Stantec Consulting Ltd.

Sisson Project Road Transportation Study

Final Report

Project Number FRE-00209565-A0

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LIST OF ACRONYMS AND UNITS

Acronym or Unit	Definition
AADT	Average Annual Daily Traffic
AADTT	Average Annual Daily Truck Traffic
ADT	Average Daily Traffic
AM	Morning
Col/MV	Collisions per million vehicles
Col/MVK	Collisions per million vehicle-kilometres
EA	Environmental Assessment
EIA	Environmental Impact Assessment
GVW	Gross Vehicle Weight
h	hour
i.e.	that is
kg	kilogram
km	kilometre
km/h	kilometres per hour
LOS	Level of Service
m	metre
NBDTI	New Brunswick Department of Transportation and Infrastructure
PDO	Property Damage Only
PM	Evening
PSA	Primary Site Access Road
PTSF	Percent Time Spent Following
SSA	Secondary Site Access Road
t	tonne
VEC	Valued Environmental Component

1 Introduction

This document is a Road Transportation Study of the road infrastructure and traffic in the area of the proposed Sisson Project, ("the Project"), a tungsten and molybdenum mine in central New Brunswick located southwest of the community of Napadogan, New Brunswick. This Road Transportation Study will serve as background information regarding the Transportation component of the Environmental Impact Assessment of the Project.

The Project, proposed by Northcliff Resources Ltd. ("Northcliff") consists of the development, construction, and operation of a conventional open pit tungsten and molybdenum mine and associated facilities. It is planned that the mine will be constructed over an 18 to 24 month period, and will operate for about 20 to 30 years.

This report has been prepared by exp Services Inc. on behalf of Stantec Consulting Ltd, as a technical background document to provide information for the Environmental Assessment of the Sisson Project. The report presents the baseline information, analysis and assessment of the potential environmental effects that the Project may have on the infrastructure and traffic conditions of the existing adjacent Provincial road transportation network that will serve the Project.

1.1 Project Overview

The proposed Sisson Project involves the construction and operation of a conventional open pit tungsten and molybdenum mine and associated processing, storage, and waste treatment and disposal facilities. The Project site is located on Crown land approximately 10 km southwest of the community of Napadogan, New Brunswick, and approximately 60 km directly northwest of Fredericton, New Brunswick.

The mined tungsten and molybdenum ore will be processed to concentrates at an on-site plant. Only the processed concentrate products will be trucked off-site to market. Organics and overburden material, ore tailings and waste rock will be stockpiled on-site.

1.2 Background

The CEA Agency and the New Brunswick Department of Environment (NBENV) accepted the final Terms of Reference (TOR) of the Sisson Project for preparing the provincial Environmental Impact Assessment (EIA) and federal Environmental Assessment (EA) in February and April of 2012, respectively.

Prior to and following registration of the Project, public information sessions and meetings were held with various stakeholders and the public in surrounding communities with the objective of introducing the proposed project, the environmental assessment TOR and proposed studies to be carried out in support of the EIA. As a result there were fourteen Valued Environmental Components (VECs) selected for this Project, based on the NEBNV Final Guidelines and the requirements of *CEAA*, as well as the input from the public, stakeholders, and Aboriginal peoples. Transportation was included among the VECs for this project.

Transportation was selected as a VEC for the Environmental Assessment of the proposed Project due to concerns of the general public and regulatory agencies with the potential environmental effects that the Project may have on the existing adjacent road transportation network infrastructure, traffic level of service and traffic safety conditions from the additional traffic generated during its

construction and in the ensuing years of its operation. Concerns regarding road transportation raised by the public included the identification of the transport routes that will be used to and from the mine, whether the mineral concentrates be shipped by rail or road, and who will maintain the existing road infrastructure.

Transportation refers to the road network that will provide access to the Project, for the purpose of transporting people and/or freight generated during the Construction and Operation Phases of the Project. This Road Transportation Study has been prepared as a stand-alone document to provide the information necessary to characterize existing conditions and predict Project-related contributions of road traffic.

This Road Transportation Study is based on the observed and reported state of the existing highway network infrastructure. In addition, the Study analyses have been conducted using the information provided by the Project proponent, Northcliff, with respect to the current plans of the proposed Project and associated use of the road transportation infrastructure. The current Project plans to use existing rail infrastructure has not been addressed within the scope of this study, except as the point of transshipment of the processed product from trucks using the road network for transportation of freight from the Project site.

This Road Transportation Study will provide information for the environmental effects assessment of Transportation for the Project.

1.3 Purpose and Approach

Road traffic will be generated by the proposed Project during the Construction and Operation phases that will add to the current traffic volumes that exist along the road network that leads to the Project site. The purpose of this Road Transportation Study is to establish a baseline of the existing road transportation network infrastructure and traffic operating conditions, and to determine the extent to which the existing road transportation network conditions will be affected by the additional traffic generated by the Project.

This Study defines the existing conditions of the road network infrastructure, and the existing traffic level of service and traffic safety conditions as a baseline from which to compare the conditions of the road and rail during the Project Construction and Operation phases.

During construction, traffic generated by the Project will include truck, bus and automobile traffic. Automobile and bus traffic will be generated by construction workers and management staff. Truck traffic will be generated from the transport of construction materials and equipment to the proposed Project site, and miscellaneous site services.

Road traffic will be generated in the ensuing years by the various operations of the Project. Automobile and bus traffic generated by the Project operation will be composed of employees travelling to and from work in addition to various operational service providers. Truck traffic will be generated by the inbound shipment of various reagents and equipment parts and materials used in production, and the outbound delivery of the processed tungsten and molybdenum mineral concentrates to the rail siding in Napadogan.

It should be noted that the Project is at a feasibility study stage, and detailed engineering design of the specific elements and configurations of the Project has not yet been completed. Consequently, the Project as described in this document is based on current knowledge and the professional experience of Northcliff and its design consultants in developing an open pit mine and mill. As such,

while Northcliff and its team have made considerable efforts at defining the envelopes of the Project and associated requirements to support the EIA in a conservative manner, it must be recognized that the actual nature, processes, configuration, capacities, and associated facility requirements for the Project as will ultimately be built and operated may vary from those described herein. As such, though based on the best available information at the time of writing, the Project details as described in this report are subject to change as the Project unfolds and as more detailed construction and operations planning is carried out.
(Boyle, personal communication, November 2012)

Three components of road transportation have been considered in the prediction of the environmental effects:

- Road network infrastructure;
- Traffic level of service; and
- Traffic safety.

1.4 Study Boundaries

1.4.1 Spatial

The spatial boundary for Road Transportation extends from the boundary of the Project site to the existing primary highway network of New Brunswick. The on-site transportation facilities and infrastructure within the Project site are internal elements of the Project and not assessed in this Road Transportation Study.

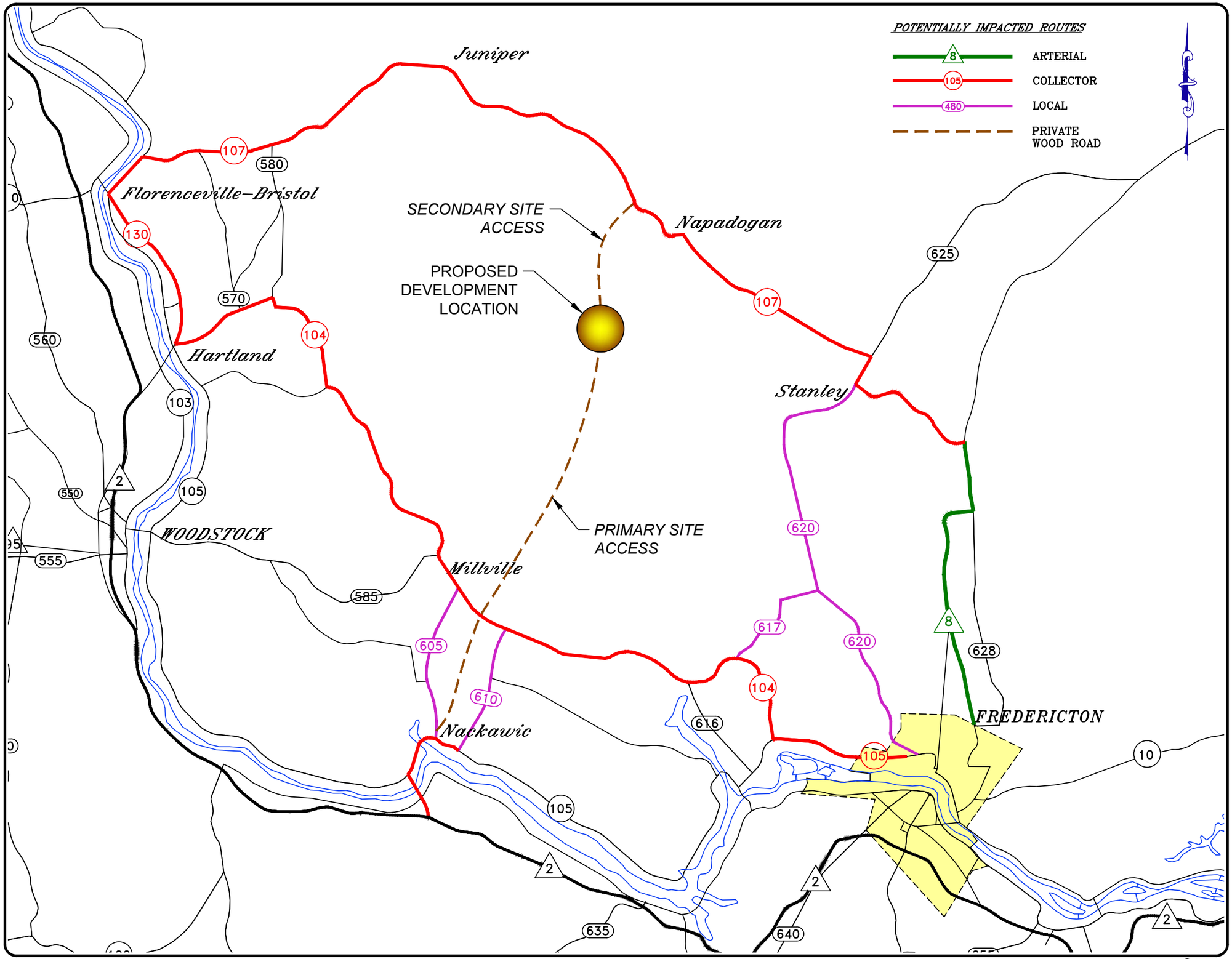
The spatial boundary of this Project with respect to Road Transportation is illustrated in **Figure 1.1**. As shown, the Project area, as pertains to Road Transportation, encompasses the Provincial highway routes that lead to the Project site from the transportation network, and includes two site access routes that have been identified as the primary and secondary routes to access the Project site from the Provincial highways. They are existing forest roads that provide direct connection between the Project site and the Provincial highway network.

