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8.15 TRANSPORTATION

Transportation, including both road and rail transportation modes and the infrastructure networks that support them, are important to the public in the area surrounding the Project for access and mobility. Road and rail transportation are also important for the safe transportation of workers and supplies to and from the Project. Transportation was identified by regulatory agencies and the public as a valued environmental component (VEC) to be assessed in the environmental impact assessment (EIA). The expected contribution of the Project to existing traffic levels in the Project area and the responsibility for maintenance of the transportation network that could be degraded as a result of the Project are a particular concern. Transportation has thus been selected as a VEC in recognition of this importance. Though existing rail infrastructure and port facilities will be used for the Project, these facilities will remain unchanged from their current state, and no new rail or port infrastructure is required or planned to facilitate their use by the Project.

Vehicles will carry personnel, materials, supplies and products to/from the Project site during all phases of the Project, which will result in increased traffic volumes on existing public and forest resource roads leading to and from the Project site. Increased traffic volumes have the potential to cause traffic delays by reducing the level of service (LOS, defined later) and/or damaging road infrastructure, and to increase the potential for accidents or collisions. The Project-related traffic will use the existing provincial highway transportation network and existing forest resource roads to access the Project site. These roads are under-used and are more than able to accommodate the limited increased traffic that will arise from the Project, with some maintenance and refurbishment as necessary. The likelihood of over-capacity on, or sustained damage to, the existing road transportation network arising from the Project will be mitigated by the use of a primary truck route that uses the provincial highway (maximum allowable weight limits, all truck configurations permitted) and forest resource roads designated for heavy trucking, by bussing of personnel from off-site parking lots to reduce the volume of traffic on the site access routes during Construction, and by the limited number of vehicles travelling to and from the Project site each day.

With the proposed mitigation described above, and with SML consultation and agreements with the Crown Timber Licence Holders and the New Brunswick Department of Natural Resources (NBDNR) regarding the refurbishment and maintenance required on the forest road network, the environmental effects of the Project on Transportation will be not significant.

8.15.1 Scope of Assessment

This section defines the scope of the assessment of potential environmental effects of the Project on Transportation in consideration of the nature of the regulatory setting, issues identified during public, stakeholder, and First Nations engagement activities, potential Project-VEC interactions, and existing knowledge.

8.15.1.1 Rationale for Selection of Valued Environmental Component, Regulatory Context, and Issues Raised During Engagement

Transportation refers specifically to transportation associated with the Project. Transportation was selected as a VEC due to the importance of the transportation network to the safety, economic and social well-being of the citizens and industry in the central New Brunswick. This VEC includes consideration of road infrastructure condition (including the condition of the infrastructure, and allowable weights and dimensions), traffic level of service (traffic volumes and operations), and traffic safety (including vehicle collisions) associated with the use of the New Brunswick highway system and forest resource roads by the Project. The assessment of Transportation will thus consider the potential changes in the use of the existing road infrastructure, traffic volumes and associated level of service, and traffic safety conditions, as a result of the Project.

The Transportation VEC considers the primary and secondary roads, intersections and infrastructure leading to and from the Project site as part of the provincial highway system (*i.e.,* provincial arterial, collector, and local highways), the forest resource roads and infrastructure between the Project site and the provincial highway system, railway infrastructure in the vicinity of the Project, and any environmental effects as a result of temporary or permanent changes in traffic levels or usability of these roads, intersections, and infrastructure. During all phases of the Project, there will be Project-related vehicle traffic for: transporting of personnel to and from the Project site; construction vehicles and heavy-duty equipment accessing the site; trucks transporting materials, equipment, goods and products; and service vehicles traveling to and from the Project site.

Several transportation modes and options will be used to supply personnel, goods, services and materials to the Project site and to ship materials from the Project location during all phases. These include trucking on provincial highways and forest resource roads to supply materials to and from the Project site, trucking to and from a local rail spur at Napadogan for direct rail delivery of products to markets, or rail shipment to a New Brunswick port for marine delivery to markets, or trucking products directly to markets. Shipments via road and rail will use existing infrastructure and will adhere to the restrictions and limitations included in all applicable provincial and federal acts and regulations, including the New Brunswick *Highway Act* and the *Shortline Railways Act*, among others.

The Final Guidelines (NBENV 2009) require an assessment of Project-related environmental effects on traffic patterns and flows, including a prediction of environmental effects on future road infrastructure and use with reference to safety and the integrity of the infrastructure on traffic flows, level of service and accident rates. These issues are addressed in this VEC. In addition, the Final Guidelines require that the environmental effects of increased ground transportation in the region be assessed with respect to air quality (including fossil fuel combustion), noise, and risk of accidental spill as a result of increased traffic volumes. These assessments are included in Sections 8.2 (Atmospheric Environment), Section 8.3 (Acoustic Environment), and Section 8.17 (Accidents, Malfunctions and Unplanned Events), respectively.

The Final Guidelines and the Terms of Reference (Stantec 2012a) also require the assessment of environmental effects as a result of the Project on rail transportation, should a new rail spur be required for the Project. Existing railway infrastructure and the existing rail spur at Napadogan will be used to transport certain materials and supplies from their origin to Central New Brunswick, and to ship products to markets. There are no planned or proposed new rail spurs included as part of the Project,

nor are there current plans to use either the Juniper or the Deersdale rail spurs to support the Project. Further, no dedicated trains will be required. Instead, shipment of Project materials, supplies and products will be accomplished by adding one or more rail cars to existing trains travelling to and from Napadogan on the existing rail system. The existing rail infrastructure and port facilities will remain unchanged from their current state, and no new rail or port infrastructure is required or planned to facilitate their use by the Project—as such, rail and port facilities are not discussed further in this EIA Report. Should the Proponent propose a new rail spur or improvements to the existing rail system in the future in support of the Project, an assessment would be conducted of that component to identify the environmental effects related to the change in rail infrastructure under applicable laws and regulations.

During public and stakeholder engagement activities, the principal issues and concerns raised by the public or stakeholders in relation to Transportation arising from the Project included the following.

- What transport routes will be used to and from the mine?
- Will concentrate be shipped by rail or road?
- Who will maintain the existing road infrastructure?

Local residents, businesses, and stakeholders have also expressed that an increase in traffic through the local communities (*e.g.,* Stanley, Juniper) would be welcomed, as this could lead to corresponding increased spending at local shops and business. Potential economic benefits of the Project to the surrounding area are assessed in Section 8.10 (Labour and Economy).

During Aboriginal engagement activities conducted for the Project, First Nations raised the concern about the Project increased the level of traffic on the existing network of forest resource roads leading to the Project, thereby potentially affecting wildlife availability for practicing traditional activities in the area and potentially leading to increased dust levels. Potential increased traffic levels are addressed in this VEC, whereas dust levels were addressed in Section 8.2 (Atmospheric Environment). There were no other issues or concerns raised by First Nations in relation to Project-related Transportation.

8.15.1.2 Selection of Environmental Effect and Measurable Parameters

The potential environmental effects of the Project on Transportation are assessed as a Change in Transportation, encompassing three categories of change.

- The suitability of the existing network infrastructure to carry equipment and materials to the Project site, and the potential change in road network infrastructure condition and integrity, due to increased use, wear, and tear.
- The change in highway traffic flows on collector and arterial highways, especially at key intersections leading from the provincial highway system to the Project site, as measured by LOS.
- The change in vehicle collision rates on roads and at intersections.

The Change in Transportation is assessed using four measurable parameters provided in Table 8.15.1 with the rationale for their selection.

Table 8.15.1 Measurable Parameters for Transportation

Environmental Effect	Measurable Parameter	Rationale for Selection of the Measurable Parameter
Change in Transportation	Level of Service (LOS, characterized as LOS A to F; Table 8.15.3)	• LOS represents traffic operating conditions at intersections and along rural highways. Level of service is typically measured in seconds of delay experienced at major intersections, and correlated to an LOS designation ranging from A (Excellent) to F (Unacceptable). Increases in traffic volumes, as could arise from the Project, can potentially cause a decrease in LOS. • Annual Average Daily Traffic (AADT) represents an estimated annual average total volume per day of traffic on a highway or road, including all cars and trucks. Annual Average Daily Truck Traffic (AADTT) is a sub-set of AADT and is limited to an annual average volume per day of truck traffic on a highway or road. Changes in AADT and AADTT are used in the calculation of LOS.
	Collisions per Million Vehicle Kilometres (Col/MVK)	• A measure of traffic safety based on the reported rate of collisions on a section of highway or street per million vehicle kilometres travelled on that highway or street. Collisions on roadways may result in property damage, or in personal injury.
	Quality of Road Network Infrastructure (Geometric Characteristics; Table 8.15.4)	• Road Network Infrastructure Quality is measured by the condition of the road infrastructure in relation to its applicable design standard and intended use. The various standards and measures considered in the determination of road infrastructure quality are based on design standards and expectations of that service.
	Road Alignment (change in alignment in km)	• The Fire Road will be re-aligned around Project infrastructure.

8.15.1.3 Temporal Boundaries

The temporal boundaries for the assessment of the potential environmental effects of the Project on Transportation include the three phases of Construction, Operation, and Decommissioning, Reclamation and Closure of the Project as defined in the Chapter 3.

The temporal boundaries for the characterization of existing conditions for Transportation include the most recent data available from the following sources, as there is little value in considering past traffic patterns when evaluating Project-related environmental effects:

- AADT data available from the New Brunswick Department of Transportation and Infrastructure (NBDTI) for the year 2010;
- vehicle collision data for highways within the Local Assessment Area (LAA, defined below) from most recent five-year period available (2006-2010), obtained from NBDTI; and
- field data collected by exp Services Inc. (exp Services Inc. 2013a) at three intersections within the Local Assessment Area (LAA, defined below) between October and November 2012, for the specific purpose of characterizing annual average daily traffic (AADT) and annual average daily truck traffic (AADTT) for this EIA.

8.15.1.4 Spatial Boundaries

The spatial boundaries for the environmental effects assessment of Transportation are defined below.

Project Development Area (PDA): The PDA is the most basic and immediate area of the Project, and consists of the area of physical disturbance associated with the Construction and Operation of the Project. Specifically, the PDA consists of an area of approximately 1,253 hectares that includes: the open pit; ore processing plant; storage areas; tailings storage facility (TSF); quarry; the relocated Fire Road and new Project site access road, and new and relocated power transmission lines. The PDA is the area represented by the physical Project footprint as detailed in Chapter 3.

The transportation network within the PDA as described above will be limited to private roads used to traverse and manoeuver vehicles within the Project site. A portion of an existing forest resource road, the Fire Road, will need to be relocated as part of the Project, which will be co-located with a relocated 345 kV electrical transmission line that also needs to be moved to accommodate the Project. There are no anticipated changes to the New Brunswick highway system, or to the network of forest resource roads (other than the relocation of a short portion of the Fire Road and normal maintenance activities on existing forest roads) arising from the Project.

Local Assessment Area (LAA): The LAA for Transportation (Figure 8.15.1) includes the PDA and the public and forest resource roads that lead to the Project and connect the Project to the New Brunswick highway system. The LAA is the maximum anticipated area within which Project-related environmental effects are expected. The LAA includes:

- Route 2 (the TransCanada Highway) and Route 8 (both designated as provincial arterial highways);
- Routes 107, 105, 104, and 130 (designated as provincial collector highways);
- Routes 620, 617, 610, and 605 (designated as local highways);
- The Primary Site Access (PSA) route, originating at the TransCanada Highway (Route 2) at Nackawic, through Route 105 and Route 605, and finally through the Napadogan Road (also known as the Valley Forest Products Road) and the Fire Road (the latter two being forest resource roads) to the Project site; and
- The Secondary Site Access (SSA) route, originating at the Canadian National (CN) Rail siding in Napadogan, through Route 107 and finally through the Four Mile Brook Road and Fire Road (the latter two being forest resource roads) to the Project site.

The LAA also includes existing rail infrastructure associated with the existing CN Rail spur in Napadogan, where the some shipping to and from the Project will take place.

Regional Assessment Area (RAA): The RAA is the area within which the Project's environmental effects may overlap or accumulate with the environmental effects of other projects or activities that have been or will be carried out. For the purpose of this VEC, the RAA is the same as the LAA (Figure 8.15.1).

