Section 4 Project Description). The alternative option of truck transport would have involved highway-legal or off-road trucks utilizing public highways; this method of transport was not selected.

In consultation with BCMoTI, consideration was given to improving the access from West Pine Quarry to Highway 97 to accommodate access/egress for highway-legal haul trucks. Due to the physical constraints of the existing rail line and the river crossing, safety improvements to the geometry of the road were determined to not be practical. As an alternative to constructing improvements, BCMoTI agreed that enhanced signing and standard traffic control procedures could be utilized as required during quarry operations.

In order to enhance safety, consultations with affected school districts have taken place to obtain school bus routing and schedule information. Discussions have also taken place with Canada Post to verify rural mail box locations and explore options for improved access to the pullout areas for both users and postal staff. Although no definitive improvements have been determined to date, commitments to continue consultation have been made to both agencies.

31.6 Residual Effects

31.6.1 Characterization of Residual Effects

Residual adverse effects are the effects of the Project that may remain after taking into account the implementation of mitigation measures. Residual adverse effects are characterized according to the residual effects criteria and associated definitions in Table 31.27.

The magnitude of effects on transportation is characterized using both change in traffic delay, expressed as change in Level of Service, and annual change in the percentage of collisions within the LAA.

Change in road safety performance (collision frequency) is based on the normal variability that is expected from the baseline safety conditions. For this assessment, the historical collision frequency was examined to establish the normal variability in collision frequency of the LAA for the years 2002 to 2006. These years were selected because the collision data within this time frame are considered stable. The analysis indicated that a change of 5% represents the normal variability in the annual collision frequency. This was confirmed with the assessment of collisions within the Peace Region and for the province as a whole. Thus, an increase in 5% of the expected annual collision frequency was selected as the magnitude threshold between a low and moderate residual effect (i.e., less than 5% increase in annual collision frequency is a low effect, and between 5% and 10% increase in annual collisions represents a moderate residual effect).

Change in traffic delay is based on a change in Level of Service (and the intrinsic delay per vehicle, expressed in seconds of delay), based on traffic operation definitions where Level of Service A represents little delay and Level of Service F represents much delay. The six Levels of Service are divided into 10-second to 25-second increments (where seconds of delay progressively increase as LOS degrades) for signalized intersections, and into 10-second to 15-second increments for stop-control intersections. A reduction of two or more levels of service was selected to indicate a moderate effect. Typically, a road authority would not consider improving an existing condition until the Level of Service erodes to E or F, indicating that a facility is at or over capacity; therefore, this is selected to indicate a high effect.

Table 31.27 Characterization Criteria for Residual Transportation Effects

Criterion	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The ultimate long-term trend of the environmental, economic, social, heritage, or health effect	**Adverse:** condition of the VC is worsening in comparison to baseline conditions and trends
		Positive: condition of the VC is improving in comparison to baseline conditions and trends
Magnitude	The amount of change in a measurable parameter or variable relative to baseline case.	**Low:** Delay: reduction in one Level of Service per road segment or intersection Safety: increase in number of collisions not more than 5% of the normal variability in annual collision frequency
		Moderate: Delay: reduction in two Levels of Service per road segment or intersection Safety: increase in collisions of between 5% and 10% of the normal variability in annual collision frequency
		High: Delay: reduction of two Levels of Service per road segment or intersection and Level of Service would be E or F Safety: increase in collisions of more than 10% of the normal variability in annual collision frequency