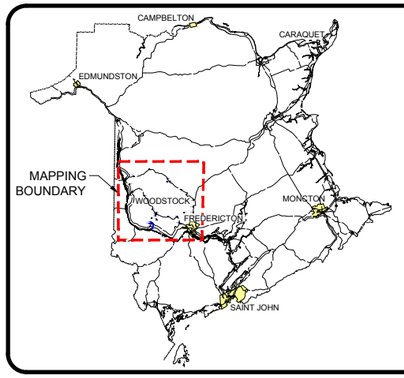
1. The ***Primary Site Access*** is provided by gravel surface forest roads (known as the "Napadogan Road' or the "Valley Forest Products Road" and the "Fire Road") that extend southward from the Project site approximately 35 km to NB collector highway Route 104, and another 10 km south to NB local highway Route 605 at Nackawic. Route 605 passes by the AV Nackawic mill and connects with NB collector highway Route 105 that circles the perimeter of Nackawic and connects to the Trans Canada Highway, NB arterial highway Route 2.

2. The ***Secondary Site Access*** is provided by gravel surface forest roads (known as the "Four Mile Brook Road" and the "Fire Road") that extend northward from the Project site approximately 17 km to NB collector highway Route 107 west of Napadogan. To the east Route 107 connects the Four Mile Brook Road to the Napadogan rail siding and from Napadogan to NB arterial highway Route 8 at Nashwaak Bridge.

1.4.2 Temporal

The temporal boundaries for Road Transportation for this Project coincide with the time periods that encompass the Construction and Operation phases of the Project. The current plans are to complete construction of the Project over an 18 – 24 month period. The Project operation will extend over a





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Project Title
SISSON BROOK PROJECT
TRANSPORTATION STUDY

Dwg. Title
POTENTIALLY IMPACTED ROUTES

Project No.	FRE-00209565-A0
Dwg. No.	**FIGURE 1.1**
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FILE: O:\ADI-LTD\PROJECT\FRE-00209565-A0 SISSON PROJECT TRANSPORTATION\ACAD\FIGURE 2.2.DWG
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period from 20 years up to 30 years, depending on the rate of mining, and will be commissioned immediately following completion of its construction.

1.4.3 Administrative and Technical

1.4.3.1 Road Network Infrastructure

In this Road Transportation Study road network infrastructure refers to the network of Provincial highway routes and the primary and secondary site access forest roads that will facilitate road transportation of project-related trucks and passenger vehicle traffic between the Project site and the traffic origins or destinations. It does not include on-site service roads constructed within the Project site to facilitate mining and processing operations.

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.

The availability and quality of the road network infrastructure define the limits of accessibility and mobility of the area to facilitate travel demands. This is important to the proposed Project to facilitate the movement of freight and workers to and from the Project site. It is also important to the forest industry that requires the road network infrastructure to haul forest products sourced and processed in the area, to residents in the area for travel to work and other activities, and to other businesses in the area to serve customers.

1.4.3.2 Traffic Service

Road traffic service is measured by level of service to define traffic operating conditions during peak traffic periods. Level of service is based on the prevailing traffic volumes, roadway geometry and traffic control measures in place along rural highways.

The various categories of level of service, as defined by the Transportation Research Board and documented in the *2000 Highway Capacity Manual*, are described in **Table 1.1** for stop-controlled intersections and along rural highways. The levels of service for stop sign controlled intersections are measured in terms of the average number of seconds vehicles are delayed at the intersection. The levels of service along segments of two-lane rural highways are measured in terms of PTSF, the average **P**ercentage **T**ime **S**pent **F**ollowing other vehicles.

Six levels of service are designated by the letters A to F to define traffic flow conditions, as presented in **Table 1.1**. Level of Service (LOS) A represents the best traffic operating conditions and LOS F the worst. Most rural highway authorities will accept up to LOS D before considering traffic control and/or infrastructure upgrade measures.

Table 1.1 - Level of Service (LOS) Criteria

LOS	Two Way Stop Controlled (TWSC) Intersections		2-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 sec	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 sec	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 sec	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 sec	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 sec	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 sec	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, Highway Capacity Manual, 2000

1.4.3.3 Traffic Safety

Average annual vehicle collision rates and the average annual percentage breakdowns of collision severity are measures of the relative frequency and severity along given sections of highway. The

New Brunswick Department of Transportation and Infrastructure (NBDTI) records vehicle collisions by location along Provincial highways. Vehicle collision rates and the percentage collision severity breakdowns have been calculated from most recent five-year period of vehicle collision data collected along the Provincial highways serving the principal Project site access roads.

Average vehicle collision rates are calculated as the number of vehicle collisions per million vehicle-km (Col/MVK) along sections of roads or urban streets. Collision rate measures normalize the vehicle collision occurrences based on traffic volumes and highway segment length to provide a common basis of comparison to highlight highway segments especially prone to vehicle collisions.

Vehicle collision severity is the average percentage breakdown of collisions classified into three levels of severity, as follows:

- Property Damage Only (PDO) Collisions - vehicle collisions involving only damage to vehicles and/or other property;
- Injury Collisions - vehicle collisions involving injury to one or more persons; and
- Fatal Collisions - vehicle collisions involving one or more fatalities.

The 20 year Province-wide average collision rate along divided arterial highways (*e.g.,* the Route 2 Trans Canada Highway) has averaged 0.387 Col/MVK, which is lower than along undivided arterial highways (*e.g.,* Route 8), at 0.703 Col/MVK. The Province-wide average of all collector highways, such as Route 107, Route 105 and Route 104, is 0.949 Col/MVK. (Thompson, personal communication, January 2013)

NBDTI does not have vehicle collision rate or severity thresholds that trigger their attention to the need to improve the safety of the particular section of highway. However, they regularly review collision databases to establish locations with unusually high vehicle collision frequency, and assess whether or not there are contributing geometric, infrastructure or traffic control elements that may need to be rectified.

1.5 Report Organization

This report summarizes the tasks undertaken and the results of the Road Transportation Study, conducted to provide background information as input to the assessment of the environmental effects of the Project on the Transportation VEC for the Sisson Project EIA. The report is organized as follows:

- **Chapter 1.0 – Introduction:** Introductory and background information is provided on the study, including its purpose and approach. Spatial, temporal and administrative boundaries of the Study. The technical parameters used to measure the pre-existing and post-Project conditions of the road transportation network that serves the Project site, are defined.
- **Chapter 2.0 – Existing Conditions:** Information and data regarding the existing road network infrastructure and operational conditions prior to the construction of the Project are described. This information has been acquired from NBDTI and supplemented by data collected for the Study. The existing conditions data are necessary to establish a baseline of transportation prior to the Construction and Operation phases of the proposed Project. The existing road transportation network infrastructure, traffic level of service and traffic safety conditions, prior to the construction of the Project, are presented.

- **Chapter 3.0 – Project Traffic Generation:** The road traffic generated by the Project during the Construction and Operation phases are estimated from the Project plan documents and in consultation with the Proponent, Northcliff. The additional traffic volumes generated by the Project have been estimated based of Project activity during the Construction and Operation phases of the Project. The additional Project traffic volumes that will be generated by the Project construction and operation have been distributed to the segments of the existing road network that lead to the site, based on where the traffic is from or where it is going. The existing plus the Project generated traffic have been summed for segments of the existing road network within the Project area to establish the total traffic conditions during the project Construction and Operation phases.

- **Chapter 4.0 – Potential Environmental Effects of Project on Road Transportation:** The predicted changes to road transportation network infrastructure, traffic level of service and traffic safety, as a result of the additional traffic generated by the Project during the Construction and Operation phases, have been estimated and assessed employing accepted analytical techniques of the transportation planning and engineering profession. Where appropriate, mitigation measures and follow-up monitoring programs have been suggested to better facilitate the additional traffic contributed by the Project.

- **Chapter 5.0 – References:** The references consulted in the preparation of the Road Transportation Study are cited.

- **Appendices:** Other supporting information are provided in **Appendices A to C.**

2 Existing Conditions

2.1 Baseline Data Collection Methods and Sources

2.1.1 Data Acquisition

Baseline data for three categories of road transportation that describe the existing networks were acquired:

- Network infrastructure – characteristics and condition;
- Traffic level of service – traffic volumes and operating conditions; and
- Traffic safety – collision rates and severity of collisions.

NBDTI collects traffic volumes, vehicle collision and infrastructure geometry and condition data along Provincial arterial, collector and local highways. The baseline Road Transportation data were collected during the last quarter of 2012 from published sources and data files retained by NBDTI. In addition, other field observations of the road network condition and three intersection traffic count surveys were conducted in late October and early November, 2012.

2.1.1.1 Road Infrastructure Data

The Province of New Brunswick retains records of the roadway infrastructure geometries (*e.g.*, typical cross-section design, road surface type and condition, number and width of lanes, shoulder widths, and vertical and horizontal curvature) of arterial and collector highways in the province. Infrastructure data were available for the principal routes, collector highway Route 105, Route 107, and Route 104 that provide direct connection to the Primary Site Access and Secondary Site Access roads for this Road Transportation Study. Infrastructure data were also collected from NBDTI for other feeder route segments of the Project area, including arterial Route 8 and collector Route 130.