8.15.1.5 Administrative and Technical Boundaries

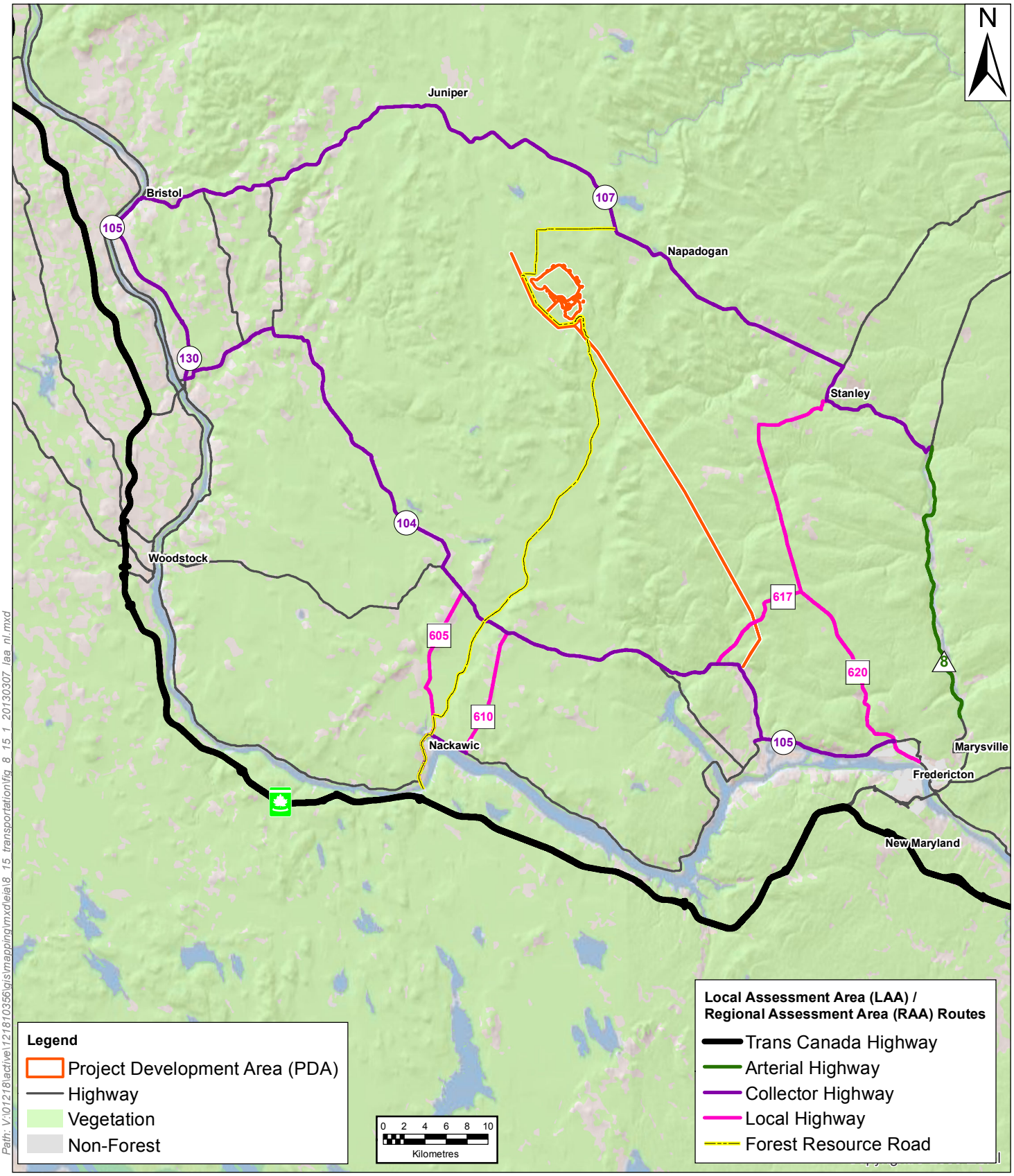
In terms of administrative boundaries, the management of road transportation on provincial arterial, collector, and local highways, including road network infrastructure condition and traffic management, is the responsibility of NBDTI under the authority of the New Brunswick *Highway Act*. The New Brunswick *Motor Vehicle Act*, administered by the New Brunswick Department of Public Safety (NBDPS), establishes traffic rules (*e.g.,* speed limits, seasonal weight restrictions). Highway designations in New Brunswick, as defined in the *Highway Act*, are described briefly in Table 8.15.2.

Table 8.15.2 Highway Designations in New Brunswick

Highway Type	Description
Arterial Highways	These highways are the primary routes in the system. New Brunswick Routes 1, 2, 7, 8, 11, 15, 16 and 95 are all designated as arterial highways. They are generally designed to accommodate gross vehicle weights (GVW) of 43,500 kg and up to 62,500 kg. The speed limit generally ranges from 80 km/h to 110 km/h, with the highest speed limits on four-lane sections. Arterial highways are marked by green signs. Arterial highways are designated by single-digit or double-digit numbers (*i.e.,* less than 99).
Collector Highways	These secondary highways are sometimes the old alignments of primary arterial highways, or connector routes between towns or to and from primary highways. They may be subject to seasonal weight restrictions. The speed limit is generally 80 km/h. Collector highways are marked by blue signs, and designated by three-digit numbers between 100 and 199.
Local Highways	These are the tertiary routes that fill out the highway network and connect small communities and areas to more important highways. These are subject to seasonal weight restrictions and lower speed limits, particularly as they cross smaller communities. The speed limit is generally 80 km/h or lower depending on road design standards. Local highways are marked by black signs and designated by three-digit numbers 200 and above.

In addition to the provincial highway system managed by NBDTI, there are a number of forest resource roads throughout the province (primarily on Crown land, or connecting to Crown land) that are used for accessing remote locations of the province. Several forest resource roads will be used for the Project. Management of the forest resource roads within the LAA is the responsibility of the Crown Timber Licence Holders for the Crown land in the area of interest, delegated to it by NBDNR under the authority of the *Crown Lands and Forests Act*. The location, class and condition of all forest roads on Crown lands under licence are reviewed annually by NBDNR to ensure that each forest road meets the standards for construction and maintenance of forest roads. The administrative boundaries are thus Crown Licences, of which there are several in the LAA.

Level of Service (LOS) is a measure of traffic operating conditions during peak traffic periods and is based on prevailing traffic conditions, roadway geometry, and traffic control measures in place on urban or rural highways and at intersections. Six levels of service are designated by the letters A to F to define traffic flow conditions. LOS A represents the best traffic operating conditions, and LOS F the worst. Most urban and rural authorities will accept LOS D traffic flow conditions before considering traffic control or infrastructure upgrade measures (Transportation Research Board 2000). A summary of LOS criteria is provided in Table 8.15.3.



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NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Local Assessment Area (LAA) and Regional Assessment Area (RAA) for Transportation Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.	Scale: 1:500,000	Project No.: 121810356	Data Sources: NBDNR, ArcGIS Online	Fig. No.: 8.15.1	Stantec
Client: Sisson Mines Ltd.	Date: (dd/mm/yyyy) 23/11/2014	Dwn. By: JAB	Appd. By: DLM		

Map: NAD83 CSRS NB Double Stereographic

Table 8.15.3 Level of Service (LOS) Criteria

LOS	Two Way Stop Controlled (TWSC) Intersections		Two-Lane Undivided Highways		
	Intersection Delay *(seconds per vehicle)*	LOS Description	Class I (Arterial) Two-Lane Highways *(PTSF: % Time spent Following)*	Class II (Collector & Local) Two-Lane Highways *(PTSF: % Time Spent Following)*	LOS Description
A	Less than 10.0 s	Very low delay; most vehicles do not have to wait for a gap in traffic. (**Excellent**)	Less than or equal to 35%.	Less than or equal to 40%.	Free flow travel conditions. (**Excellent**)
B	Between 10.0 and 15.0 s	Higher delay; more vehicles have to wait for a gap. (**Very Good**)	Greater than 35% and less than or equal to 50%.	Greater than 40% and less than or equal to 55%.	Stable flow travel conditions. (**Very Good**)
C	Between 15.0 and 25.0 s	Higher level of congestion; number of vehicles waiting for a gap is significant. (**Good**)	Greater than 50% and less than or equal to 65%.	Greater than 55% and less than or equal to 70%.	Stable flow travel conditions, with some traffic interaction, platoon formation and speed selection affected. (**Good**)
D	Between 25.0 and 35.0 s	Congestion becomes noticeable; some vehicles experience long wait times between gaps. (**Satisfactory**)	Greater than 65% and less than or equal to 80%.	Greater than 70% and less than or equal to 85%.	Higher density and platoon conditions, with travel flow becoming unstable, and speed selection and freedom to maneuver restricted. (**Satisfactory**)
E	Between 35.0 and 50.0 s	Intersection is at or very near capacity; considered by many agencies to be the limit of acceptable delay. (**Limit of Acceptable**)	Greater than 80%.	Greater than 85%.	Traffic volumes are approaching capacity, with unstable flow causing breakdowns, and maneuverability highly restricted. (**Limit of Acceptable**)
F	Greater than 50.0 s	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection. (**Unacceptable**)	Flow rate exceeds capacity.	Flow rate exceeds capacity.	Traffic demand exceeding capacity with heavily congested traffic flow and frequent variations in travel speeds and stoppages. (**Unacceptable**)

Source: Transportation Research Board (2000).

For traffic safety, vehicle collision rate statistics are maintained by NBDTI to normalize the vehicle collision occurrences based on traffic volumes and highway segment length, and to provide a basis for comparison while identifying highway segments that may be especially prone to vehicle collisions. Average vehicle collision rate is calculated as the number of vehicle collisions per million vehicle kilometres (Col/MVK) along sections of roads or urban streets. Vehicle collision rates are classified by severity as Property Damage Only (PDO) Collisions (*i.e.,* involving only damage to vehicles and/or other property), Injury Collisions (*i.e.,* involving injury to one or more persons), or Fatal Collisions (*i.e.,* involving one or more fatalities). There are no set vehicle collision rates or severity thresholds that trigger attention to the need to improve the safety of a particular section of road; however, accident databases are regularly reviewed by NBDTI to establish locations with unusually high accident frequencies and to assess whether corrective action may be required.

Road network infrastructure condition is established by NBDTI (and by some municipalities within larger incorporated areas), based primarily on the field observations and professional judgment of its transportation engineers. Road network infrastructure quality is defined by the characteristics and geometries of the roadway links and includes the typical cross-section design, road surface type and condition, posted speed limits and other highway signage, number and width of lanes, shoulder widths, and vertical and horizontal curvature, as defined in Table 8.15.4 (exp Services Inc. 2013a).

Table 8.15.4 Road Network Infrastructure Condition Geometric Criteria

Geometric Criteria	Description
Surface Type	The surface type is identified as asphalt, chip seal or a combination of both and is based on the Road Life Study diagrams data from NBDTI, and field observations of the Study Team.
Surface Width	The surface widths are identified from the NBDTI Road Life Study diagrams. The width of the 600 series roadways was qualitatively noted as part of field observations of the Study Team.
Surface Condition	The surface condition is based on a qualitative assessment made as part of field observations of the Study Team. The rating has been based on a subjective visual observation of the general roadway surface pavement deterioration and its condition (*e.g.,* cracked, bumpy, *etc*.).
Rideability	Rideability is a measure of pavement surface condition and smoothness, referred to as Ride Comfort Indexes (RCIs) based on a scale of 1 to 10, with higher numbers representing a smoother pavement surface.
Number of Lanes	The number of travel lanes of the roadway.
Shoulder Width	The shoulder widths are identified from the Road Life Study diagrams. The width of the 600 series roadways was qualitatively noted during the field survey.
Shoulder Condition	The shoulder condition has been based on a qualitative assessment and rating made by the Study Team during the field survey. The shoulder condition is characterized by qualitative ratings ranging from unacceptable to excellent.

Source: exp Services Inc. (2013a).

The existing road infrastructure condition was established using data obtained from NBDTI as available, and supplemented by field observations by transportation engineers (exp Services Inc. 2013a).

The assessment of Transportation has technical limitations. These pertain mainly to the manner in which baseline data and existing conditions are collected for the measurable parameters (based on short-term traffic counts at fixed locations, extrapolated to an AADT or AADTT volume). Also, traffic levels over the operating life of the Project will vary from day-to-day, month-to-month, and year-to-year and are thus hard to predict. Therefore, the highest traffic month predicted during each phase is carried through this assessment, to be conservative. Also, vehicle collision rates are difficult to predict as no explicit relationship has been established between traffic volumes and collision rates.