Criterion	Description	Quantitative Measure or Definition of Qualitative Categories
Geographical Extent	The geographic area in which an environmental, economic, social, heritage, or health effect of a defined magnitude occurs	**Site-specific:** the expected measurable changes are within the LAA
		Local: the expected measurable changes are within the LAA and extend to surrounding road networks
		Regional: Peace River Regional District
Frequency	The number of times during a project or a specific project phase may occur	**Once:** occurs once
		Continuous: occurs on a regular basis and at regular intervals
		Sporadic: occurs rarely and at irregular intervals
Duration	The period of time required until the VC returns to its baseline condition, or the effect can no longer be measured or otherwise perceived	**Short term:** effect is limited to less than one year
		Medium term: effect occurs in more than one year, but not beyond construction phase
		Long term: effect lasts beyond construction
Reversibility	The likelihood that a measurable parameter will recover from an effect	Effect **reversible** with reclamation and/or over time
		Effect **permanent** and cannot be reversed with reclamation and/or over time
Context	Capacity of socio-economic systems and processes to accept change, resilience, or the level of change relative to base case or base line variation typically experienced	**Low:** effect occurs in environments of low resiliency and/or high vulnerability
		Moderate: effect occurs in an environment of moderate resiliency and/or moderate vulnerability
		High: effect occurs in an environment of high resiliency and/or low vulnerability
Level of Confidence	Certainty in quantifying or estimating the effect; the quality and/or quantity of data; the understanding of the effect mechanisms; and the effectiveness of mitigation.	**Low:** assessment based on professional judgment and experience, but hampered by incomplete understanding of cause-effect relationships, and/or lack of data
		Moderate: assessment based on professional judgment and experience, including a reasonable understanding of cause-effect relationships, and adequate data
		High: assessment based on professional judgment and experience
Probability	The likelihood that an adverse effect will occur	**Low:** past experience indicates that an effect is unlikely, but could occur
		High: past experience indicates that an effect is highly likely to occur
		Unknown: past experience does not allow the determination of the effect's probability

Considering that the analyses carried out were focused on potential peak year results, the overall residual Project effect on transportation over the entire project period would be low in magnitude. In off-peak years, Project-related traffic volumes would be lower than the peak year, and attendant traffic delays would be less, and road safety would be improved over the analyses presented earlier in the Project Traffic Analysis (Volume 4 Appendix B).

Average traffic delays are anticipated to reduce Level of Service by, at most in a peak hour of the peak construction year, one level, remaining within the higher categories of

LOS (i.e., LOS A to LOS B, and LOS B to LOS C) for all road segments assessed. Increases in traffic delays are anticipated to be minor (less than 10 seconds) in the typical peak hour of the peak construction year for all traffic movements.

The magnitude of residual effects on collisions is considered to be low, as neither the predicted number of collisions on any one corridor, nor for the LAA at large, approaches the 5% normal variability threshold for a change in annual collision frequency. The total net change in collisions throughout the LAA during the construction period is predicted to be 29.0, taking into account the permanent improvements on Highway 29, Jackfish Lake Road, and Old Fort Road (DeLeur Consulting Limited, 2012). The predicted change in the total number of collisions during the construction period ranged between -5.3 on Highway 29 (an improvement due to permanent roadway improvements) and 25.4 on Highway 97 North (representing a 3.3% increase) over the entire Project construction period.

The overall residual Project effects on traffic delay and road safety would be local in geographic extent, as the changes would occur within the LAA and surrounding road networks; would be medium term in duration, extending through the construction phase; and would be reversible once the construction phase is complete. The frequency of effects, where changes occur, would be daily throughout construction, with commuter-based traffic volumes peaking during shift changes.

The context in which residual effects would occur is moderate. Given the rural nature of the area and its resource-based economy, affected communities and drivers would be familiar with other development projects exhibiting similar road usage requirements and effects. More locally, however, residents south of Highway 97 and living closer to the dam site would experience an increase in traffic activity during the construction period. BC Hydro is committed to continue engaging with local residents to reduce the potential effects that this localized increase in activity would bring.

The level of confidence in the traffic forecasts for the Project and corresponding traffic effects assessment is moderate, since this information is based on detailed evaluation of materials, routes, and timing, but it is subject to shifts in these factors based on the contractors' schedule, means, and methods. Further, the base case traffic forecasts (without the Project) have assumed population and industrial growth rates that have prevailed in the past 20 years. For this reason, the level of confidence in base case traffic forecasts during the construction time period is also moderate. The probability of an adverse effect occurring on transportation would be high, because the Project would add traffic volumes to the identified routes.

During operations there may be adverse effects on road safety, due to a possible increase in fog conditions at Taylor. As discussed above, there is uncertainty as to whether or not this would occur and, if so, what the magnitude of change would be (measured in hours of normal and heavy fog per year). If the effect does occur, it would be site-specific in the vicinity of the bridge at Taylor, would occur throughout operations (long term), and would happen in a seasonal cycle based on water and air temperatures. The changes would be permanent and therefore not reversible. If there are more fog hours, the social context is moderately resilient, as there are driver behaviour measures than can reduce road safety risks, and management measures that can also reduce road safety risks. As discussed, the level of confidence in the characterization of this effect is low and the probability is unknown; therefore, monitoring is proposed.