Windshield observation surveys were conducted by **exp** to verify and update the condition of Provincial arterial and collector highway segments. Since the Province does not maintain as extensive a database of the road network geometry and condition of local highways, windshield surveys were also completed to document the general geometric characteristics and condition of the local highway routes (Route 605, Route 610, Route 617 and Route 620) within the Project area.

In addition to the principal and feeder route segments of the Provincial highway network, a windshield survey was undertaken by **exp** of the Primary Site Access and Secondary Site Access roads that will provide access from the Provincial highways to the south and north, respectively, to the Project site. These forest roads presently serve the forest product industry. They are not Provincial public roads, but will be utilized for the mine site access during both the Construction and Operation phases of the Project.

The road infrastructure geometry and surface conditions, as observed in the **exp** windshield surveys, are summarized in **Appendix A**.

2.1.1.2 Traffic Volume Data

NBDTI collects traffic volumes data at various locations along Provincial arterial, collector and local highways on an ongoing basis. These traffic counts are summarized and averaged to daily traffic volumes by NBDTI, and expressed as Average Annual Daily Traffic (AADT) volumes (Thompson, personal communication, October, 2012).

The most recent, 2010, traffic data available were acquired from NBDTI for the principal and other alternate feeder highway route segments within the Project area. There were traffic count data along the principal highway route segments in the vicinity of the Primary Site Access and Secondary Site Access roads, but none on the forest roads. To fill this data gap, traffic count surveys were conducted by exp in early November, 2012, at the three intersections where the forest roads intersect Provincial highways. They include:

- The intersection of Route 105 and Route 605 (which connects to Napadogan Road at the southern end of the Primary Site Access forest road at the Nackawic millyard).
- The intersection of Route 104 and the Napadogan Road / Valley Forest Products Road (the Primary Site Access forest road north of Nackawic).
- The intersection of Route 107 and Four Mile Brook Road (the northernmost segment of the Secondary Site Access forest road).

The traffic count surveys were used to estimate the existing truck traffic and the volumes of all vehicles on the forest roads that will be used as for Primary Site Access (Napadogan Road / Valley Forest Products Road and Fire Road) and Secondary Site Access (Four Mile Brook Road and Fire Road). The number of vehicles and their turning movements during the morning (AM) and evening (PM) peak traffic hours were counted at each of the intersections surveyed. The traffic flow diagrams of the count surveys are provided in **Appendix B**.

The fall period of early November when the traffic count surveys were conducted follows the summer season and precedes the Christmas shopping season, when road traffic conditions are considered representative. As it was deer hunting season, there was some evidence of deer hunter vehicles along the low volume rural roads serving the Project area. Since the provincial AADT traffic data are based on year round counts, they were used as control data to check the expansion of the survey traffic counts to AADT.

2.1.1.3 Vehicle Collision Data

NBDTI retains vehicle collision data recorded by location along all arterial, collector and local Provincial highways. These vehicle collision data are divided into three levels of severity:

- Collisions involving fatality(ies);
- Collisions involving personal injury(ies); and
- Collisions involving property damage only.

Collision data for the five most recent years available, 2006-2010, along the principal and other feeder highway route segments of the Project area were acquired from NBDTI. No collision data are available for the forest roads that comprise the Primary Site Access and Secondary Site Access roads (Pelkey, personal communication, October 2012).

2.2 Baseline Road Transportation Network

The existing road transportation network that will provide access to the Project site is described in this section. Baseline data of the current physical and operating conditions of the road modes were documented and presented for the three Road Transportation components:

- Road network infrastructure;
- Traffic level of service; and
- Traffic safety.

Road access to the Project site from the Provincial highway network will be provided by forest roads accessible from Provincial highways: the Primary Site Access Road from Route 105/Route 605 in Nackawic and Route 104 in the Hainesville area, and the Secondary Site Access Road from Route 107 west of Napadogan. Highway routes to the Project site have been identified and are described based on aerial mapping and the field observations conducted for this study.

The three principal provincial highway routes that will serve the proposed Sisson Project are shown in **Figure 2.1 (**Boyle, personal communication, November 2012). They include the following:

- Route 105 and Route 605 north from the Trans Canada Highway Route 2
- Route 107 east from the CN Rail siding in Napadogan, and
- Route 107 east from Route 8.

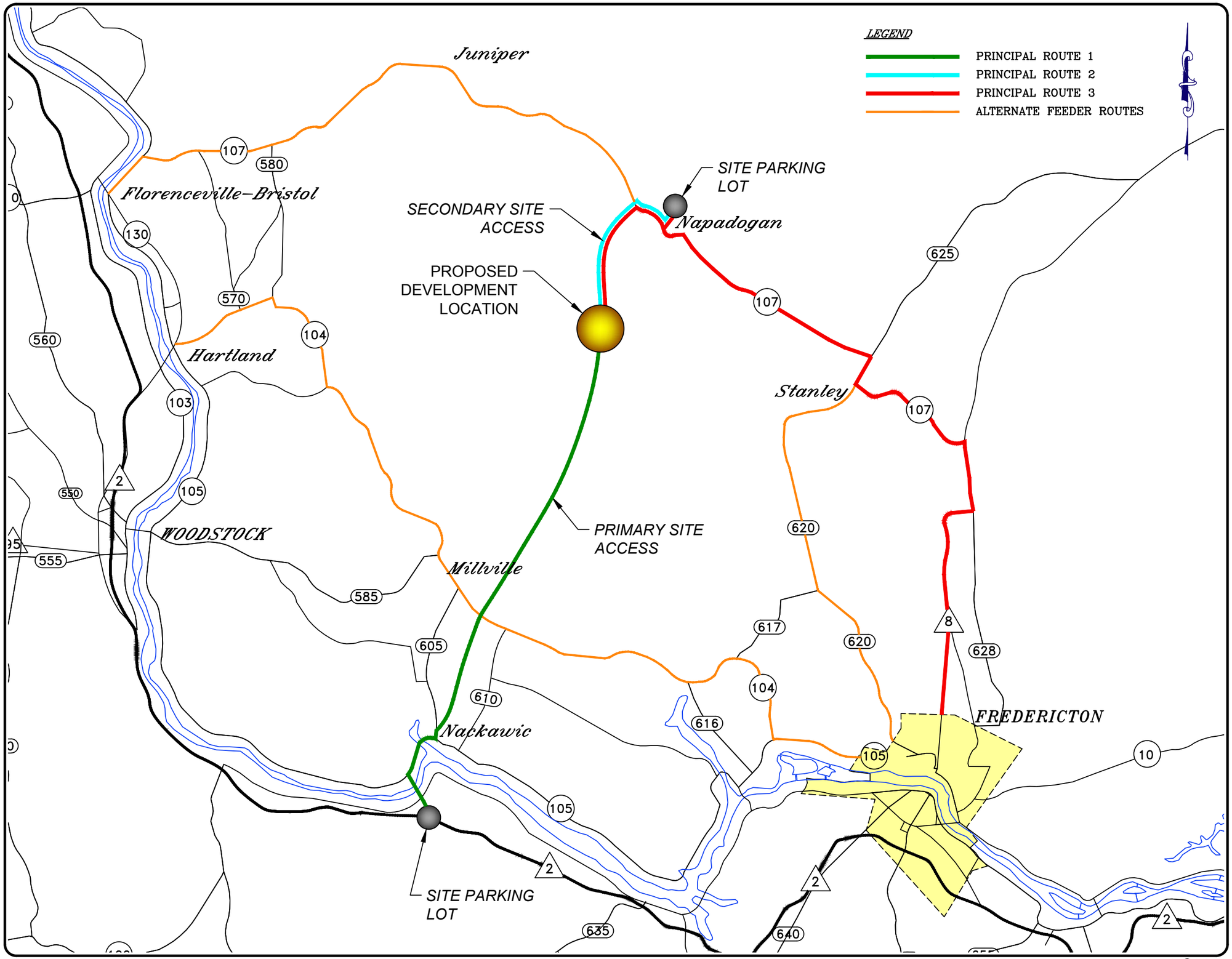
Existing forest roads have been designated to provide access between the provincial highway network and the proposed Sisson Project. They are also shown in **Figure 2.1** and include the following:

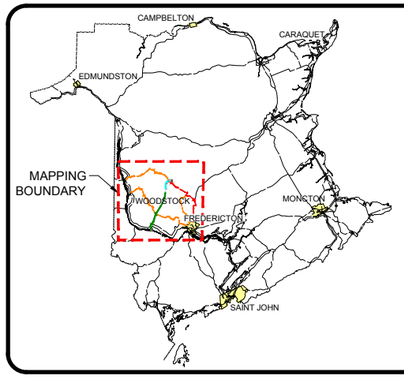
- Napadogan Road (Valley Forest Products Road) and Fire Road (the Primary Site Access Road); and
- Four Mile Brook Road and Fire Road (the Secondary Site Access Road).

Route 105 (Route 605 to Route 2) is a provincially designated collector highway. This segment of highway between Route 605 in Nackawic and Route 2 is the principal Provincial highway link to Napadogan Road, the Primary Site Access Road to the Project site. The section of Route 105 from Route 605 to the Hawkshaw Bridge Road is 5.1 km in length. From there this segment connects to Route 2 across the Hawkshaw Bridge (0.9 km) and a short section of Route 102 (1.3 km). The section west of the Hawkshaw Bridge was constructed as a new connector road between Route 102/Route 105 and Route 2, as part of the Route 2 twinning project. The entire length of this segment from Route 605 to Route 2 is 7.3 km.

The Primary Site Access Road (PSA) is comprised of two forest roads, Napadogan Road (Valley Forest Products Road) and Fire Road, that extend approximately 45 km from Route 105 and Route 605 at the Nackawic Mill Woodyard Road to the Sisson Project site. It has been designated by Northcliff Resources Ltd. as the primary route of access to the Project from the Provincial Highway network. Napadogan Road intersects Route 104, approximately 10 km north of the Nackawic Mill Woodyard Road. From Route 104 Napadogan Road continues north another 28 km to the Fire Road. The Project site is located approximately another 7 km north.