8.15.1.6 Residual Environmental Effects Significance Criteria

A significant adverse residual environmental effect on Transportation is one where Project-related traffic:

- results in a drop in the existing level of service of the road network below LOS D for roads and intersections that were otherwise classified as LOS A, B, or C, except for intermittent or short periods of time not exceeding one month;
- degrades road network infrastructure so that it cannot function at the current level of service and/or results in damage to the infrastructure that is substantive;

- results in an increase in the rate of vehicle collisions as a result of the Project where mitigation was not implemented or for which damage was not compensated; or

- results in a change of alignment that does not provide a similar or better LOS and transportation network for the intended purpose of the road.

8.15.2 Existing Conditions

The existing conditions for the road transportation network that will provide access to the Project site are described in this section. The firm exp Services Inc. of Fredericton, New Brunswick was retained as an expert transportation engineering firm to characterize existing Transportation conditions in the LAA and to evaluate the potential environmental effects of Project-related traffic (exp Services Inc. 2013a; 2013b).

8.15.2.1 Primary Site Access (PSA) Route and Secondary Site Access (SSA) Route

The two principal access routes to the Project are shown in Figure 8.15.2. They include the following.

- **Primary Site Access (PSA) route:** From the TransCanada Highway (Route 2), through Route 105 and Route 605, and finally through two forest resource roads, the Napadogan Road (also known as the Valley Forest Products Road) and the Fire Road, to the Project site.

- **Secondary Site Access (SSA) route:** From the CN Rail siding in Napadogan, through Route 107, and finally through two forest resource roads, Four Mile Brook Road and Fire Road, to the Project site.

The PSA route uses two forest resource roads, the Napadogan Road (also known as the Valley Forest Products Road) and the Fire Road, that extend approximately 45 km in length from Route 105 and Route 605 at the AV Nackawic Mill Woodyard entrance to the Project site. It has been designated by SML as the primary route of access to the Project from the provincial highway network. The Napadogan Road intersects Route 104, approximately 10 km north of the AV Nackawic mill woodyard. From Route 104, it continues north another 28 km to the Fire Road. The Project is located approximately another 7 km north of this intersection (Figure 8.15.2).

The SSA route also uses two existing forest roads, Four Mile Brook Road and Fire Road that extend westward then southward from Route 107 to the Project site, a length of approximately 17 km. These roads have been designated by SML as the secondary route of access from the provincial highway network north of the Project. The Secondary Site Access Route intersects Route 107 at the Four Mile Brook Road, approximately 5 km west of the community of Napadogan (Figure 8.15.2).

8.15.2.2 Existing Road Transportation Network

Route 2, the TransCanada Highway, is designated as a provincial arterial highway that runs from the Québec border west of Edmundston, through the entire province of New Brunswick and terminates at the Nova Scotia border at Aulac. It connects with Québec Highway 185 at the New-Brunswick-Québec border and with Nova Scotia Highway 104 at the New Brunswick-Nova Scotia border, as well as to the United States Interstate 95 via Route 95. It is a four-lane expressway that directly serves the cities of Edmundston, Fredericton, and Moncton.

Route 8 is designated as a provincial arterial highway that originates at the city of Fredericton, runs northward to the city of Miramichi, and terminates at Route 11 just east of the city of Bathurst in northern New Brunswick. It is a two-lane highway along its entire length. Route 107 intersects Route 148, then Route 8, at Nashwaak Bridge, east of Stanley. The new Route 8 by-pass, a 36-km two-lane highway realignment to divert traffic around Marysville to South Portage, opened in Summer 2014. The former section of Route 8 between Marysville and South Portage has been renamed Route 148. Route 148 is not discussed further in this EIA, as it is assumed that commuter traffic (including that arising from the Project) would follow this new section of Route 8—a more direct route and in better condition—than the older Route 148.

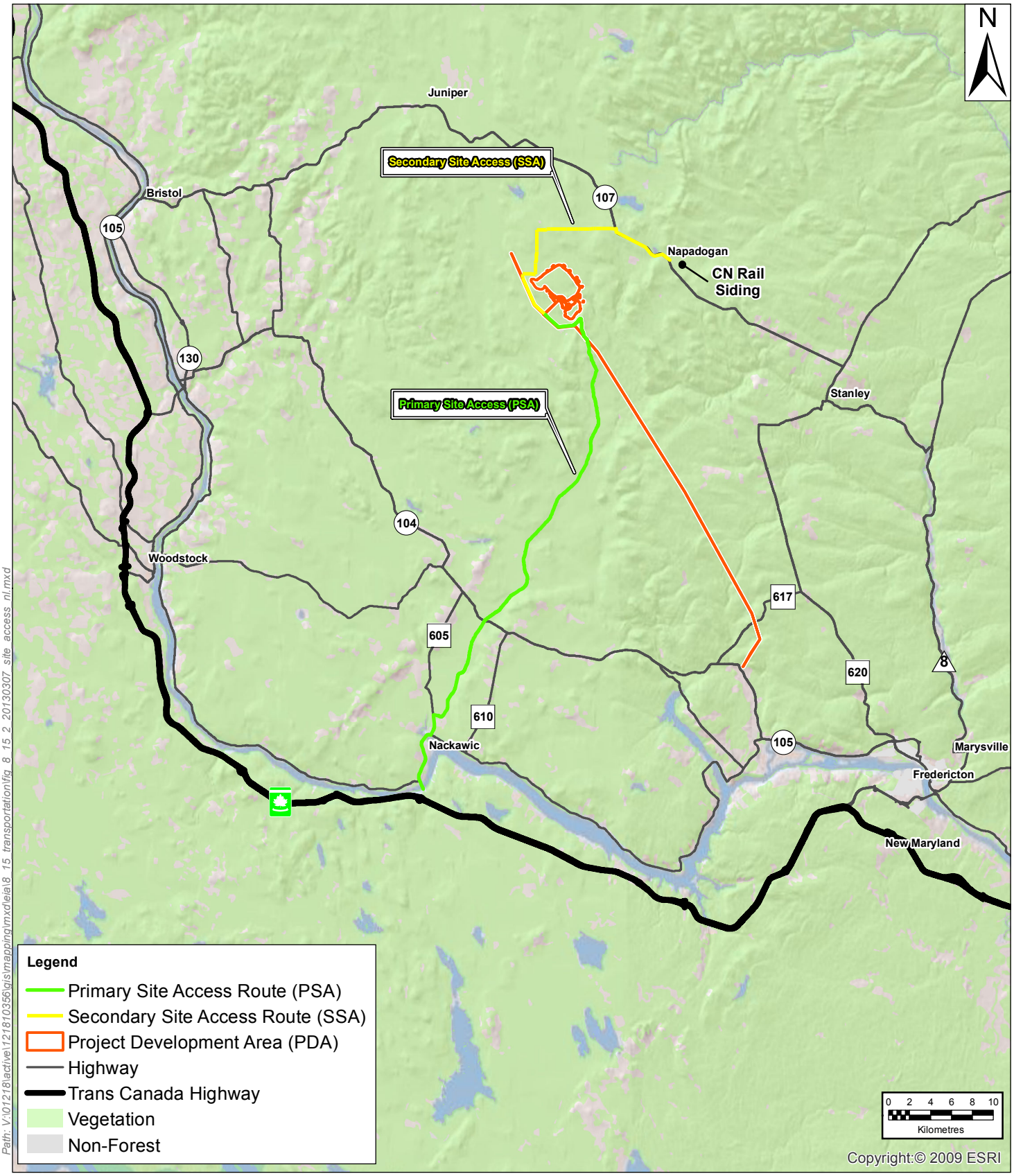
Route 7 is the main arterial highway between Fredericton and Saint John. It intersects Route 8 at Fredericton and Route 1 at Lorneville, west of Saint John. The Welsford By-pass on Route 7 opened in Fall 2013. Route 1 is a four-lane arterial highway connects the New Brunswick highway network to United States interstate network at Calais, Maine, and Route 2 near Salisbury in the east. Route 1 also provides a direct point of access to the Port of Saint John.

Route 105 (between Route 2 and Route 605) is designated as a provincial collector highway, and connects Route 2 to Route 605 in Nackawic. The section of Route 105 from Route 605 to the Hawkshaw Bridge Road is 5.1 km in length which connects with Route 2 across the Hawkshaw Bridge (0.9 km) and a short section of Route 102 (1.3 km). The entire length of this segment from Route 2 to Route 605 is 7.3 km.

Route 107 is designated as a provincial collector highway. At its western end, Route 107 intersects Route 105 at Bristol, and at its eastern end it intersects Route 620 and Route 148 then Route 8 at Nashwaak Bridge. Route 107 intersects the SSA route west of Napadogan.

In addition to the PSA and SSA routes that will provide site access as described above, there are a number of alternate feeder routes that could provide access to the Project site. As shown in Figure 8.15.2, they include:

- Route 107 (Route 105 to SSA route);
- Route 105 (Route 107 to Route 130);
- Route 104 (Route 105 to PSA route);
- Route 104 (Route 130 to PSA route);



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Primary Site Access (PSA) Route and Secondary Site Access (SSA) Route Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B. Client: Sisson Mines Ltd.	Scale: 1:500,000	Project No.: 121810356	Data Sources: NBDNR, ArcGIS Online	Fig. No.: 8.15.2	Stantec
	Date: (dd/mm/yyyy) 23/11/2014	Dwn. By: JAB	Appd. By: DLM		

Map: NAD83 CSRS NB Double Stereographic

- Route 105 (Route 620 to Route 104); and
- Route 620 (Route 105 to Route 107).

Alternate routes that provide direct access to the Project are from east and west of Route 104 and from west of Route 107. Route 104 is designated as a provincial collector highway. At its western end, Route 104 intersects Route 130 in Hartland; at its eastern limit end, Route 104 intersects Route 105 at Keswick. The Napadogan Road crosses Route 104 approximately 2 km east of Millville. This intersection provides alternate access to the Project site from the highway network.

Depending on the origin of the Project-generated traffic, other provincial highways within the LAA that could provide access to the Project include:

- Route 130 (Route 105 to Route 104);
- Route 605 (Route 105 to Route 104);
- Route 610 (Route 105 to Route 104); and
- Route 617 (Route 104 to Route 620).

8.15.2.3 Existing Level of Service

The existing truck and vehicle traffic volumes were acquired, as available, from NBDTI and from traffic count surveys carried out for the Project at key intersections within the LAA. The existing LOS of major routes within the LAA is provided in Table 8.15.5.

Table 8.15.5 Existing Level of Service (LOS) for Selected Routes within the LAA

Location			LOS Criteria and Results for Selected Routes within the LAA						
			Length (km)	AADT (2010)	Posted Speed Limit (km/h)	Passing Opportunities	Roadside Development Density	LOS [a]	PTSF
Roadway Segment	Route 8	Fredericton City Limits to Route 107	28	3,500-5,340	80-70-80-50-90-80	Low-Moderate	Low-Moderate	D	58.1 - 61.8%
	Route 104	Route 105 to PSA route	34.1	780-2,540	80-60-80-50-80-50	Moderate	Moderate	A-B	33.4-50.1%
	Route 104	PSA route to Route 130	48.6	330-1,070	80-50-80-70-80-50-80-50-80	Low-Moderate	Low	A	28.6-36.9%
	Route 107	Route 8 to SSA route	42.8	290-1,280	50-70-80-70-50-80-50-80-60-80	Moderate-High	Low-Moderate	A	23.3-34.6%
	Route 107	SSA route to Route 105	57	300-1,200	80-50-80-50-80-50	Moderate-High	Low-Moderate	A	23.5-33.8%
	Route 105	Route 620 to Route 104	13.1	4,500-8,700	90-70-80-70	Moderate	High	C-D	57.5-70.9%
	Route 105	Route 2 to Route 605	11.2	1,360-3,480	70-80-70-80	Moderate-High	Moderate	A-B	35.5-54.4%

Table 8.15.5 Existing Level of Service (LOS) for Selected Routes within the LAA

Location			LOS Criteria and Results for Selected Routes within the LAA						
			Length (km)	AADT (2010)	Posted Speed Limit (km/h)	Passing Opportunities	Roadside Development Density	LOS [a]	PTSF
	Route 105	Route 107 to Route 130	4.3	6,000	50-80-50	Low	High	C	63.50%
	Route 130	Route 105 to Route 104	16.9	2,800	80-100	High	Low	B	45.70%
	Route 605	Route 105 to AV Nackawic Mill Entrance	2	2,430	80	Moderate	Moderate	B	53.40%
	Route 605	AV Nackawic Mill Entrance to Route 104	12.9	520	80-70-80-50	Low-Moderate	Low-Moderate	A	30.80%
	Route 610	Route 105 to Route 104	12.4	360	80	Low	Low	A	29.30%
	Route 617	Route 104 to Route 620	11.5	650	50-80	Low	Low	A	32.70%
	Route 620	Route 105 to Route 107	42.7	1,240	50-60-80-60-80-70-80-50	Moderate	Low-Moderate	A	38.20%

Notes:
[a] See Table 8.15.3 for LOS descriptions.
Legend:
PSA Primary Site Access route.
SSA Secondary Site Access route.
LOS Level of Service.
PTSF Percent of time spent following.
AADT Annual Average Daily Traffic.