The adverse project effect on transportation is characterized in Table 31.28.

Table 31.28 Summary of Residual Effects Ratings for Transportation

Activity	Effect	Residual Environmental Effect							
		Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Social Context	Level of Confidence	Probability
Construction	Change in road traffic delay	Adverse	Low	Local	Medium term Daily	Reversible	Moderate resiliency	Moderate	High
	Change in road safety	Adverse	Low	Local	Medium term Daily	Reversible	Moderate resiliency	Moderate	High
Operations	Change in road safety (fog at Taylor)	Adverse	Unknown	Site-specific	Long term Seasonal	Irreversible	Moderate resiliency	Low	Unknown

31.6.2 Standards or Thresholds for Determining Significance

The assessment of Project effects on transportation has considered the potential for changes during Project construction to road traffic delays on road networks in the LAA, changes to road safety on road networks in the LAA, and changes during Project operations on road safety due to increased fog conditions roads in the vicinity of the Project.

A residual effect on transportation is considered significant if all of the following criteria are met:

- The effect is adverse
- The magnitude is moderate or high
- The geographic context is local or regional
- The frequency is continuous
- The duration is long term
- The effect is irreversible
- The social context is moderate or high

31.6.3 Determination of Significance of Residual Effects

Road safety during construction is anticipated to be somewhat reduced on most roads within the LAA, but would be well within the normal variability of annual collision frequency in the LAA. On Highway 29 North and Old Fort Road, implementation of mitigation measures and construction of road improvements are expected to improve road safety in the long term. Adverse effects associated with traffic delay and road safety would be contained to the LAA, and only for the duration of construction. However, benefits from road and highway infrastructure improvements completed as part of the Project would be realized beyond completion of the Project and into the future. For these reasons, adverse residual effects on transportation are considered not significant.

Table 31.29 summarizes the effects, mitigation, and assessment of significance for transportation.

Table 31.29 Summary of Assessment of Potentially Significant Residual Adverse Effects

Valued Component	Project Phase	Potential Effects	Key Mitigation Measures	Significance Analysis of Residual Effects (Summary Statement)
Transportation	Construction	Potential changes to traffic delays and road safety – all road segments Residual adverse effects anticipated on all road segments due to general increase in traffic	▪ Implement Traffic Management Plans to include Traffic Control Plans, Public Information Plans, Incident Plans, and Implementation Plans ▪ Geometric, cross-section, and road structure improvements to roads to be used by Project-related traffic ▪ On Canyon Drive west of Hudson's Hope, construct a paved brake check before the start of the 10% grade, and make it a mandatory requirement for Project-related trucks to stop and check vehicle brakes ▪ Explore, and install if feasible, opportunities for constructing either arrestor beds or runaway lanes, or both, on Canyon Drive above Hudson's Hope ▪ Shuttle for workers, as deemed necessary; work with District of Chetwynd to identify suitable parking locations for workers using shuttles. ▪ Control access to Project access road at north end of Jackfish Lake Road ▪ Carpooling program for local workforce ▪ Conduct intersection lighting calculations to determine if illumination is warranted and then, in collaboration with BCMoTI, consider installing intersection lighting	Not significant
Transportation	Operations	Potential changes to road safety due to fog Potential for residual adverse effects on road safety if Project is confirmed to increase fog conditions	▪ Monitor the change in fog hours on, and on the approaches to, the Taylor Bridge, and implement mitigative measures as deemed necessary	Not significant

31.7 Cumulative Effects Assessment

In extrapolating past long-term industrial growth trends, the base case traffic projections, as discussed above in the road transportation outlook, inherently include future major development projects (Volume 4 Appendix B Project Traffic Analysis Report). Therefore, the residual project effects of transportation already account for overlaps and interaction with these projects. An assessment of cumulative effects was not undertaken because it would represent a double-counting of project residual effects.