Route 107 is a provincially designated collector highway. At its western limit Route 107 intersects Route 105 at Bristol and at its eastern limit it intersects Route 8 at Nashwaak Bridge. Route 107





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Project Title

SISSON BROOK PROJECT
TRANSPORTATION STUDY

Dwg. Title

PRINCIPAL ACCESS ROUTES

Project No.	FRE-00209565-A0
Dwg. No.	**FIGURE 2.1**
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intersects the Four Mile Brook Road, the Secondary Site Access Road just west of Napadogan. Route 107 intersections with Route 620 and Route 8 at the eastern end and Route 105 at the western end.

The Secondary Site Access Road (SSA) is comprised of two existing forest roads, Four Mile Brook Road and Fire Road that extend southward from Route 107 to the Sisson Project site, a length of approximately 17 km. These roads have been designated by Northcliff Resources Ltd. as the secondary route of access from the Provincial Highway network north of the Project. The Secondary Site Access Road intersects Route 107 at the Four Mile Brook Road 5 km west of Napadogan.

In addition to these principal site access routes to the Project site, there are a number of alternate feeder routes that will provide access to the Project site. As shown in **Figure 2.1**, they include:

- Route 107 (Route 105 to SSA);
- Route 105 (Route 107 to Route 130);
- Route 104 (Route 105 to PSA);
- Route 104 (Route 130 to PSA);
- Route 105 (Route 620 to Route 104); and
- Route 620 (Route 105 to Route 107).

Alternate routes that provide direct access to the proposed Sisson Project site are from east and west of Route 104 and from west of Route 107. Route 104 is a provincially designated collector highway. At its western limit Route 104 intersects Route 130 in Hartland and at its eastern limit it intersects Route 105 in Keswick. Napadogan Road crosses Route 104 approximately 2 km east of Millville. This intersection of Route 104 and Napadogan Road provides an alternate access point to the Sisson mine development from the Provincial highway network. Traffic generated by the Project may travel in either direction on Route 104 to Napadogan Road.

Depending on the origin of the Project generated traffic, other provincial highways may be utilized as links to the principal or alternate feeder highway routes that lead to the Project site. Other Provincial highway routes within the Project area 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).

2.2.1 Road Network Infrastructure

For reporting and analysis purposes all of the Provincial principal access routes and alternate feeder routes, and the site access forest roads, have been divided into roadway links. The link lengths and some roadway characteristics are as follows:

a. *Route 8 – Fredericton City Limits to Route 107*: 28.0 km of paved surface in good to very good condition following the Nashwaak River.

b. *Route 104 – Route 105 to PSA (Napadogan Road):* 34.1 km of paved surface in good condition passing through the communities of Burtts Corner and Zealand.

c. *Route 104 – PSA (Napadogan Road) to Route 130:* 48.6 km of paved surface in fair condition passing through the communities of Millville and Coldstream.

d. *Route 107 – Route 8 to SSA (Four Mile Brook Road)*: 42.8 km of paved surface in fair to good condition passing through the communities of Stanley, Williamsburg, and Napadogan.

e. *Route 107 – SSA (Four Mile Brook Road) to Route 105*: 57.0 km of paved surface in fair to good condition passing through the communities of Juniper, Glassville, Bristol.

f. *Route 105 – Route 620 to Route 104:* 13.1 km of paved surface in fair to good condition passing through northwest Fredericton and the community of Douglas.

g. *Route 105 – Route 2 to Route 605*: 11.2 km of paved surface in good to very good condition passing through the community of Nackawic.

h. *Route 105 – Route 107 to Route 130*: 4.3 km of paved surface in good to very good condition passing through the community of Florenceville-Bristol.

i. *Route 130 – Route 105 to Route 104*: 16.9 km of paved surface in very good condition connecting Florenceville-Bristol with the community of Hartland. This roadway was formerly part of the Route 2 Trans-Canada Highway.

j. *Route 605 – Route 105 to Mill Woodyard Road*: 2.0 km of paved surface in good condition in the community of Nackawic. This section of roadway serves as the truck access road between the Nackawic Mill / Napadogan Road and Route 105 (which connects to Route 2).

k. *Route 605 – Mill Woodyard Road to Route 104*: 12.9 km of paved surface in fair condition passing through the community of Pinder. Route 605 connects Nackawic with Millville.

l. *Route 610 – Route 105 to Route 104*: 12.4 km of paved surface in fair condition passing through Upper Caverhill.

m. *Route 617 – Route 104 to Route 620*: 11.5 km of paved surface in fair condition passing through Birdton. It connects Burtts Corner with the roadway to Stanley.

n. Route 620 – Route 105 to Route 107: 42.7 km of paved surface in fair to good condition connecting the City of Fredericton to the community of Stanley. Route 620 passes through the communities of Esteys Bridge and Tay Creek.

o. PSA (Napadogan Road) – Route 605 to Route 104: approximately 10 km of two-lane functioning gravel forest road in good condition.

p. PSA (Napadogan Road and Fire Road) – Route 104 to Project Site: approximately 35 km of gravel forest road, comprised of a 28 km Napadogan Road section north from Route 104 to a 7 km Fire Road section; the first 15 km of Napadogan Road is a narrow functionally two-lane road in good to fair condition, but the remaining road sections to the Project site are one-lane only in fair to poor condition.

q. SSA (Four Mile Brook Road and Fire Road) – Route 107 to Project Site: approximately 17 km of gravel forest road comprised of the 14 km Four Mile Brook Road and a 3 km section of the Fire Road to the Project site that are one-lane only in fair to poor condition.

A summary profile of the geometric characteristics of each of the Provincial highway routes in the Project site area is presented in **Table 2.1**.

Table 2.1 – Geometric Characteristics on Potential Access Routes

Location			Geometric Criteria							
			Surface Type	Surface Width (m)	Surface Condition	Rideability	# of Lanes	Shoulder Type	Shoulder Width (m)	Shoulder Condition
Roadway Segment	a. Route 8	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
	b. Route 104	Route 105 to PSA	Asphalt / Chip Seal	6.8 – 7.0	Good	5.43	2	Gravel	1.0 – 2.0	Good
	c. Route 104	PSA to Route 130	Asphalt / Chip Seal	7	Fair to Good	4.26	2	Gravel	0.9 – 2.0	Fair
	d. Route 107	Route 8 to SSA	Asphalt / Chip Seal	6.6 – 7.0	Fair to Good	4.53	2	Gravel	1.0 – 2.0	Fair to Good
	e. Route 107	SSA to Route 105	Asphalt / Chip Seal	6.8 – 7.0	Fair to Good	4.88	2	Gravel	1.0 – 2.0	Fair to Good
	f. Route 105	Route 620 to Route 104	Asphalt	7	Good	5.75	2 – 4	Asphalt / Gravel	1.5 – 2.0	Good
	g. Route 105	Route 2 to Route 605	Asphalt / Chip Seal	7	Good to Very Good	5.42	2	Asphalt / Gravel	1.1 – 2.0	Good to Very Good
	h. Route 105	Route 107 to Route 130	Asphalt	7	Good to Very Good	5.09	2	Asphalt / Gravel	0.4 – 2.0	Good to Very Good
	i. Route 130	Route 105 to Route 104	Asphalt	7.5	Very Good	6.71	2	Asphalt	1.5 – 3.0	Very Good
	j. Route 605	Route 105 to Mill Entrance	Chip Seal	Wide Lanes	Good	N/A	2	Chip Seal / Gravel	Wide	Good
	k. Route 605	Mill Entrance to Route 104	Chip Seal	Narrow Lanes	Fair	N/A	2	Gravel	Narrow	Poor
	l. Route 610	Route 105 to Route 104	Chip Seal	Narrow Lanes	Fair	N/A	2	Gravel	Narrow	Poor
	m. Route 617	Route 104 to Route 620	Chip Seal	Narrow Lanes	Fair	N/A	2	Gravel	Narrow	Poor
	n. Route 620	Route 105 to Route 107	Asphalt / Chip Seal	Varies	Fair to Good	N/A	2	Asphalt / Gravel	Varies	Fair
	o. PSA	Route 605 to Route 104	Gravel	Varies	Good	N/A	2	Gravel	Varies	Fair
	p. PSA	Route 104 to Project Site	Gravel	Narrow	Fair to Poor	N/A	1 - 2	Gravel	Varies	Poor
	q. SSA	Route 107 to Project Site	Gravel	Narrow	Fair to Poor	N/A	1 - 2	Gravel	Varies	Poor

The geometric characteristics include surface type, surface width, surface condition rideability, number of lanes, shoulder width and shoulder condition, as defined below.

Surface Type: The surface types is identified as asphalt, chip seal or a combination of both based on the Road Life Study diagrams data from NBDTI, and observations during the field review.

Surface Width: The surface widths are identified from the NBDTI Road Life Study diagrams. The width of the 600 series roadways was qualitatively noted during the field review.

Surface Condition: The surface condition is based on a qualitative assessment made by the Study Team during the field review. The surface condition rating ranged 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 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. The 2009 RCIs shown in **Table 2.1** are identified from the Road Life Study diagrams. Rideability was not available for the 600 series roadways.

Number of Lanes: All roadways observed in the field review have 2 lane cross-sections with the exception of a short 4-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 reviews.

Shoulder Condition: The shoulder condition has been based on a qualitative assessment made by the Study Team during the field review. The shoulder condition rating ranged from poor to very good.

Table 2.2 shows the current maximum Gross Vehicle Weights (GVW) of the Provincial highway route network serving the Project area. The maximum GVW ranges from 43.5 tonnes to 62.5 tonnes. Each spring, NBDTI imposes spring weight restrictions on routes within the provincial highway network not deemed “all weather” highways to protect highway infrastructure from damage during the spring thaw. Although weight restrictions may vary from year to year, the weight restrictions in place during the spring of 2012 are shown in the table below. None of the highways in the Project area have imposed spring weight restrictions below 80%.