Source: exp Services Inc. (2013a).

The data in Table 8.15.5 indicate that all routes operate at a good LOS C or better, with the exception of Route 8 (between the Fredericton city limits and Route 107) and Route 105 (between Route 620 and Route 104), which operate at a satisfactory LOS D. These routes experience higher traffic volumes than other routes studied as they serve as commuter routes to the city of Fredericton.

The overall intersection levels of service presently experienced at each of the key intersections are shown in Table 8.15.6.

Table 8.15.6 Existing Levels of Service of Key Intersections

Intersection	Type	Period	LOS[a]
Route 105 / Route 605 (to PSA route)	3-Way Stop Controlled on Route 605	AM Peak Hour	A
		PM Peak Hour	A
Route 104 / PSA route (Napadogan Road)	4-Way Stop Controlled on PSA	AM Peak Hour	A
		PM Peak Hour	A
Route 107 / SSA route (Four Mile Brook Road)	3-Way Stop Controlled on SSA	AM Peak Hour	A
		PM Peak Hour	A

Notes:
[a] See Table 8.15.3 for LOS descriptions.
Legend:
PSA Primary Site Access route.
SSA Secondary Site Access route.
LOS Level of Service.
PTSF Percent of time spent following.
AADT Annual Average Daily Traffic.

Source: exp Services Inc. (2013a).

The LOS analysis presented in Table 8.15.6 identifies that the three intersections of the PSA and SSA with provincial highways operate at an excellent LOS A during peak periods and are operating efficiently and well below capacity under existing traffic volumes, roadway geometry, and traffic control.

8.15.2.4 Existing Traffic Safety

Average annual vehicle collision frequencies and rates for each potential access route for the five-year period from 2006 to 2010 were collected from NBDTI. The total collision rate and rates per severity class for the each provincial roadway segment, by severity classes (fatal, personal injury, and property damage only) are presented in Table 8.15.7.

Table 8.15.7 Existing Collision Rates Along Provincial Highway Routes (2006 – 2010)

Location			Total	Collisions by Severity			Collision Rate (Col/MVK)			
			Average Annual Collisions	% PDO	% Injury	% Fatal	Total	PDO	Injury	Fatal
Roadway Segment	Route 8	Fredericton City Limits to Route 107	19.4	81%	17%	2%	0.568	0.462	0.094	0.012
	Route 104	PSA route to Route 105	15.2	72%	28%	0%	0.824	0.596	0.228	0
	Route 104	PSA route to Route 130	6.2	74%	26%	0%	0.652	0.484	0.168	0
	Route 107	Route 8 to SSA route	5.6	68%	32%	0%	0.412	0.28	0.133	0
	Route 107	SSA route to Route 105	11.2	70%	28%	2%	0.577	0.402	0.165	0.01
	Route 105	Route 620 to Route 104	22.2	80%	20%	0%	0.697	0.559	0.138	0
	Route 105	Route 2 to Route 605	7.2	92%	8%	0%	1.038	0.951	0.086	0
	Route 105	Route 107 to Route 130	4.6	91%	9%	0%	0.482	0.44	0.042	0
	Route 130	Route 105 to Route 104	9.7	83%	17%	0%	0.587	0.486	0.101	0
	Route 605	Route 105 to AV Nackawic Mill Entrance	1.0	100%	0%	0%	0.564	0.564	0	0
	Route 605	AV Nackawic Mill Entrance to Route 104	1.8	56%	44%	0%	0.796	0.442	0.354	0
	Route 610	Route 105 to Route 104	1.0	100%	0%	0%	0.65	0.65	0	0
	Route 617	Route 104 to Route 620	2.8	71%	29%	0%	0.824	0.588	0.235	0
	Route 620	Route 105 to Route 107	19.2	76%	23%	1%	0.956	0.727	0.219	0.01

Notes:
1) Calculated from NBDTI collision report files, 2006 – 2010.
2) Col/MVK is the average number of collisions per million vehicle-kilometres.
3) The collision severity categories are: collisions that involve Property Damage Only (PDO); collisions that involve injuries to one or more persons (Injury); and collisions that involve one or more fatalities (Fatal).

Legend:
PSA Primary Site Access route. SSA Secondary Site Access route.

Source: exp Services Inc. (2013a).

Vehicle collision rates per million vehicle-kilometres of the provincial highways within the LAA are generally expected to be within the range of the provincial average for undivided arterial highways (0.703 Col/MVK) and provincial collector highways (0.949 Col/MVK).

There are no collision data available for the forest resource roads (*i.e.,* Napadogan Road, Fire Road, and, Four Mile Brook Road). Stop signs are posted at the approaches of the Napadogan Road and Four Mile Brook Road where they intersect Route 104 and Route 107. Stop warning signs are posted on Napadogan Road approximately 150 m ahead of the intersection on both the north and south approaches to Route 104.

Some portions of the Four Mile Brook Road, the Fire Road north and south of the Project site, and the northern portion of the Napadogan Road, are narrow and hilly and require stoppage of one vehicle to allow the other passage, specifically where one vehicle is a heavy truck or is carrying a wide-load. Warning signs are posted ahead of the one-lane bridges to be prepared to stop for opposing traffic. There are also kilometre markers every 1 km along the forest roads. Common practice for heavy trucks on the forest roads is to call in on their CB radio every 2 km to alert other vehicles that may be oncoming of their position. Signage, posted by the Crown Timber Licence Holders advising drivers to call in on their CB radios every 2 km, is posted at various locations on the forest road network. Some yellow curvature warning signs are posted on sharp curves.

Although the traffic volumes are very low, the proportionally high use of the forest resource roads by trucks and the road infrastructure limitations (*e.g.,* single-lane bridges) may pose a risk of collision. This collision risk is currently addressed by the forest industry participants by the provision of warning signs at entry points, and the requirement for use of CB radio systems for communicating vehicle locations among drivers using the forest roads.

8.15.2.5 Existing Road Network Infrastructure Condition

Road network infrastructure condition is typically characterized in terms of the geometric characteristics of a particular road or roadway segment, including surface type, surface width, surface condition rideability, number of lanes, shoulder width, and shoulder condition, as defined in Table 8.15.4. exp Services Inc. conducted a field survey of various provincial highways and routes as well as forest resource roads potentially leading to the Project in Fall 2012, and qualitative observations of the condition of the road network infrastructure are as follows by a Study Team comprising a professional engineer and transportation technician.

- **Surface Type:** The surface type was identified as asphalt, chip seal, or a combination of both, based on the Road Life Study diagrams data from NBDTI.

- **Surface Width:** The surface width of the 600 series roadways was qualitatively noted as part of field observations of the Study Team.

- **Surface Condition:** The surface condition was qualitatively rated from fair to very good. The rating has been based on a subjective visual observation of the general roadway surface pavement deterioration and its condition (*e.g.,* cracked, bumpy, *etc*.).

- **Rideability:** The rideability, characterized as Ride Comfort Indexes (RCIs), are shown in Table 8.15.7 based on the Road Life Study diagrams from NBDTI. Rideability was not available for the 600 series roadways.
- **Number of Lanes:** All roadways observed in the field survey were observed to have two-lane cross-sections, with the exception of a short four-lane section on Route 105 just west of Route 620.
- **Shoulder Width:** The shoulder widths are identified from the Road Life Study diagrams. The width of the 600 series roadways was qualitatively noted during the field survey.
- **Shoulder Condition:** The shoulder condition was rated qualitatively by the Study Team, with ratings ranging from poor to very good.

A summary profile of the geometric characteristics of each of the roads in the LAA is presented in Table 8.15.8.

Table 8.15.8 Geometric Characteristics of Roads within the LAA

Location			Geometric Criteria							
			Surface Type	Surface Width (m)	Surface Condition	Rideability	# of Lanes	Shoulder Type	Shoulder Width (m)	Shoulder Condition
Roadway Segment	Route 8	Fredericton City Limits to Route 107	Asphalt	7.3-7.5	Good to Very Good	5.88	2	Asphalt / Gravel	1.0-2.5	Good to Very Good
	Route 104	Route 105 to PSA route	Asphalt / Chip Seal	6.8-7.0	Good	5.43	2	Gravel	1.0-2.0	Good
	Route 104	PSA route to Route 130	Asphalt / Chip Seal	7.0	Fair to Good	4.26	2	Gravel	0.9-2.0	Fair
	Route 107	Route 8 to SSA route	Asphalt / Chip Seal	6.6-7.0	Fair to Good	4.53	2	Gravel	1.0-2.0	Fair to Good
	Route 107	SSA route to Route 105	Asphalt / Chip Seal	6.8-7.0	Fair to Good	4.88	2	Gravel	1.0-2.0	Fair to Good
	Route 105	Route 620 to Route 104	Asphalt	7.0	Good	5.75	2 – 4	Asphalt / Gravel	1.5-2.0	Good
	Route 105	Route 2 to Route 605	Asphalt / Chip Seal	7.0	Good to Very Good	5.42	2	Asphalt / Gravel	1.1-2.0	Good to Very Good
	Route 105	Route 107 to Route 130	Asphalt	7.0	Good to Very Good	5.09	2	Asphalt / Gravel	0.4-2.0	Good to Very Good
	Route 130	Route 105 to Route 104	Asphalt	7.5	Very Good	6.71	2	Asphalt	1.5-3.0	Very Good
	Route 605	Route 105 to AV Nackawic Mill Entrance	Chip Seal	Wide Lanes	Good	N/A	2	Chip Seal / Gravel	Wide	Good

Table 8.15.8 Geometric Characteristics of Roads within the LAA

Location			Geometric Criteria							
			Surface Type	Surface Width (m)	Surface Condition	Rideability	# of Lanes	Shoulder Type	Shoulder Width (m)	Shoulder Condition
	Route 605	AV Nackawic Mill Entrance to Route 104	Chip Seal	Narrow Lanes	Fair	N/A	2	Gravel	Narrow	Poor
	Route 610	Route 105 to Route 104	Chip Seal	Narrow Lanes	Fair	N/A	2	Gravel	Narrow	Poor
	Route 617	Route 104 to Route 620	Chip Seal	Narrow Lanes	Fair	N/A	2	Gravel	Narrow	Poor
	Route 620	Route 105 to Route 107	Asphalt / Chip Seal	Varies	Fair to Good	N/A	2	Asphalt / Gravel	Varies	Fair
	PSA route	Route 605 to Route 104	Gravel	Varies	Good	N/A	2	Gravel	Varies	Fair
	PSA route	Route 104 to Project Site	Gravel	Narrow	Fair to Poor	N/A	1-2	Gravel	Varies	Poor
	SSA route	Route 107 to Project Site	Gravel	Narrow	Fair to Poor	N/A	1-2	Gravel	Varies	Poor

Legend:
PSA Primary Site Access route. N/A Not available.
SSA Secondary Site Access route.

Source: exp Services Inc. (2013a).

In general, the provincial road network infrastructure in the LAA is comprised of two-lane, two-way paved rural collector and local highways maintained by ongoing provincial patching and resurfacing activities in fair to good surface condition and rideability. The rural highways in the LAA typically have narrow shoulders that are partially paved, but mostly gravel.

All of the provincial highways in the LAA are used for trucking, typically forest products, but most are subject to weight restrictions limiting them to a maximum of 43,500 kg gross vehicle weight (GVW) with 80% spring weight limits. Some highway segments, including the sections of Route 105 and Route 605 between the TransCanada Highway and the Napadogan Road, are all-weather roads with up to 63,500 kg GVW suitable to most truck configurations (exp Services Inc. 2013a).