31.8 Monitoring and Follow-Up

During construction, given the moderate level of uncertainty in the traffic modelling results, monitoring could include periodic Project traffic counts in the LAA to determine if Project-related traffic volumes are adversely affecting traffic operations. Locations, and potential resulting mitigation, could include:

- The intersection of Highway 29 and Canyon Drive, to confirm any traffic delays resulting from construction. Potential resulting mitigation could include construction of a dedicated left-hand turn slot, or changing intersection priority by revising pavement markings and signing.
- The signalized intersection of Highway 29 South and Highway 97 South in Chetwynd to determine if traffic signal timing adjustments could reduce overall intersection delay during construction.
- Monitor Highway 97 signalized intersections in Fort St. John and, if deemed necessary in discussion with BCMoTI and the City of Fort St. John, adjust traffic signal timings to reduce overall intersection delay during construction.
- Local commuter road usage, and, if deemed necessary in discussion with BCMoTI and local stakeholders, implement local road use restrictions, for example on Project traffic using 269 Road between 240 Road and Highway 97.

This monitoring work could take the form of short duration (one day) intersection counts, longer (one week) duration hose counts, or downloading traffic count data from signalized intersections. Details regarding the construction traffic monitoring program would be developed when the contractor's schedule and details associated with Project-related infrastructure, such as parking lots, camp locations, and off-site accommodation, are confirmed. Following this monitoring program, the scope of any required mitigation would be developed in collaboration with BCMoTI and stakeholders.

Given the uncertainty in predicting changes in fog hours at Taylor Bridge, monitoring of the changes in fog hours will be carried out on Taylor Bridge and the South Taylor Hill during operations to determine if mitigation measures (e.g., illumination, changeable message signs that are visible in dense fog, radio broadcasts) are required to reduce driver speed, minimize the potential for fog-related collisions, and maintain overall road safety. Using the results of this monitoring program, the scope of any required mitigation would be developed in collaboration with BCMoTI and stakeholders.

Monitoring recommendations are summarized in Table 31.30.

Table 31.30 Follow-up Program for Transportation

Valued Component	Project Phase	Monitoring Program Objective	Monitoring Program Frequency	Monitoring Program Duration
Transportation	Construction	Record traffic counts and monitor traffic operations at the following intersections: ▪ Highway 29 and Canyon Drive in Hudson's Hope ▪ Highway 97/Highway 29 in Chetwynd ▪ Highway 97 intersections in Fort St. John Monitor traffic operations on local roads to determine if road restrictions for Project-related traffic should be implemented	▪ Intersection and local road operations – annually, during active construction ▪ Traffic Counts – annually, during active construction ▪ Fog – Seasonally	During construction
Transportation	Operations	▪ Monitor the change in fog hours during operations on, and on the approaches to, the Taylor Bridge and implement mitigative measures as deemed necessary	▪ Seasonally	Initiate during construction to develop a baseline, and continue through Years 0 to 4 of operation or until the changes in fog can be confirmed

References

Literature Cited

DeLeur Consulting Limited. 2012. Roadway Safety Engineering Study, Site C Clean Energy Project. Road Safety Engineering and Planning. Prepared for Tetra Tech WEI Inc. Manuscript on file at BC Hydro. Vancouver, B.C.

Transportation Research Board. 2000. Highway Capacity Manual. Transportation Research Board. Washington, DC.

Internet Sites

British Columbia Ministry of Transportation and Infrastructure (BCMoTI). 2012. Ministry Reporting: Service Plans, Annual Reports and Financial Statements. Available at: http://www.th.gov.bc.ca/publications/ministry_reporting/index.htm Accessed: June 2012.

British Columbia Ministry of Transportation and Infrastructure (BCMoTI). 2011. Traffic Data Program. Available at: http://www.th.gov.bc.ca/trafficData/index.asp. Accessed: October 2012.

Fisher, Erica. 2012. North Peace Airport Improvement Fee increasing to $18. Energetic City: Everything Fort St. John. November 15, 2012. Available at: http://energeticcity.ca/article/news/2012/11/15/north-peace-airport-improvement-fee-increasing-18 Accessed: December 2012

Personal Communications

District of Hudson's Hope. 2011. Community Representative. In-person meeting Hudson's November 30, 2011.

North Peace Regional Airport. 2012. Managing Director, Moira Green. Telephone conversation October 3, 2012.