Some bridges have weight restrictions that are below the prevailing weight limit of the highway segment. All bridges within the provincial roadway segments presented in **Table 2.2** were reviewed within the 2012 NBDTI *Bridge Inventory* manual. Only 1 bridge was found to have a current weight restriction and that is bridge number T100 (Tay River #4) on Route 620, which has a maximum weight restriction of 30 t.

Table 2.2 – Vehicle Weight Restrictions on Potential Access Routes

Location			Weight Limit Criteria		
			Max GVW (tonnes)	Spring Weight Restriction	Bridge Weight Restrictions
Roadway Segment	a. Route 8	City Limits to Route 107	62.5	all weather	None
	a. Route 104	Route 105 to PSA	43.5	80-90%	None
	b. Route 104	PSA to Route 130	43.5	80%	None
	c. Route 107	Route 8 to SSA	43.5	80%	None
	d. Route 107	SSA to Route 105	43.5-62.5	80% - all weather	None
	e. Route 105	Route 620 to Route 104	43.5	80%	None
	f. Route 105	Route 2 to Route 605	62.5	all weather	None
	g. Route 105	Route 107 to Route 130	62.5	all weather	None
	h. Route 130	Route 105 to Route 104	43.5	all weather	None
	i. Route 605	Route 105 to Mill Entrance	62.5	all weather	None
	j. Route 605	Mill Entrance to Route 104	43.5	80%	None
	k. Route 610	Route 105 to Route 104	43.5	80%	None
	l. Route 617	Route 104 to Route 620	43.5	80%	None
	m. Route 620	Route 105 to Route 107	43.5-62.5	80% - all weather	Tay Creek Bridge (T100): 30 t max

Some roadway sections within New Brunswick are designated controlled access highways, as described in the New Brunswick *Highway Act*. Highways can be designated as level I, level II, level III, level IV, or no access control with level I being the most restrictive in terms of the type of accesses permitted. Access control is typically placed on higher level arterial highways and adjacent to highway interchange ramps to help ensure safe and efficient travel on high volume arterial routes. Provincial legislation was reviewed to determine what roadway segments among the potential access routes currently have access control. The levels of access control on the Provincial highway routes within the Project area are summarized below.

a. *Route 8 – Fredericton City Limits to Route 107*: No access control.

b. *Route 104 – Route 105 to PSA (Napadogan Road):* No access control.

c. *Route 104 – PSA (Napadogan Road) to Route 130:* No access control.

d. *Route 107 – Route 8 to SSA (Four Mile Brook Road)*: No access control.

e. *Route 107 – SSA (Four Mile Brook Road) to Route 105*: No access control.

f. *Route 105 – Route 620 to Route 104*: Level I access control from Route 620 (Royal Road) to the Claudie Road (2.9 km). All other portions have no access control.

g. *Route 105 – Route 2 to Route 605*: This section has several segments of access control including the following:
    i. Level III access control from the centreline of the grade separation with Route 2 to the north a distance of 190 m;
    ii. Level III access control from the centreline of the grade separation with Route 102 to the south a distance of 155 m and to the north a distance of 165 m;
    iii. Level III access control from Otis Drive to the north a distance of 2.35 km; and
    iv. All other portions have no access control.

h. *Route 105 – Route 107 to Route 130*: No access control.

i. *Route 130 – Route 105 to Route 104*: No access control.

j. *Route 605 – Route 105 to Mill Woodyard Road*: No access control.

k. *Route 605 – Mill Woodyard Road to Route 104*: No access control.

l. *Route 610 – Route 104 to Route 105*: No access control.

m. *Route 617 – Route 104 to Route 620*: No access control.

n. *Route 620 – Route 105 to Route 107*: Level III access control from the centreline of the grade separation with Route 105 to the north a distance of 125 m. All other portions have no access control.

In general the Provincial highway network infrastructure in the project area 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 project area typically have narrow shoulders that are partially paved, but mostly gravel.

Most of the Provincial highways have no access control with private driveways and serve both drive-through traffic and local area traffic demands. All of the Provincial highways are used for trucking, typically forest products, but most are subject to weight restrictions limiting them to a maximum of 43.5 t GVW with 80% spring weight limits. Some highway segments, including the sections of Route 105 and Route 605 between the Trans Canada Highway and the Napadogan Road, are all weather roads with up to 63.5 t GVW suitable to most truck configurations (Goguen, personal communication, October 2012).

The forest roads planned to provide access to the Project site from the Provincial highway network from the south (the 45 km Primary Site Access road) and from the north (the 17 km Secondary Site Access road) are gravel roads. The segment of the Primary Site Access road 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. The remaining portion of Napadogan Road and the Fire Road to the Project site is functionally a one-lane road. There are three one-lane bridges along the northern segment of the Primary Site Access Road. Most of the Secondary Site Access Road is narrow with a one-lane bridge and functionally limited to one lane only, and in fair to poor condition.

Maintenance of the forest roads (grading, snow removal, and restoration and upgrading) is conducted through ongoing agreements among the forest products industry participants of the area and NBDNR. The level of road maintenance provided to segments of the forest roads is generally dependent upon whether they are actively in use by the forest products industry. (Comeau, personal communication, November 2012)

2.2.2 Road Traffic Level of Service

The most recent (2010) average annual daily traffic (AADT) volumes along Provincial highway sections in the Project area have been acquired from NBDTI. In addition, traffic volumes were counted for this study during the first week of November at three key intersections on Route 105, Route 107, and Route 104 that provide access from the Provincial highway network to the Project site. All traffic going into the Project site will pass through one or more of these key intersections. **Table 2.3** provides the locations of the key intersections surveyed.

Based on the traffic turning movement count survey of Napadogan Road at Route 104, the estimated AADT volume on the Primary Site Access Road south of Route 104 is 190 vehicles, of which 116 (61%) are trucks. North of Route 104 the estimated AADT volume on Napadogan Road is 242 vehicles, 104 (43%) of which are trucks. Very high percentages of trucks along Napadogan Road underline the prominence of trucks on the forest roads. The traffic count survey was conducted during deer hunting season, and the presence of hunter vehicles was observed.

Based on the traffic turning movement count survey of Four Mile Brook Road at Route 107, the estimated AADT volume counted on the Secondary Site Access road, south of Route 107 is 16 vehicles with no (0%) trucks. At this point in time there is no forest activity utilizing the Four Mile Brook Road and Fire Road north of the Project site.

Table 2.3 - Key Intersections on Primary Access Routes

Intersection	Type	Approaches	Turning Movements *
Route 105 / Route 605 (to PSA)	3-Way Stop Controlled on Route 605	Route 105 West	L, T
		Route 105 East	T/R
		Route 605 North	L/R
Route 104 / PSA (Napadogan Road)	4-Way Stop Controlled on PSA	Route 104 West	L/T/R
		Route 104 East	L/T/R
		PSA North	L/T/R
		PSA South	L/T/R
Route 107 / SSA (Four Mile Brook Road)	3-Way Stop Controlled on SSA	Route 107 West	T/R
		Route 107 East	T/L
		SSA South	L/R

** Note: Turning Movements:* *L = Left Turn Lane* *T = Through Lane* *R = Right Turn Lane* *T/L = Shared Through & Left Lane* *T/R = Shared Through & Right* *L/R = Shared Left & Right Lane* *L/T/R = Shared Left, Through & Right Lane*

The existing AADT traffic volumes on all of the Provincial highways within the Project area, as well as on the Primary and Secondary Site Access roads, are shown in **Figure 2.2**.

Level of service (LOS) analysis was completed using HCM 2000 methodologies for each Provincial highway segment on the potential access routes. The LOS on roadway segments ranges from an excellent LOS A to a poor LOS F and is function of the percent time-spent following (PTSF) for a vehicle during the peak hour. The LOS analysis accounts for various geometric and traffic flow variables to estimate what percentage of time a vehicle may be following another vehicle during the peak hour. The following parameter data, summarized below, were collected during the field review and included in the LOS analysis for each Provincial highway section.

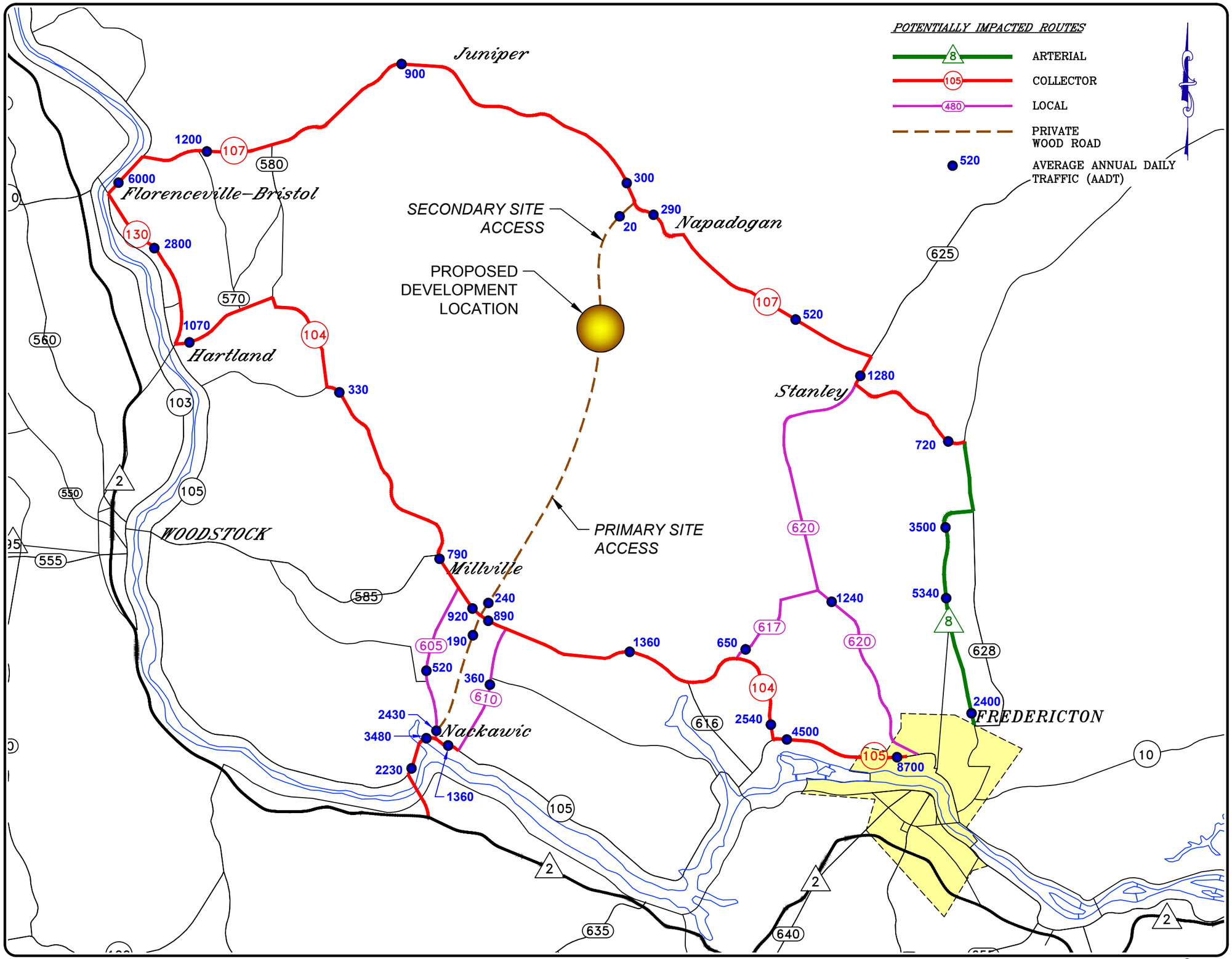
Posted Speed: The posted speed limits along each potential access route are shown in **Table 2.4**. The posted speed limit ranged from 50 km/h to 90 km/h although 80 km/h was the most common posted speed limit.