The forest roads (*i.e.,* Napadogan Road, Four Mile Brook Road, and Fire Road) are gravel roads maintained by the current Crown Timber Licence Holders. The segment of the PSA route from Nackawic to Route 104, and for about half the distance to the Project site north of Route 104 is wide enough to allow two-way passage, and generally in good to fair condition (Photo 8.15.1). The remaining portion of Napadogan Road and the Fire Road to the Project site is functionally a one-lane road (Photo 8.15.2). There are three one-lane bridges along the northern segment of the PSA route (Photos 8.15.3 and 8.15.4). Most of the SSA route is narrow with a one-lane bridge and functionally limited to one lane only, and in fair to poor condition. The forest resource roads are equipped with kilometre markers and other signage (*e.g.,* warnings near single-lane bridges; CB radio call-in reminders) (Photo 8.15.5). Though single-lane, the bridges along the PSA and SSA have been built to accommodate heavy logging trucks carrying loads of up to 62,500 kg GVW. Enforcement of traffic rules on forest resource roads is the responsibility of the Royal Canadian Mounted Police (RCMP).

The design of forest roads is the responsibility of the Crown Timber Licence Holders and is reviewed and approved by NBDNR prior to construction. Design considerations for the construction and maintenance of forest roads, including watercourses crossings, is dependent upon expected loadings, vehicle dimensions, travel speeds, sight distances, and traffic densities that are anticipated to use the road, for the life of the road (NBDNR 2004). Maintenance of the forest roads (*e.g.,* grading, snow removal, and restoration and upgrading) is conducted by the Crown Timber Licence Holders and managed through on-going agreements among the Crown Timber Licence Holders in consultation with NBDNR. The level of road maintenance provided to segments and condition of the forest roads is generally dependent upon whether they are actively in use by the forest products industry (exp Services Inc. 2013a).

Photo 8.15.1 Napadogan Road (also known as Valley Forest Products Road), looking northward.

Photo 8.15.2 **Fire Road, near the intersection with Napadogan Road, looking eastward.**

Photo 8.15.3 **New single-span, single-lane bridge at Nashwaak River.**

Photo 8.15.4 Single-span, single-lane bridge at Keswick River.

Photo 8.15.5 Warning sign near single-lane bridge on Four Mile Brook Road.

8.15.3 Potential Project-VEC Interactions

Table 8.15.9 below lists each Project activity and physical work for the Project, and ranks each interaction as 0, 1, or 2 based on the level of interaction each activity or physical work may have with Transportation.

Table 8.15.9 Potential Project Environmental Effects to Transportation

Project Activities and Physical Works	Potential Environmental Effects Change in Transportation
Construction	
Site Preparation of Open Pit, TSF, and Buildings and Ancillary Facilities	0
Physical Construction and Installation of Project Facilities	0
Physical Construction of Transmission Lines and Associated Infrastructure	0
Physical Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads	1
Implementation of Fish Habitat Offsetting/Compensation Plan	0
Emissions and Wastes	0
Transportation	2
Employment and Expenditure	0
Operation	
Mining	0
Ore Processing	0
Mine Waste and Water Management	0
Linear Facilities Presence, Operation, and Maintenance	0
Emissions and Wastes	0
Transportation	2
Employment and Expenditure	0
Decommissioning, Reclamation and Closure	
Decommissioning	0
Reclamation	0
Closure	0
Post-Closure	0
Emissions and Wastes	0
Transportation	1
Employment and Expenditure	0

Project-Related Environmental Effects

Notes:

Project-Related Environmental Effects were ranked as follows:

0 No substantive interaction. The environmental effects are rated not significant and are not considered further in this report.

1 Interaction will occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices and/or permit conditions. The environmental effects are rated not significant and are not considered further in this report.

2 Interaction may, even with codified mitigation and/or permit conditions, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EIA.

Rail transportation was identified by regulatory agencies as requiring assessment if new rail infrastructure is required to support the Project. Central New Brunswick has a mature rail network that has been in place since the mid-19th Century. The CN Rail line is a Class 1[1] rail line that connects the intermodal hub in Moncton to larger multi-model hubs in Halifax, Nova Scotia and Montréal, Québec. The existing rail network is under-used and well below capacity. No dedicated trains will be required for shipments to or from the Project; instead, shipments will be accomplished by adding one or more rail cars to existing trains currently travelling to and from Napadogan on a periodic basis. Even with the Project, there will remain considerable capacity within the existing rail network. Thus a Project-related capacity concern with respect to the use of the existing rail infrastructure is not anticipated. No new rail infrastructure is planned or required as a result of the Project. As such, environmental effects of the Project on rail transportation are rated not significant and further consideration in this assessment is not required.

Environmental effects of the Project on Transportation are collectively considered under the activity identified as Transportation in Table 8.15.9, so as to encompass all Project-related transportation activities (*e.g.,* movement of equipment, supplies, materials, and personnel to and from the Project site) under a single activity during each phase. Therefore, all other Project activities are rated as 0 (no interaction) in Table 8.15.8 and are thus rated not significant and there is no requirement to consider these further in the EIA.

Potential Project-related environmental effects to Transportation could occur as a result of Project-related traffic using public and forest resource roads within the LAA during all Project phases. Transportation has been ranked as 2 in Table 8.15.9 for the Construction and Operation phase, and as 1 for the Decommissioning, Reclamation and Closure phase. The Project will generate vehicle traffic during all phases as a result of the movement of equipment, supplies, materials, and personnel to and from the Project site. The most noticeable change in Transportation on the roads within the LAA will take place during Construction, when site preparation and physical construction of Project-related infrastructure will require specialized equipment, materials, and supplies and up to 500 personnel (some by bus) at the peak of Construction activity to be transported on a daily basis to the Project site. During Operation, over time, the public and the transportation network will adapt to an increase of personal vehicles and truck movements on local highways and forest resource roads as they move to and from the Project site. Process mineral products will be shipped off-site by truck via the existing forest resource road network and onto the provincial highway network, either directly to markets by truck or via the existing rail spur located at Napadogan. Increased traffic volumes on the PSA route and/or SSA route could lower the LOS of the intersections on these routes below acceptable limits. Increased traffic, particularly an increase in heavy trucks, could also damage road infrastructure. These Project-related activities during Construction and Operation will thus be considered further in the EIA. Traffic safety considerations are by definition considered an Accident, Malfunction or Unplanned Event, which are addressed in Section 8.17.

[1] A Class 1 railway in Canada, is one of the largest freight railroads, as classified based on operating revenue. The threshold for a Class 1 Railroad in 2006 was $346.8 million (CN Rail 2013).

Transportation during Decommissioning, Reclamation and Closure has been ranked as 1 in Table 8.15.9. During Decommissioning, Reclamation and Closure, most Project-related traffic will consist of heavy truck traffic that will be used to transport equipment and materials to and from the Project site. Compared to that arising during the Operation phase, there will be a decrease in personnel vehicle traffic during Decommissioning and Reclamation activities, which will then become negligible upon Closure. Traffic levels during Decommissioning, Reclamation and Closure are conservatively assumed to have similar characteristics as traffic levels during Construction, though lesser volumes are anticipated and traffic levels are expected to taper off once decommissioning and reclamation activities are completed and as Closure activities begin. With lesser environmental effects and the same mitigation in place, relying upon the assessment of the environmental effects of Construction and Operation and planned mitigation, the potential environmental effects of the Project on Transportation during Decommissioning, Reclamation and Closure (including cumulative environmental effects) are rated not significant, and do not require further consideration in the EIA.

Physical Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads has been ranked as 1 in Table 8.15.9, as the construction of the new site access road and the realignment of the Fire Road will change traffic patterns and potentially result in a change in the LOS within the LAA. The construction of the site access road and the realignment of a portion of the Fire Road to accommodate Project facilities will be designed to applicable standards and adhere to best-practices for the construction of forest roads. During these Construction activities, the existing forest road network will remain in operation to serve motorists and the forest industry in the LAA. Some temporary, short-term and intermittent interruptions of traffic flow will be experienced as materials are transported, laid-down and installed (culverts) in areas where existing and new roads will intersect, and as heavy equipment maneuver on the existing right-of-way. These interruptions are not anticipated to cause prolonged traffic delays or traffic safety concerns. The realignment of the Fire Road will be designed in consultation and in agreement with the Crown Timber Licence Holders and NBDNR to ensure that the current needs of these roads are maintained during Construction and will continue through the life of the Project. NBDNR will be provided with design plans for the site access road and the realigned Fire Road required for the Project, and open communication with the Crown Timber Licence Holders in the LAA will be maintained throughout the life of the Project. SML will consult with the Crown Timber Licence Holders on a regular basis to review any new plans, maintenance requirements and construction agreements required to support the ongoing use of the forest resource roads.

SML is committed to maintaining safe travel routes within the LAA, and will actively participate in the management and maintenance of these roads. The realignment of the Fire Road will widen the travelling surface to allow for continuous two-way passing traffic on the realigned section of Fire Road. Signage advising motorists of Construction activities in the area and traffic pattern changes will be posted at regular intervals on the forest roads in accordance with current safety and construction standards and best-practices for the construction of forest roads. Physical Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads, in and of itself, will not result in increased traffic levels travelling on the PSA route or SSA route, although it will facilitate safer and more effective movement of vehicles through the LAA. The Project will be built to current best-practice design standards that implicitly allow for improved traffic safety moving through the area (*e.g.,* the clearer line of sight) in comparison to some other areas.

In consideration of the nature of the interactions between Physical Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads and Transportation and the planned implementation of known and proven mitigation, the potential environmental effects of Physical Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads (including cumulative environmental effects) on Transportation are rated not significant, and not required to be considered further in the EIA.

Transportation as a Project-activity within Construction and Operation has been ranked as 2 in Table 8.15.9 and is discussed further in the sections below.

8.15.4 Assessment of Project-Related Environmental Effects

A summary of the environmental effects assessment on Transportation for interactions ranked as 2 is provided in Table 8.15.10.

Table 8.15.10 Summary of Residual Project-Related Environmental Effects on Transportation

Potential Residual Project-Related Environmental Effects	Project Phases, Activities, and Physical Works	Mitigation / Compensation Measures	Residual Environmental Effects Characteristics						Significance	Prediction Confidence	Likelihood	Cumulative Environmental Effects?	Recommended Follow-up or Monitoring
			Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological/ Socioeconomic Context					
Change in Transportation	Construction • Transportation.	Mitigation to be implemented in Construction and Operation is as follows. • During Construction, bussing of personnel to/from the Project location from off-site parking lots in Nackawic and Napadogan, and potentially from other towns. • The designation of principal truck routes to the Project site to limit truck traffic to PSA and SSA routes during all phases. • Design of the realignment of the Fire Road will be done in consultation with and approved by NBDNR and in agreement with the Crown Timber Licence Holders. • Adherence to current design standards and best-practices for forest road construction, for the realignment of the Fire Road and refurbishment of the forest resource roads along the PSA and SSA routes as required to accommodate two-way Project traffic on the realigned section of Fire Road. • In consultation with NBDNR and the Crown Timber Licence Holders, maintenance of the roadway and roadside warning signs to reduce traffic safety risks along the forest	A	M	L	MT/ S	R	D	N	H	-	Y	None recommended.

Table 8.15.10 Summary of Residual Project-Related Environmental Effects on Transportation

Potential Residual Project-Related Environmental Effects	Project Phases, Activities, and Physical Works	Mitigation / Compensation Measures	Residual Environmental Effects Characteristics						Significance	Prediction Confidence	Likelihood	Cumulative Environmental Effects?	Recommended Follow-up or Monitoring
			Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological/ Socioeconomic Context					
	Operation • Transportation.	roads that are part of the PSA and SSA routes during all phases. • In consultation with NBDTI, NBDNR and the Crown Timber Licence Holders, the clearing of bushes along roadsides to improve sight distance at the approaches of the intersections of the PSA and SSA routes at provincial highways during Operation. • Compliance with the existing forest roads best practices that require use of CB radio systems (in SML-controlled vehicles like heavy trucks and buses) for communicating the location of heavy or vehicles among drivers will reduce traffic safety risks along the PSA and SSA routes during all phases. • Traffic Plan will be developed to guide Project employees and delivery vehicles that specifically identifies roadway hazards along the PSA and SSA routes. The Traffic Plan will include communications and best-practices training and a monitoring and reporting program aimed at reducing traffic safety risks along the PSA and SSA routes for the Operation phase.	A	L	L	MT/ R	R	D	N	H		Y	

Table 8.15.10 Summary of Residual Project-Related Environmental Effects on Transportation

Potential Residual Project-Related Environmental Effects	Project Phases, Activities, and Physical Works	Mitigation / Compensation Measures	Residual Environmental Effects Characteristics						Significance	Prediction Confidence	Likelihood	Cumulative Environmental Effects?	Recommended Follow-up or Monitoring
			Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological/ Socioeconomic Context					
	Decommissioning, Reclamation and Closure												
	Residual Environmental Effects for all Phases								N	H	-	Y	

KEY

Direction

P Positive.