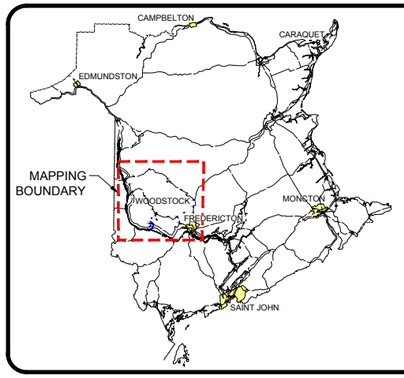
Passing Opportunities: The amount of passing opportunities was a qualitative assessment based on observations during the field reviews. The opportunities range from low to high. The more horizontal and vertical curvature that a roadway has the fewer passing opportunities it will have due to sight distance restrictions.

Roadside Development Density: The amount of roadside development was a qualitative assessment based on observations during the field reviews. The roadside development density ranged from low through much of the largely rural area around the Project site to high within the more urban areas, particularly in Fredericton.

The results of the Provincial highway segment LOS analysis can be found in **Table 2.4**. The results indicate that all routes operate at a good LOS C or better with the exception of Route 8 and Route 105 adjacent to and within the City of Fredericton. These routes experience higher traffic volumes than other routes studied as they serve as commuter routes to the City of Fredericton. These two commuter routes currently operate at a satisfactory LOS D. Although Route 8 currently operates at a LOS D between the City of Fredericton and Route 107, it will soon be by-passed upon opening of the new Route 8 highway alignment from Marysville to South Portage, north of Route 107.

The level of service of the three intersections where traffic counts were completed has been determined. The intersection turning movements, as presented in **Table 2.3** above, and the turning movement volumes during the morning (“AM”) and evening (“PM”) peak hours have been extracted from the traffic count surveys conducted for this study for use in the intersection level of service analyses. The AM and PM peak hour intersection traffic flow diagrams for the key intersections located along the Project site access routes are presented in **Appendix B**.





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TRANSPORTATION STUDY

Dwg. Title
ESTIMATED DAILY TRAFFIC VOLUMES

Project No.	FRE-00209565-A0	
Dwg. No.	**FIGURE 2.2**	Rev. No.
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Table 2.4 – LOS Parameters and Results for Potential Access Routes

Location			LOS Criteria and Results for Potential Access Routes						
			Length (km)	AADT (2010)	Posted Speed (km/h)	Passing Opportunities	Roadside Development Density	Roadway LOS	PTSF
Roadway Segment	a. Route 8	City Limits to Route 107	28	3500-5340	80-70-80-50-90-80	Low-Moderate	Low-Moderate	D	58.1 - 61.8%
	b. Route 104	Route 105 to PSA	34.1	780-2540	80-60-80-50-80-50	Moderate	Moderate	A-B	33.4-50.1%
	c. Route 104	PSA to Route 130	48.6	330-1070	80-50-80-70-80-50-80-50-80	Low-Moderate	Low	A	28.6-36.9%
	d. Route 107	Route 8 to SSA	42.8	290-1280	50-70-80-70-50-80-50-80-60-80	Moderate-High	Low-Moderate	A	23.3-34.6%
	e. Route 107	SSA to Route 105	57	300-1200	80-50-80-50-80-50	Moderate-High	Low-Moderate	A	23.5-33.8%
	f. Route 105	Route 620 to Route 104	13.1	4500-8700	90-70-80-70	Moderate	High	C-D	57.5-70.9%
	g. Route 105	Route 2 to Route 605	11.2	1360-3480	70-80-70-80	Moderate-High	Moderate	A-B	35.5-54.4%
	h. Route 105	Route 107 to Route 130	4.3	6000	50-80-50	Low	High	C	63.50%
	i. Route 130	Route 105 to Route 104	16.9	2800	80 - 100	High	Low	B	45.70%
	j. Route 605	Route 105 to Mill Entrance	2	2430	80	Moderate	Moderate	B	53.40%
	k. Route 605	Mill Entrance to Route 104	12.9	520	80-70-80-50	Low-Moderate	Low-Moderate	A	30.80%
	l. Route 610	Route 105 to Route 104	12.4	360	80	Low	Low	A	29.30%
	m. Route 617	Route 104 to Route 620	11.5	650	50-80	Low	Low	A	32.70%
	n. Route 620	Route 105 to Route 107	42.7	1240	50-60-80-60-80-70-80-50	Moderate	Low-Moderate	A	38.20%

These intersections have been evaluated to establish the baseline of traffic conditions that will be used to assess the environmental effects of the increased traffic generated during the Construction and Operation phases of the Project.

The overall intersection levels of service presently experienced at each of the key intersections are shown in **Table 2.5**. The results of the LOS analysis show that all intersections operate at an excellent LOS A during peak periods. There was no congestion observed during the field visits and traffic counts at any of these intersections. These observations were supported by the LOS analysis

which shows all turning movements at these intersections operating efficiently and well below capacity under existing traffic volumes, roadway geometry, and traffic control.

Table 2.5 - Existing Levels of Service of Key Intersections

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

2.2.3 Road Traffic Safety

Average annual vehicle collision frequencies and rates have been calculated from NBDOT collision report files for each potential access route for the 5-year period from 2006 to 2010. The total collision rate and rates per severity class for the each provincial roadway segment are presented in **Table 2.6**. The percentage of collisions broken into severity classes (fatal, personal injury, and property damage only) is also shown in the table.

Collision data for Route 130 only includes data for a 3-year period encompassing 2008 to 2010. The collision rates for Route 105 (Route 2 to Route 605) only include collision rates for the roadway segment from the northern end of the Hawkshaw Bridge to Route 610. There was no collision data available for the forest roads.

The Provincial average collision rate for undivided arterial highways is 0.703 Col/MVK and for collector highways is 0.949 Col/MVK. As shown in **Table 2.6**, the vehicle collision rates of the Provincial highways that lead to the Project site access roads are generally within the range of the Provincial average rates for undivided arterial and collector highways.

The collision rate calculated for Provincial arterial highway Route 8 was 0.568 Col/MVK. The collision rates calculated for Provincial collector highways Route 104, Route 105, Route 107, and Route 130 ranged from 0.410 to 1.038 Col/MVK. The collision rates calculated for Provincial local highway Route 605, Route 610, Route 617, and Route 620 ranged from 0.564 to 0.956 Col/MVK.

The roadway segment with the lowest collision rate calculated was Route 107 from Route 8 to the Secondary Site Access Road with a rate of 0.412 Col / MVK. This roadway segment will be a key roadway link for the proposed development. Property damage only collisions ranged from 56% to 100% of total collisions, while injury collisions ranged from 0% to 44%, and fatal collisions ranged from 0% to 2%.

Table 2.6 – Existing Collision Rates along Provincial Highway Routes (2006 – 2010)

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

Source: calculated from NBDOT collision report files, 2006 - 2010.
Notes: [1] *Col/MVK is the average number of collisions per million vehicle-kilometres.*
[2] *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).*

There are no collision data available for the forest roads, Napadogan Road, Fire Road and Four Mile Brook Road, that lead from the Provincial highways to the Project site. Stop signs are posted at the approaches of the Napadogan Road and Four Mile Brook Road where they intersect Provincial highways, Route 104 and Route 107, respectively. 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.

Most of the Four Mile Brook, 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. Warning signs are posted ahead of the one-lane bridges to be prepared to stop for opposing traffic. There are also km markers every 1 km along the forest roads. Normal practice of drivers on the forest roads is to call in on their CB radio every 2 km to alert others that may be oncoming of their position. Some yellow turning arrow warning signs are posted on sharp curves.

Although the traffic volumes are very low, the proportionally high use by trucks and the road infrastructure passing limitations 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.

It was observed that at the intersection approaches of the Primary and Secondary Site Access roads to the Provincial highway Route 104 and Route 107, respectively, that bush growth restricts the sight distances of traffic from the forest roads when crossing the Provincial highways. This may be a temporary condition, as the Province normally maintains the lateral clearance by cutting back growth along collector highways.

3 Project Traffic Generation and Distribution

3.1 Project Traffic

The Sisson Project activities will generate road traffic during its Construction and Operation phases. Through the preliminary Project planning process the Project Proponent, Northcliff Resources, has estimated the number of truck trips, as well as workers trips on buses and their own vehicles, generated by the Project. In addition, Northcliff has indicated the routings of where project traffic will be distributed (Boyle, personal communication, November 2012). The estimates of traffic generated and distributed are presented in this section, and form the basis of the assessment of the potential effects of the Project on transportation presented in the next section of this report.

It once again must be noted that the Project is at a feasibility study stage, and detailed engineering design of the specific elements and configurations of the Project and associated facilities have not yet been completed. As such, though based on the best available information at the time of writing, the Project details as described in this report are subject to change as the Project unfolds and as more detailed construction and operations planning is carried out.

The Proponent's current estimates of truck and worker trips generated by the Project, and the Provincial and forest road routings to access the site, are provided in **Appendix C**. These estimates have been used as the basis of this road transportation assessment of the effects that the Project will have on road infrastructure, traffic level of service and traffic safety within the Project area.

3.1.1 Traffic Generated by the Project

The number of truck trips that will be generated by the Project per month during each phase have been estimated based on the currently planned mining and production level. This pertains to the Construction phase, inasmuch as it influences the required size and extent of the Project facilities, and to the activity level of the Project once in operation.

Current plans are for the Construction phase to be completed within an 18 to 24 month period. Estimates of the truck trips per month generated by the Project during construction have been based on the breakdown of required materials and equipment, and the various services used. Construction and trucking activities will vary from month to month during construction, depending on what components are being constructed and the stage of construction. The daily average number of construction workers has been estimated for the Project. The worker trips to the Project site have been split between those who will travel to the Project site in buses, and those that will drive into the site in their own vehicles. For the purpose of this road transportation study, it has been assumed that Project workers during each phase would be collected at two parking lots, one located near Route 2 at Nackawic and the other located at the Napadogan rail siding, and travel by bus from those parking lots to the Project location. The precise location of the parking lots to be used for such purposes will be confirmed as further Project planning and permitting is conducted.

Once commissioning activities are completed, the Project operations and the traffic generated will be fairly uniform. Estimates of the truck trips per month have been broken down by inbound shipments of production input materials and outbound product, as well as various services used during the Operation phase. The estimated daily average number of mine workers that will be employed in the Project mining operation have been split between those who will travel to the Project site on buses, and those that will drive into the site in their own vehicles.

3.1.2 Project Traffic Distribution

The traffic generated by the Project during both the Construction and Operation phases will travel between the Project site and the public Provincial highway network over forest roads designated to provide access to the site, the Primary Site Access Road to the south and the Secondary Site Access Road to the north. The Proponent has indicated how they expect the Project traffic will be distributed between two site access roads, as well as the Provincial highways leading to them. The current plans are to distribute all of the Construction and Operation phase truck and bussed worker traffic among three principal routings to the Project site, including:

- Route 2 (Trans Canada Highway) to Route 105 and Route 605 to the Project site on the Primary Site Access Road;
- Route 107 from the CN Rail siding in Napadogan to the Project site on the Secondary Site Access Road, and
- Route 107 from Route 8 to the Project site on the Secondary Site Access Road.

(Boyle, personal communication, November 2012)

3.2 Project-Related Road Traffic During Construction

Road traffic generated during the Construction phase of the Project will be comprised of:

- Passenger vehicles (construction workers' automobiles, SUVs, vans and pick-ups);
- Buses (construction workers); and
- Trucks (for transport of construction equipment and materials, and various services).

Truck traffic generated by the Project during construction will travel over the public Provincial highway network within the Project area to the site access roads. To reduce the volumes of construction workers traffic going to and from the Project site, the Proponent plans to provide bus services that would run between two off-site parking lots and the Project site.

The Project-related traffic data and assumptions used in the Road Transportation analysis are provided below. Note that the maximum traffic volumes that may possibly be generated by the Project during the highest month of construction activity, month 12 (**Appendix C**), have been assumed. This approach has been taken to capture the most pronounced environmental effects on Road Transportation that may be attributed to traffic generated during the Project Construction phase.

Current Plans and Principal Assumptions – Construction Phase

- At the peak month of construction, there will be a total of 501 round truck and bus trips to and from the site per month, of which 357 will be trucks hauling construction equipment and materials, and providing various services, and 144 will be busses carrying construction workers to the Project site.

- Truck trips have been based on average truckloads of 20 t per shipment.

- Truck trips have been distributed among two principal routings to the Project site according to their expected origin, the Route 2 (Trans Canada Highway) to Route 105 and Route 605 to the site on the Primary Site Access Road and the Route 107 from Route 8 to the site on the Secondary Site Access Road.

- All of the construction materials and equipment will be transported to the Project site from the Trans Canada Highway via the Route 105, Route 605 and Primary Site Access Road.

- No construction materials or equipment will be transported by rail to the CN Rail siding for transhipment 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.

- There will be an average of 400 construction workers working at the Project site, six days a week, day shift only. There is no night time construction activities currently planned.

- Of the 400 construction workers 300 will be bussed to the site, an average of 6 round trips per day.

- Two thirds (200) of the 300 construction workers travelling by bus will park and go to the to the Project site from a parking lot located at the Route 2 Trans Canada Highway interchange across the Hawkshaw Bridge at Nackawic, and the other one third (100) will park and go to the site from a parking lot located at the CN Rail siding in Napadogan. It is assumed that these workers will use the Trans Canada Highway Route 2 to the Nackawic area parking lot and Route 107 to the CN Rail siding parking lot.

- The 100 construction workers travelling to the site in their own vehicles will carpool at an average of two per vehicle. It is assumed that these workers travelling to the Project site in their own vehicles will travel to the Secondary Site Access Road from Route 107 and to the Primary Site Access Road from Route 104.

The traffic generated by the Project during construction will accumulate as it approaches the Project site to the number of round trips presented in **Table 3.1**. All Project generated traffic volumes were converted to one-way daily (ADT) volumes to correspond with the existing AADT traffic. A summary of the average daily traffic that will be generated by the construction activities associated with the Project, based on the above plans and assumptions, is presented in **Table 3.1**.

The Project-generated traffic volumes reflect the maximum volumes expected during the highest month of construction activity. The additional traffic volumes predicted to be generated by the Project total 136 ADT. Note that the additional traffic volumes generated during construction will be split by direction from the Project site, south along the Primary Site Access Road and north along the Secondary Site Access Road, and distributed among the routes to and from the Project site. The additional traffic generated during construction will decrease along the Provincial highways, as it becomes more distant from the Project site.

Table 3.1 - Average Daily Traffic Generated During Construction

Traffic Components	Round Trips per day	ADT (one-way)
Vehicles to/from Project Site:		
Trucks *(at highest month of Project construction activity to Site)*	12	24
Construction Workers' Buses *(75% of workers, between parking lots and Site)*	6	12
Construction Workers' Autos *(25% of total workers, direct to Site, two per vehicle)*	50	100
Total	**68**	**136**

Note: The above Project-generated traffic volumes have been based on the peak month of construction activity, month 12 under current plans, when traffic is anticipated to be the highest during the planned 18 – 24 month construction period.

Table 3.2 presents the traffic volumes generated by the Project during the Construction phase have been assigned to the Provincial highway route segments within the Project area that will be used for travel to the Project site. The sum of the traffic volumes generated by Project construction activity and the existing traffic volumes provide the total expected traffic volumes during the peak month of construction.

As shown in **Table 3.2**, the additional traffic generated during the peak month of Project construction will result in total traffic volumes along the principal Project access route segments of up to 31 ADT from the Trans Canada Highway Route 2 to Route 105 and Route 605 in Nackawic and along the forest road, Napadogan Road, to Route 104. North of Route 104, the ADT will increase to 81 vehicles as construction workers in their own passenger vehicles access the forest road, Napadogan Road, from the east and west on Route 104. Of this total 81 ADT, 31 will be trucks or busses, and the remaining 50 will be passenger vehicles.

A total of 55 ADT of construction traffic will be generated that will travel on the Secondary Site Access road 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 (also east of the Secondary Site Access road on Route 107). Of this 55 ADT on the Secondary Site Access road, 5 will be trucks or busses, and the remaining 50 will be construction workers in their own passenger vehicles. Project construction traffic volumes on Route 107 between Napadogan and the Secondary Site Access road, and east of Napadogan towards Route 8, will be higher due to the additional construction worker passenger vehicles going to the employee parking lot to catch a bus to the Project site, at 80 ADT and 76 ADT, respectively.

The additional traffic generated by the Project during construction on other feeder routes will decrease as it becomes more distant from the Project site.

Table 3.2 – Distribution of Traffic Volumes to Highway Segments – Construction Phase

Location			Existing Vehicles (AADT)	Additional Project Traffic Generated (ADT)	Total Traffic during Project Construction (AADT)
Roadway Segment	a. Route 8	City Limits to Route 107	3500-5340	20	3520-5360
	b. Route 104	Route 105 to PSA	780-2540	25-26[1]	805-2566
	c. Route 104	PSA to Route 130	330-1070	25	355-1095
	d. Route 107	Route 8 to SSA	290-1280	76-80[3]	370-1356
	e. Route 107	SSA to Route 105	300-1200	75	375-1275
	f. Route 105	Route 620 to Route 104	4500-8700	14	4514-8714
	g. Route 105	Route 2 to Route 605	1360-3480	31[2]	1360-3511
	h. Route 105	Route 107 to Route 130	6000	38	6038
	i. Route 130	Route 105 to Route 104	2800	Negligible	2800
	j. Route 605	Route 105 to Mill Entrance	2430	31	2461
	k. Route 605	Mill Entrance to Route 104	520	Negligible	520
	l. Route 610	Route 105 to Route 104	360	Negligible	360
	m. Route 617	Route 104 to Route 620	650	Negligible	650
	n. Route 620	Route 105 to Route 107	1240	18	1258
	o. PSA	Route 605 to Route 104	190	31	221
	p. PSA	Route 104 to Project Site	242	81	323
	q. SSA	Route 107 to Project Site	16	55	71

[1]26 ADT between Route 105 and Route 617 and 25 ADT between Route 617 and PSA
[2]31 ADT between Route 2 and Route 605 and 0 ADT between Route 605 and Route 610
[3]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

Note: 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.