A Adverse.

Magnitude

L Low: No damage to infrastructure, no change in overall LOS, or no change in accident rates.

M Moderate: Slight increase or minor localized and/or repairable damage to road infrastructure, or unmitigated change in overall LOS by one category, but not below LOS D; or increase in accident rates that would be of concern to NBDTI, NBDNR, or the Crown Licence Holders, requiring mitigation.

H High: Substantial damage to road infrastructure; substantial unmitigated change in overall LOS by more than one category or to lower than LOS D; or increase in accident rates that would be of concern to NBDTI, NBDNR, or the Crown Licence Holders, requiring mitigation.

Geographic Extent

S Site-specific: Within the PDA.

L Local: Within the LAA.

R Regional: Within the RAA.

Duration

ST Short-term: Occurs and lasts for short periods (*e.g.,* days/weeks).

MT Medium-term: Occurs and lasts for extended periods of time (*e.g.,* years).

LT Long-term: Occurs during Construction and/or Operation and lasts for the life of Project.

P Permanent: Occurs during Construction and Operation and beyond.

Frequency

O Occurs once.

S Occurs sporadically at irregular intervals.

R Occurs on a regular basis and at regular intervals.

C Continuous.

Reversibility

R Reversible.

I Irreversible.

Ecological/Socioeconomic Context

U Undisturbed: Area relatively or not adversely affected by human activity.

D Developed: Area has been substantially previously disturbed by human development or human development is still present.

N/A Not Applicable.

Significance

S Significant.

N Not Significant.

Prediction Confidence

Confidence in the significance prediction, based on scientific information and statistical analysis, professional judgment and known effectiveness of mitigation:

L Low level of confidence.

M Moderate level of confidence.

H High level of confidence.

Likelihood

If a significant environmental effect is predicted, the likelihood of that significant environmental effect occurring is determined, based on professional judgment:

L Low probability of occurrence.

M Medium probability of occurrence.

H High probability of occurrence.

Cumulative Environmental Effects?

Y Potential for environmental effect to interact with the environmental effects of other past, present or foreseeable future projects or activities in RAA.

N Environmental effect will not or is not likely to interact with the environmental effects of other past, present or foreseeable future projects or activities in RAA.

8.15.4.1 Potential Project Environmental Effects Mechanisms

Potential Project-related environmental effects to Transportation could occur as a result of Project traffic using public and forest resource roads within the LAA during all Project phases. The Project will generate vehicle traffic as a result of the movement of equipment, supplies, materials, products and personnel to and from the Project site during all phases. Products will be shipped in enclosed containers off-site by truck via the existing transportation network either directly to markets by truck or via the existing rail at Napadogan. All Project-related traffic will be distributed among three principal routes:

- Route 2 (TransCanada Highway) to Route 105 and Route 605 to the Project site on the PSA route;
- Route 8 to Route 107 to the site on the SSA route, and
- Route 107 from the CN Rail siding site in Napadogan to the Project site on the SSA route.

Construction will require specialized equipment, materials, and supplies and up to 500 personnel to be transported to the Project site. SML will require contractors to supply buses from a designated parking area near Nackawic and another at Napadogan to transport construction workers between these parking areas and the Project site, or from nearby towns or cities. Most travel to and from the Project site during Construction will occur during the daytime, as it is expected that nighttime construction activity will be very limited. This transportation activity will vary from day-to-day and month-to-month as construction activities also vary, but will generally continue throughout the duration of the Construction phase.

As discussed in Chapter 3, approximately 10 km of the existing Fire Road will be realigned and widened as part of the Project. This realignment will result in an upgrade of the existing infrastructure and a change in traffic patterns on the forest road network, though traffic levels would not be expected to increase considerably over current levels, except for Project-related traffic.

During Operation, traffic will be comprised of heavy trucks generated from inbound materials, reagents, and equipment, outbound products, and various maintenance and services, as well as personnel going to and from the Project site in their personal vehicles. No buses will be provided by SML during Operation. About 300 personnel (split between daytime and nighttime shifts) will travel to and from the Project site using personal vehicles, and personal vehicle use will likely increase marginally when compared to Construction. This traffic will continue through the life of the Project.

8.15.4.2 Mitigation of Project Environmental Effects

The following mitigation measures, through careful design and planning, will be implemented during both Construction and Operation so as to reduce the environmental effects of the Project on Transportation (Table 8.15.10).

- During Construction, bussing of personnel to/from the Project location from off-site parking lots in Nackawic and Napadogan, and potentially from other towns. For the purposes of this EIA, it is conservatively assumed that bussing will only be to/from the parking lots at Nackawic and Napadogan.

- The designation of principal truck routes to the Project site to limit truck traffic to the PSA and SSA routes during all phases.

- Design of the realignment of the Fire Road will be done in consultation with and approved by NBDNR and in agreement with the Crown Timber Licence Holders.

- Adherence to current design standards and best-practices for forest road construction, for the realignment of the Fire Road and refurbishment of forest resource roads along the PSA and SSA routes as required to accommodate two-way Project traffic on the realigned section of Fire Road.

- In consultation with NBDNR and the Crown Timber Licence Holders, maintenance of the roadway and roadside warning signs to reduce traffic safety risks along the forest roads that are part of the PSA and SSA routes during all phases.

- In consultation with NBDTI, NBDNR and the Crown Timber Licence Holders, the clearing of bushes along roadsides to improve sight distance at the approaches of the intersections of the PSA and SSA routes at provincial highways during Operation.

- Compliance with the existing forest roads best practices that require use of CB radio systems (in SML-controlled vehicles like heavy trucks and buses) for communicating the location of heavy or large vehicles among drivers will reduce traffic safety risks along the PSA and SSA routes during all phases.

- As it would not be possible to maintain CB radios in every private passenger vehicle, a Traffic Plan will be developed to guide Project employees and delivery vehicles that specifically identifies roadway hazards along the PSA and SSA routes. The Traffic Plan will include communications and best-practices training and a monitoring and reporting program aimed at reducing traffic safety risks along the PSA and SSA routes for the Operation phase.

8.15.4.3 Characterization of Residual Project Environmental Effects

8.15.4.3.1 Road Infrastructure

Construction

As outlined in the Project Description (Section 3.4.1), Project-related traffic volumes were predicted to total 136 vehicles as average daily traffic (ADT), which reflects the maximum traffic volume expected during the highest month of construction activity. Traffic volumes generated during Construction will be distributed between the PSA and SSA, and will accumulate as it gets closer to the Project site. Table 8.15.11 presents a comparison of existing traffic volumes to the total expected traffic volumes on the provincial highway network leading to the Project site during the peak month of Construction. As these traffic volumes represent the highest period of activity during Construction, the assessment of Transportation using these volumes is conservative.

Table 8.15.11 Distribution of Traffic Volumes to Highway Segments – Construction Phase

Location			Existing Vehicles (AADT)	Additional Project Traffic Generated During Construction (ADT)[d]	Total Traffic during Project Construction (AADT)
Roadway Segment	Route 8	Fredericton City Limits to Route 107	3,500-5,340	20	3,520-5,360
	Route 104	Route 105 to PSA route	780-2,540	25-26[a]	805-2,566
	Route 104	PSA route to Route 130	330-1,070	25	355-1,095
	Route 107	Route 8 to SSA route	290-1,280	76-80[c]	370-1,356
	Route 107	SSA route to Route 105	300-1,200	75	375-1,275
	Route 105	Route 620 to Route 104	4,500-8,700	14	4,514-8,714
	Route 105	Route 2 to Route 605	1,360-3,480	31[b]	1,360-3,511
	Route 105	Route 107 to Route 130	6,000	38	6,038
	Route 130	Route 105 to Route 104	2,800	Negligible	2,800
	Route 605	Route 105 to AV Nackawic Mill Entrance	2,430	31	2,461
	Route 605	AV Nackawic Mill Entrance to Route 104	520	Negligible	520
	Route 610	Route 105 to Route 104	360	Negligible	360
	Route 617	Route 104 to Route 620	650	Negligible	650
	Route 620	Route 105 to Route 107	1,240	18	1,258
	PSA route	Route 605 to Route 104	190	31	221
	PSA route	Route 104 to Project Site	242	81	323
	SSA route	Route 107 to Project Site	16	55	71

Notes:

[a] 26 ADT between Route 105 and Route 617 and 25 ADT between Route 617 and PSA.

[b] 31 ADT between Route 2 and Route 605 and 0 ADT between Route 605 and Route 610.

[c] 80 ADT between SSA and Project Employee Parking Lot in Napadogan and 76 ADT between Project Employee Parking Lot in Napadogan and Route 620. Lower volumes generated east of Route 620.

[d] The above Project-generated traffic volumes have been based on the peak month of construction activity, when, under current plans, traffic is anticipated to be the highest during the planned 18 to 24 month construction period.

Source: exp Services Inc. (2013a).

As shown in Table 8.15.11, on the PSA route, despite the use of buses between the parking lot and the Project site, notable increases in traffic are expected during the peak month of Project construction on the PSA route, where the ADT will increase to 31 vehicles between the TransCanada Highway and Napadogan Road. As traffic accumulates on the PSA route, specifically north of Route 104, the ADT will increase further to 81 vehicles as construction workers in their own passenger vehicles access Napadogan Road from the east and west via Route 104. Of this total 81 ADT, 31 vehicles will be trucks or buses, and the remaining 50 will be passenger vehicles.

On the SSA route, a total of 55 ADT of construction-related traffic will be generated that will travel on the SSA route from Route 107 west and east of the access road, as well as from the employee parking lot located at the CN Rail siding in Napadogan. Of this 55 ADT, 5 vehicles will be trucks or buses, and the remaining 50 will be construction workers in their own passenger vehicles.

Project-related construction traffic volumes on Route 107 between Route 8 and Napadogan and between Napadogan and the Four Mile Brook Road on the SSA route, will be higher with an estimated ADT of 76 and 80 vehicles, respectively, due to the additional construction worker passenger vehicles going to the parking lot to catch a bus to the Project site.

During Construction, all materials and equipment will be transported from the TransCanada Highway to the Project site via the PSA route. The provincial highway segments of this route allow truck configurations 23 m in length *(i.e.,* WB-20 tractor-trailers) and loadings up to a maximum of 62,500 kg GVW. The provincial highway network on this route is comprised of all-weather highways with no spring weight restrictions and has the highest permitted allowable truck dimensions and weight limits in New Brunswick.

A small portion of the truck traffic (*e.g.,* services vehicles) will originate in Fredericton or communities along Route 8 and Route 107, and will travel along the SSA route to the Project site. Route 8 is presently an all-weather highway with the maximum of 62,500 kg GVW. Route 107 between Route 8 and the SSA route is limited to 43,500 kg GVW and is subject to spring weight restriction, typically at 80% of allowable GVW. The trucks that will use this route will not exceed the maximum weight limits even during the spring weight season; if they do, they will travel to the site from the TransCanada Highway.

No construction materials or equipment will be transported to the CN Rail siding for trans-shipment to the Project site. The CN Rail site will be used only for a parking lot for workers bussed in to the site during Construction. These buses will not exceed the 43,500 kg GVW limits of Route 107.

The PSA and SSA routes are comprised of gravel forest roads built to serve the forestry industry. Except for the Napadogan Road segments of the PSA route between Route 605 at the Nackawic mill and Route 104 and the lower section of the segment north of Route 104 (all of which are in good condition), most of the segments of the PSA and SSA routes are in fair to poor condition. The forest resource roads are typically maintained only where the forestry industry is active and the roads are in use. SML will realign and widen the Fire Road as part of the Project, and with NBDNR and the Crown Timber Licence Holders, will cooperate to refurbish the PSA and SSA forest roads as needed to accommodate Project-related traffic, and to actively manage the safe use, operation and maintenance of these roads.

The realignment and widening of approximately 10 km of the Fire Road to accommodate Project facilities will enhance the forest road network in the LAA. The current Fire Road is relatively narrow and generally only allows passing of one vehicle at a time. The realignment will be designed to applicable standards and best practices for the construction of forest roads and to accommodate safe transportation needs of the Project, Crown Timber Licence Holders, and to a lesser extent the public, including adequate width for two-way passing on the realigned Fire Road and posting of signage advising drivers of construction activities and changes in traffic patterns in the area. Design of the realignment will be conducted in consultation with and approved by NBDNR in accordance with the *Crown Lands and Forest Act*, and in agreement with the Crown Timber Licence Holders in the LAA. The existing forest road network will be maintained through construction of the realignment to ensure that the current needs of the Project and Crown Licence Holders are met.

The additional passenger vehicle traffic generated by construction workers traveling to and from the Project site will not affect the condition of the road infrastructure on the provincial highway network. Passenger vehicles range from 1,300 kg for compact cars to 2,500 kg for pickup trucks or sport utility vehicles (SUVs), which are well below the all-weather or seasonal weight restrictions on the provincial highway network.

The increase in ADT on the forest roads within the PSA and SSA routes could deteriorate the road infrastructure, causing washboarding (*i.e.,* a series of small ridges and potholes that appear in a pattern similar to the surface of a washboard) or other erosion and drainage issues (*e.g.*, tire rutting, overflows). Where maintenance activities on the forest roads are required (*e.g.,* grading), a short-term and intermittent delay in traffic could be recognized as machinery manoeuvers within the right-of-way. Best-practices for the maintenance of gravel roads will be implemented, including posting of signage identifying areas under maintenance activities.

Open communication with the Crown Timber Licence Holders in the LAA will be maintained throughout the life of the Project. SML will consult with the Crown Timber Licence Holders on a regular basis to review any maintenance requirements required to support the ongoing use of the forest roads, and any new plans (design changes) required to support the safe movement of traffic on these roads will be provided to NBDNR for review and consideration prior to implementation.

Therefore, the additional traffic generated during Construction within the LAA is not expected to adversely affect the road infrastructure condition.

Operation

Most of the inbound shipments of materials and equipment will be transported to the Project site from the TransCanada Highway via the PSA route.

Project-related traffic generated by Operation will distributed among the PSA and SSA routes and feeder routes within the LAA. The sum of the Project generated traffic volumes during Operation and the existing traffic volumes provide the total expected traffic volumes at full operation of the Project. Table 8.15.12 presents a comparison of existing traffic volumes to the total expected traffic volumes on the provincial highway network leading to the Project site during the peak month of Operation. These assumed traffic levels throughout the entire life of Operation of the mine are conservative.

Table 8.15.12 Distribution of Traffic Volumes to Highway Segments – Operation Phase

Location			Existing Vehicles (AADT)	Additional Project Traffic Generated (ADT)	Total Traffic during Project Operation (AADT)
Roadway Segment	Route 8	Fredericton City Limits to Route 107	3,500-5,340	15	3,515-5,355
	Route 104	Route 105 to PSA route	780-2,540	13	793-2,553
	Route 104	PSA route to Route 130	330-1,070	12	342-1,082
	Route 107	Route 8 to SSA route	290-1,280	52-58	348-1,332
	Route 107	SSA route to Route 105	300-1,200	50	350-1,250
	Route 105	Route 620 to Route 104	4,500-8,700	7	4507-8,707
	Route 105	Route 2 to Route 605	1,360-3,480	96	1,360-3,576
	Route 105	Route 107 to Route 130	6,000	26	6,026
	Route 130	Route 105 to Route 104	2,800	Negligible	2,800
	Route 605	Route 105 to AV Nackawic Mill Entrance	2,430	75	2,505
	Route 605	AV Nackawic Mill Entrance to Route 104	520	Negligible	520
	Route 610	Route 105 to Route 104	360	Negligible	360
	Route 617	Route 104 to Route 620	650	Negligible	650
	Route 620	Route 105 to Route 107	1,240	12	1,252

Table 8.15.12 Distribution of Traffic Volumes to Highway Segments – Operation Phase

Location			Existing Vehicles (AADT)	Additional Project Traffic Generated (ADT)	Total Traffic during Project Operation (AADT)
	PSA route	Route 605 to Route 104	190	96	286
	PSA route	Route 104 to Project Site	242	121	363
	SSA route	Route 107 to Project Site	16	107	123

Source: exp Services Inc. (2013b).

As shown in Table 8.15.12, on the PSA, the additional traffic generated at peak Operation will result in total traffic volumes of up to 96 ADT along the segment of the PSA route from the TransCanada Highway to Route 105 and Route 605 in Nackawic, and Napadogan Road at Route 104. North of Route 104, the ADT will increase to 121 vehicles, as personnel in their own passenger vehicles access Napadogan Road from the east and west on Route 104.

On the SSA route, a total traffic volume of 107 ADT will be generated that will travel to the site on the SSA route from west and east on Route 107.

All of the outbound product shipments, and a small portion of the inbound process freight and equipment, will be transported between the Project site and the CN Rail siding in Napadogan via the SSA route. These shipments will be transported on flatbed or enclosed transport truck trailers, and will be palletted loads that offer flexibility in distributing axle loadings, which should not restrict the planned 20 tonne truckload size.

A small portion of the various maintenance services truck traffic will originate in Fredericton or communities along Route 8 and Route 107, and will travel along the SSA route. The service trucks that will use this route will not exceed the maximum weight limits even during the spring weight season. If any shipments exceed the imposed vehicle weight limits, they will travel to the site from the TransCanada Highway and through the PSA route.

There will be no bussing of workers to the Project site during Operation, and workers will use their personal vehicles on either the PSA route or the SSA route to access the Project site. The additional passenger vehicle traffic generated by workers traveling to and from the Project site will not affect the condition of the road infrastructure on the provincial highway network. Passenger vehicles range from 1,300 kg for compact cars to 2,500 kg for pickup trucks or SUVs, which are well below the all-weather or seasonal weight restrictions on the provincial highway network.

Maintenance agreements will be negotiated with the Crown Timber Licence Holders in the LAA in consultation with NBDNR to ensure the forest roads continue to provide safe and efficient movement of personnel, goods and services within the LAA. Where maintenance activities on the forest roads are required (*e.g.,* grading), a short-term and intermittent delay in traffic could be recognized as machinery operates within the right-of-way. SML will be an active participant in the ongoing management and maintenance of the forest resource roads that lead to the Project. Best practices for the maintenance of gravel roads will be implemented, including posting of signage identifying areas under maintenance activities.

The additional traffic generated throughout Operation within the LAA is not expected to adversely affect the road infrastructure.

8.15.4.3.2 Traffic Level of Service

Construction

The LOS analysis along various potential highway routes within the LAA was evaluated under projected Construction volumes (Section 3.4.1) and is summarized in Table 8.15.13. For comparison purposes, Table 8.15.13 also includes the LOS under existing volumes without the Project.

Table 8.15.13 Level of Service – Existing Conditions and Construction Phase

Location			LOS Criteria and Results for Potential Access Routes					
			Existing Conditions			Construction Phase		
			AADT (2010)	LOS[a] (2010)	PTSF (2010)	AADT (After)	LOS[a] (After)	PTSF (After)
Roadway Segment	Route 8	Fredericton City Limits to Route 107	3,500-5,340	D	58.1-61.8%	3,520-5,360	D	58.9-62.1%
	Route 104	Route 130 to PSA route	330-1,070	A	28.6-36.9%	355-1,095	A	33.5 - 39.0%
	Route 104	PSA route to Route 105	780-2,540	A-B	33.4-50.1%	806-2,566	A-B	36.2-51.4%
	Route 105	Route 620 to Route 104	4,500-8,700	C-D	57.5-70.9%	4,514-8,714	C-D	57.9-71.1%
	Route 105	Route 2 to Route 610	1,360-3,480	A-B	35.5-54.4%	1,360-3,511	A-C	35.5-56.4%
	Route 105	Route 107 to Route 130	6,000	C	63.50%	6,038	C	63.9%
	Route 107	Route 8 to SSA route	290-1,280	A	23.3-34.6%	370-1,356	A	36.4-39.9%
	Route 107	SSA route to Route 105	300-1,200	A	23.5-33.8%	375-1,275	A	37.2-39.3%
	Route 130	Route 105 to Route 104	2,800	B	45.70%	*No Change*		
	Route 605	Route 105 to AV Nackawic Mill Entrance	2,430	B	53.40%	2,461	C	55.6%
	Route 605	AV Nackawic Mill Entrance to Route 107	520	A	30.80%	*No Change*		
	Route 610	Route 107 to Route 105	360	A	29.30%	*No Change*		
	Route 617	Route 104 to Route 620	650	A	32.70%	*No Change*		
	Route 620	Route 105 to Route 107	1,240	A	38.20%	1,258	A	39.7%

Notes:
[a] See Table 8.15.3 for LOS descriptions.

Legend:

PSA	Primary Site Access route.	LOS	Level of Service.
SSA	Secondary Site Access route.	PTSF	Percent of time spent following.
AADT	Annual Average Daily Traffic.		

Source: exp Services Inc. (2013a).

As a result of the relatively low increases in traffic volumes associated with Construction compared to current volumes, most of the LAA will see little or no change in the roadway LOS. The exceptions are the segments of Route 105, from Route 2 to Route 605 and Route 605 from Route 105 to the AV Nackawic Mill entrance road, which would experience a drop in level of service from a very good LOS B to a good LOS C; a change in PTSF on these segments will be approximately 2%. Given the nominal change in the PTSF, the actual change in level of service on these highway segments of Route 105 and Route 605 will be relatively minor and no additional special mitigation is warranted. All other highway segments would not experience a discernible change in level of service during Construction.

In addition to the LOS along the provincial highway network, LOS has been estimated at the three intersections leading into the Project site:

- the Route 105/Route 605 intersection that leads to the PSA route;
- the Route 104/Napadogan Road intersection, and
- the Route 107/Four Mile Brook Road intersection.

The level of service analysis results of existing traffic and total traffic with the additional traffic volumes generated during Project Construction at three key intersections are presented in Table 8.15.14.

Table 8.15.14 Level of Service at Key Intersections – Existing Conditions and Construction Phase

Intersection	Type	Period	Overall Intersection LOS[a]	
			Existing Conditions	Construction Phase
Route 105 / Route 605	3-Way Stop Controlled on Route 605	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A
Route 104 / Napadogan Road	4-Way Stop Controlled on PSA route	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A
Route 107 / Four Mile Brook Road	3-Way Stop Controlled on SSA route	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A

Notes:
[a] See Table 8.15.3 for LOS descriptions.

Source: exp Services Inc. (2013a).

The LOS analysis suggests that all three intersections would continue to operate at an excellent LOS A, and that individual turning movements would continue to operate at very good LOS B, or better, during peak periods. No additional special mitigation is warranted for these minor changes in LOS.

Operation

The LOS analysis along various potential highway routes within the LAA was evaluated under projected Operation phase traffic volumes (Section 3.4.1) and is summarized in Table 8.15.15. For comparison purposes, Table 8.15.15 also includes the LOS under existing volumes without the Project.

Table 8.15.15 Level of Service – Existing Conditions and Operation Phase

Location			LOS Criteria and Results for Potential Access Routes					
			Existing Conditions			Operation Phase		
			AADT (2010)	LOS* (2010)	PTSF (2010)	AADT (After)	LOS[a] (After)	PTSF (After)
Roadway Segment	Route 8	Fredericton City Limits to Route 107	3,500-5,340	D	58.1-61.8%	15	D	58.7-62.0%
	Route 104	Route 130 to PSA route	330-1,070	A	28.6-36.9%	13	A	31.3-37.9%
	Route 104	PSA route to Route 105	780-2540	A-B	33.4-50.1%	13	A-B	34.8-50.8%
	Route 105	Route 620 to Route 104	4,500-8,700	C-D	57.5-70.9%	7	C-D	57.7-71.0%
	Route 105	Route 2 to Route 610	1,360-3,480	A-B	35.5-54.4%	96	A-C	35.5-57.3%
	Route 105	Route 107 to Route 130	6,000	C	63.50%	26	C	63.8%
	Route 107	Route 8 to SSA route	290-1,280	A	23.3-34.6%	52-58	A	27.8-38.5%
	Route 107	SSA route to Route 105	300-1,200	A	23.5-33.8%	51	A	34.3-37.6%
	Route 130	Route 105 to Route 104	2,800	B	45.70%	*No Change*		
	Route 605	Route 105 to AV Nackawic Mill Entrance	2,430	B	53.40%	96	C	57.8%
	Route 605	AV Nackawic Mill Entrance to Route 107	520	A	30.80%	*No Change*		
	Route 610	Route 107 to Route 105	360	A	29.30%	*No Change*		
	Route 617	Route 104 to Route 620	650	A	32.70%	*No Change*		
	Route 620	Route 105 to Route 107	1,240	A	38.20%	12	A	39.3%

Notes:
[a] See Table 8.15.3 for LOS descriptions.

Legend:
PSA Primary Site Access route.
SSA Secondary Site Access route.
AADT Annual Average Daily Traffic.
LOS Level of Service.
PTSF Percent of time spent following.

Source: exp Services Inc. (2013b).

During Operation, there will be no predicted change in LOS arising from an increase in traffic volumes in the LAA, except on two segments of Route 105 within the PSA route. Route 105 from Route 2 to Route 605, and Route 605 from Route 105 to the AV Nackawic Mill Entrance, would both experience a drop in LOS from a very good LOS B to a good LOS C. However, it should be noted that the threshold of two-lane collector and local highways from LOS B to LOS C is 55% PTSF. When the actual change in PTSF on these segments of Route 105 and Route 605 are examined, the increases of only about 3% in PTSF moved them from top of the range within LOS B to the bottom of the range of LOS C. The actual change in LOS on these highway segments of Route 105 and Route 605 will be relatively minor. The remaining roadway segments would not experience a change in level of service. No additional special mitigation is warranted for these minor changes in LOS.

The level of service analysis results of existing traffic and total traffic with the additional traffic volumes generated during Project Operation at three key intersections are presented in Table 8.15.16.

Table 8.15.16 Level of Service at Key Intersections – Existing Conditions and Operation Phase

Intersection	Type	Period	Overall Intersection LOS*	
			Existing Conditions	Operation Phase
Route 105 / Route 605	3-Way Stop Controlled on Route 605	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A
Route 104 /Napadogan Road	4-Way Stop Controlled on PSA route	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A
Route 107 / Four Mile Brook Road	3-Way Stop Controlled on SSA route	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A

Notes:
* See Table 8.15.3 for LOS descriptions.

Source: exp Services Inc. (2013b).

The LOS analysis suggests that all three intersections would continue to operate at an excellent LOS A, during both morning and evening peak periods. All individual turning movements would continue to operate at very good LOS B, or better, during peak periods. No additional special mitigation is warranted for these minor changes in LOS.

8.15.4.3.3 Summary

Although the Project will contribute to an increase in traffic within the LAA, the Project-related traffic levels during both Construction and Operation are only nominally higher in the LAA when compared to existing traffic volumes. The provincial highway network has been designed to serve the needs of industry, forestry operations, and residents of the LAA with considerable excess capacity as evidenced by the relatively high LOS levels (*i.e.,* mostly LOS A to C) on all routes. During Construction, there will be a noticeable increase in the volume of traffic using the PSA route and SSA route, although the LOS on the provincial highway network is not anticipated to be substantially adversely affected by the Project; in no case will the LOS fall below a satisfactory LOS D which defines traffic operating conditions during peak traffic periods. During Operation, there are no features of the Project that would result in prolonged traffic delays or a change in the LOS that could not be mitigated through the implementation of best practices for the forest roads.

Through careful Project planning, SML has considered the contribution of Project-related traffic on the forest roads within the LAA, and is committed to working with the Crown Timber Licence Holders and NBDNR to refurbish and maintain the existing forest road network to ensure the safe movement of traffic within the LAA.

There may be short-term, intermittent and temporary disruptions in traffic flow on the forest roads during Construction of upgrades to the existing forest road infrastructure and the transportation of materials, supplies and equipment to Project site, but these will not be significant.

Road network infrastructure condition on public highways is not expected to be adversely affected by the Project traffic, and improvements to Fire Road and other maintenance carried out by SML in

partnership with the Crown Timber Licence Holders and NBDNR may result in improved traffic flow and traffic safety on forest resource roads.

Communication of the preferred truck route to shippers, suppliers and service providers visiting the site will reduce the deterioration on the provincial highway network where seasonal weight restrictions are imposed by directing heavy truck traffic to infrastructure that by design is capable of handling truck configurations and maximum load weights.

8.15.5 Assessment of Cumulative Environmental Effects

In addition to the Project environmental effects discussed above, an assessment of the potential cumulative environmental effects was conducted for other projects or activities that have potential to cause environmental effects that overlap with those of the Project, as identified in Table 8.15.10. Table 8.15.17 below presents the potential cumulative environmental effects to Transportation, and ranks each interaction with other projects or activities as 0, 1, or 2 with respect to the nature and degree to which important Project-related environmental effects overlap with those of other projects or activities.

Table 8.15.17 Potential Cumulative Environmental Effects to Transportation

Other Projects or Activities With Potential for Cumulative Environmental Effects	Potential Cumulative Environmental Effects Change in Transportation
Past or Present Projects or Activities That Have Been Carried Out	
Industrial Land Use (Past or Present)	1
Forestry and Agricultural Land Use (Past or Present)	1
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons (Past or Present)	0
Recreational Land Use (Past or Present)	1
Residential Land Use (Past or Present)	1
Potential Future Projects or Activities That Will Be Carried Out	
Industrial Land Use (Future)	1
Forestry and Agricultural Land Use (Future)	1
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons (Future)	0
Recreational Land Use (Future)	1
Planned Residential Development (Future)	1

Cumulative Environmental Effects

Notes:

Cumulative environmental effects were ranked as follows:

0 Project environmental effects do not act cumulatively with those of other projects or activities that have been or will be carried out.

1 Project environmental effects act cumulatively with those of other projects or activities that have been or will be carried out, but are unlikely to result in significant cumulative environmental effects; or Project environmental effects act cumulatively with existing significant levels of cumulative environmental effects but the Project will not measurably contribute to these cumulative environmental effects on the VEC.

2 Project environmental effects act cumulatively with those of other projects or activities that have been or will be carried out, and may result in significant cumulative environmental effects; or Project environmental effects act cumulatively with existing significant levels of cumulative environmental effects and the Project may measurably contribute to adverse changes in the state of the VEC.

There are no overlapping environmental effects between the Project and past, present, or future Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons. Though First Nations people do use the public road network and the forest resource roads in the RAA to access

Crown land for carrying out their traditional activities, the use of these roads by the Project will not impede the ongoing conduct of those traditional activities.

Past, present, and reasonably foreseeable future Industrial Land Use and Forestry and Agricultural Land Use within the RAA relies on the provincial transportation network to transport goods and services to market. Through past and present Forestry Land Use in the RAA, forest roads have been developed to transport timber by truck to and from Crown Land within the RAA. The use of these roads for the Project in addition to past, present and future Industrial Land Use and Forestry and Agricultural Land Use is not expected to be adversely affected to the extent that their condition would deteriorate to an unacceptable state, or that traffic flow would be adversely affected.

Present and future Recreational Land Use particularly during hunting seasons would also increase the traffic volumes within the RAA as hunters access Crown Land for hunting. Residents of the RAA use the provincial highway to commute between rural and urban centres, in central New Brunswick. Forest roads are also used to a lesser extent. Past, present and reasonably foreseeable future Recreational Land Use and Residential Land Use may result in overlapping environmental effects to Transportation to those of the Project, but are not expected to degrade the road network infrastructure or the LOS substantially, or degrade the current LOS below LOS D.

The existing provincial highway network, particularly arterial and collector highways, has been designed to accommodate high traffic volumes for both passenger vehicles and the transport of goods and materials, and provided that weight restrictions, speed limits and other highway rules are followed. It should not be adversely affected by the Project in combination with other projects or activities that have been or will be carried out. The existing provincial highway network in the RAA has sufficient capacity to support the anticipated increase in traffic arising from the Project and any reasonably foreseeable future increase in traffic arising in this rural area. With the exception of Route 8 and a small segment of Route 105, all provincial highways in the RAA are considered to provide a good LOS C to excellent LOS A. The Route 8 by-pass between Marysville and South Portage recently opened and is anticipated to improve the LOS on this highway.

The Fire Road will be refurbished and partially relocated as part of the Project and will provide wider travel surfaces, improved grade and curvatures, and better visibility. Combined with ongoing maintenance of the existing network of forest resource roads by the Crown Timber Licence Holders with participation by SML, the condition of these roads will be maintained at least to their current state, or improve. Any maintenance conducted will improve the LOS, safety, and quality of the road network infrastructure within the RAA and will mitigate bottlenecks at the one-lane bridges and more narrow sections of the forest roads on the PSA and SSA routes.

SML is committed to maintaining compliance with the existing forest roads best practices that require use of CB radio systems for communicating the location of large or heavy vehicles along the PSA and SSA routes by SML-controlled vehicles (it would not be possible to maintain CB radios in every private passenger vehicle, however), and the implementation of a Traffic Plan for the Project to specifically identify roadway hazards along the PSA and SSA routes for Project related workers and deliveries. Through the implementation of these best practices, Project-related traffic in combination with other past, present, or reasonably foreseeable future projects or activities is not expected to result in a significant cumulative environmental effect to Transportation.

8.15.6 Determination of Significance

8.15.6.1 Residual Project Environmental Effects

Although the Project will contribute to an increase in traffic within the RAA during Construction and Operation, the Project contribution is small when compared to existing traffic volumes on the existing provincial highway network that has been designed to service the needs of industry, forestry operations, and residents of the LAA. During Construction, there will be a noticeable increase in the volume of traffic using the Primary Site Access (PSA) route and Secondary Site Access (SSA) route, although the level of service (LOS) on the provincial highway network is not anticipated to be adversely affected by the Project, and in no case will the LOS fall below a satisfactory LOS D which defines traffic operating conditions during peak traffic periods.

During Operation, there are no features of the Project that would result in prolonged traffic delays or a change in the LOS that could not be mitigated through the implementation of best practices for the forest roads. Road network infrastructure on public highways is not expected to be adversely affected by the Project traffic, and improvements to Fire Road and other maintenance carried out by SML in partnership with the Crown Timber Licence Holders and NBDNR may result in improved traffic flow and traffic safety on forest resource roads.

There may be short-term, intermittent and temporary disruptions in traffic flow on the forest roads during Construction of refurbishments to the existing forest road infrastructure and the transportation of materials, supplies and equipment to Project site, but these will not be significant. Through careful Project planning, SML has considered the contribution of Project-related traffic on the forest roads within the LAA, and is committed to working with the Crown Timber Licence Holders and NBDNR to refurbish and maintain the existing forest road network to ensure the safe movement of road traffic within the LAA.

Thus, in consideration of the nature of these interactions, Project planning aimed at minimizing environmental effects of Transportation on the existing transportation network, and the planned implementation of known and proven mitigation, the potential environmental effects of all Project activities and physical works to be carried out during all phases of the Project on Transportation are rated not significant. This prediction has a high level of confidence.

8.15.6.2 Residual Cumulative Environmental Effects

The Project in combination with other past, present, or reasonably foreseeable future projects or activities that have been or will be carried out will result in increased traffic levels on the public highway system and on the forest resource roads in the RAA. However, the existing provincial highway network has been designed to accommodate high traffic volumes and has sufficient capacity to support the anticipated increase in traffic arising from the Project and any reasonably foreseeable future increase in other traffic arising in this rural area. On forest resource roads, the Fire Road will be refurbished and partially rerouted as part of the Project to provide wider travel surfaces, improved grade and curvatures, and better visibility. Combined with ongoing maintenance of the existing network of forest resource roads by the Crown Timber Licence Holders with participation by SML, the condition of these roads will improve. Any maintenance conducted will improve the LOS, safety and quality of the road network

infrastructure within the RAA and will mitigate against traffic bottlenecks at the single-lane bridges and more narrow sections of the forest roads on the PSA and SSA routes.

Thus, in consideration of the nature and magnitude of the overlapping environmental effects of the Project in combination with other past, present or reasonably foreseeable projects or activities and planned mitigation, the cumulative environmental effects of the Project in combination with other projects or activities that have been or will be carried out on Transportation during all phases of the Project are rated not significant. This determination has a high level of confidence.

8.15.7 Follow-up or Monitoring

There is no follow-up or monitoring recommended with respect to Transportation.