3.3 Project-Related Road Traffic During Operation

Road traffic generated during the Operation phase of the Project will be comprised of:

- Passenger vehicles (mine workers' automobiles, SUVs, vans and pick-ups);
- Buses (mine workers from designated parking lots to site); and
- Trucks (for transport of inbound shipments of production input materials and outbound product, and various services for mine operations).

Truck traffic generated by the Project during its operation will travel over segments of the public Provincial highway network within the Project area to the site access roads. To reduce the volumes of mine operation workers traffic going to and from the Project site, the Proponent plans to provide bus services that would run between two off-site parking lots and the Project site.

The Project-related traffic data and assumptions used in the Road Transportation analysis are provided below. Note that the traffic volumes generated by the Project during the Operation phase reflect the highest month when the full level of the mining operation is expected, in month 30 (**Appendix C**). It has been planned that this operation level will continue through the life of the mining operation (Boyle, personal communication, November 2012). Assessment of the traffic at this full operational level will capture the environmental effects on Road Transportation that may be attributed to traffic generated during the Project Operation phase.

Current Plans and Principal Assumptions – Operation Phase

- At full operation, there will be a total of 529 truck and bus trips per month to and from the site, of which 409 will be trucks hauling inbound shipments of production input materials to the Project site and outbound product from the site, as well as trucks providing various services to the mining operations. In addition there will be 120 busses carrying mine workers from off-site parking lots to the Project site.

- Truck trips have been based on average truckloads of 20 t per shipment.

- Truck trips have been distributed among three principal routings to the Project site according to their expected origin or destination:
    - Route 2 (Trans Canada Highway) to Route 105 and Route 605 to the Project site via the Primary Site Access Road;
    - Route 107 to the truck-to-rail transhipment site at the CN Rail siding in Napadogan from the Project site via the Secondary Site Access Road, and
    - Route 107 from Route 8 to the Project site via the Secondary Site Access Road.

- There will be an average of 200 mine workers working at the Project site, on rotating day and night shifts.

- Of the 200 mine workers 150 will be bussed to the Project site from off-site parking lots.

- Half (75) of the 150 mine workers travelling by bus will park and go to the site from a parking lot located at the Route 2 Trans Canada Highway interchange across the Hawkshaw Bridge at Nackawic, and the other half (50) will park and go to the site from a parking lot located at the CN Rail siding in Napadogan. It is assumed that these workers will use the Trans Canada

Highway Route 2 to the Nackawic area parking lot and Route 107 to the CN Rail siding parking lot.

- The 50 mine workers travelling to the site in their own vehicles will carpool at an average of two per vehicle. It is assumed that these workers travelling to the site in their own vehicles will travel to the Secondary Site Access Road from Route 107 and to the Primary Site Access Road from Route 104.

The Operation phase traffic generated by the Project will accumulate as it approaches the Project site to the number of round trips presented in **Table 3.3**. All Project generated traffic volumes were converted to one-way daily (ADT) volumes to correspond with the existing AADT traffic. A summary of the average daily traffic that will be generated by the Project mining operation activities, based on the above plans and assumptions, is presented in **Table 3.3**.

The Project-generated traffic volumes reflect the maximum volumes generated at the site once the mining operation is at its full level of activity, which is planned to be achieved in month 30. A steady state mining operation will continue from that point forward at this average daily traffic generation level. The additional traffic volumes predicted to be generated by the Project operation total 86 ADT. Note that the additional traffic volumes generated by the Project operations will be split by direction from the Project site, south along the Primary Site Access Road and north along the Secondary Site Access Road, and distributed among the routes to the Project site, and will decrease along the Provincial highways, as they become more distant from the Project site.

Table 3.3 - Average Daily Traffic Generated During Operation

Traffic Components	Round Trips per day	ADT (one-way)
Vehicles to/from Project Site:		
Trucks *(at full Project operation level, to Site)*	14	28
Mine Workers' Buses *(75% of workers, between parking lots and Site)*	4	8
Mine Workers' Autos *(25% of total workers, direct to Site, two per vehicle)*	25	50
Total	**43**	**86**

Note: The above Project-generated traffic volumes have been based on full operation, achieved in month 30 under current plans; traffic is anticipated to continue at that level through the Project life.

Table 3.4 presents the additional Project Operation Phase traffic generated at full operation of the mine distributed among the principal Project access route segments and feeder routes within the Project area that will be used for travel to the Project site. The sum of the Project operation generated traffic volumes and the existing traffic volumes provide the total expected traffic volumes at full operation of the mine.

As shown in **Table 3.4**, the additional traffic generated during full operation of the Project will result in total traffic volumes of up to 25 ADT along the segment of the principal access route from the Trans Canada Highway Route 2 to Route 105 and Route 605 in Nackawic and the forest road, Napadogan Road, to Route 104. North of Route 104, the ADT will increase to 50 vehicles, as mine workers in their own passenger vehicles access Napadogan Road from the east and west on Route 104.

Table 3.4 – 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	a. Route 8	City Limits to Route 107	3500-5340	15	3515-5355
	b. Route 104	Route 105 to PSDA	780-2540	13	793-2553
	c. Route 104	PSA to Route 130	330-1070	12	342-1082
	d. Route 107	Route 8 to SSA	290-1280	52-62[2]	352-1332
	e. Route 107	SSA to Route 105	300-1200	50	350-1250
	f. Route 105	Route 620 to Route 104	4500-8700	7	4507-8707
	g. Route 105	Route 2 to Route 605	1360-3480	25[1]	1360-3505
	h. Route 105	Route 107 to Route 130	6000	26	6026
	i. Route 130	Route 105 to Route 104	2800	Negligible	2800
	j. Route 605	Route 105 to Mill Entrance	2430	25	2455
	k. Route 605	Mill Entrance to Route 104	520	Negligible	520
	l. Route 610	Route 105 to Route 104	360	Negligible	360
	m. Route 617	Route 104 to Route 620	650	Negligible	650
	n. Route 620	Route 105 to Route 107	1240	12	1252
	o. PSA	Route 605 to Route 104	190	25	215
	p. PSA	Route 104 to Project Site	242	50	292
	q. SSA	Route 107 to Project Site	16	36	52

[1] *25 ADT between Route 2 and Route 605 and 0 ADT between Route 605 and Route 610*
[2] *62 ADT between SSA and Project Employee Parking Lot in Napadogan and 52 ADT between Project Employee Parking Lot in Napadogan and Route 620. Lower volumes generated east of Route 620*

A total traffic volume of 36 ADT will be generated that will travel to the site on the Secondary Site Access Road from west and east on Route 107, as well as from the off-site parking lot located in at the CN Rail siding in Napadogan (also to the east on Route 107). Of this 36 ADT on the Secondary

Site Access Road, 11 will be trucks or busses, and the remaining 25 will be passenger vehicles. Immediately west of Napadogan to the Secondary Site Access road, and east of Napadogan towards Route 8, Project generated traffic volumes on Route 107 will be higher due to the additional mine worker passenger vehicles going to the Napadogan parking lot to catch a bus to the Project site, at 62 ADT and 52 ADT, respectively.

The additional traffic generated by the Project operation on other feeder routes will decrease as it becomes more distant from the Project site.

4 Assessment of Potential Environmental Effects of Project on Road Transportation

4.1 Overview

During the Construction phase additional traffic will be generated to and from the proposed Project site and the off-site parking lots by transportation activities that include the movement of equipment and material by trucks and construction workers in busses and their own vehicles. This additional traffic will correspond with the duration of Project Construction phase activity, currently planned to be completed over an 18 to 24 month period.

During the Operation phase, additional traffic will be generated to and from the proposed Project site, comprised of truck traffic generated from inbound processing materials and equipment, outbound product and various maintenance and service vehicles, as well as mining workers going to and from work in busses or their own vehicles. This additional traffic will correspond with the duration of the operation phase of the Project, currently planned to cover a period of from 20 to 30 years.

The potential environmental effects of the proposed Project on Road Transportation fall into three categories:

- The potential environmental effects of the Project on the road infrastructure;
- The potential environmental effects of the Project on the traffic level of service along highway routes to the Project site; and
- The potential environmental effects of the Project on road traffic safety.

4.2 Road Transportation – Construction Phase

The potential environmental effects during the Construction phase have been predicted based on the estimated volumes of additional vehicle traffic generated during the planned 18 to 24 month period of construction, as established in Section 3.2. This analysis has been based on the maximum traffic generated by the Project during the twelfth month when planned construction activity is highest. This approach to the transportation analysis has been taken in order to ensure that any potential environmental effects that may be attributed to traffic generated by the Project construction are captured and assessed during the period of the highest level of construction activity and traffic generated.

The current Project plans designate all of the construction traffic, trucks and workers' busses, to be distributed among three principal routings to the Project site, which include:

- Route 2 (Trans Canada Highway) to Route 105 and Route 605 to the site on the Primary Site Access Road;
- Route 107 from Route 8 to the site on the Secondary Site Access Road, and
- Route 107 from the CN Rail siding site in Napadogan to the Project site on the Secondary Site Access Road (for bussing construction workers only).

4.2.1 Road Infrastructure – Construction Phase

All of the construction materials and equipment will be transported from the Trans Canada Highway to the Project site via the Route 105, Route 605 and Primary Site Access Road 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 Gross Vehicle Weight (GVW). These route segments are

all weather highways with no spring weight restrictions. These allowable truck dimensions and weight limits are the highest permitted on highways in the Province of New Brunswick.

A small portion of the truck traffic (for miscellaneous maintenance services) will originate in Fredericton or communities along Route 8 and Route 107, and will travel along the Route 107 from Route 8 to the site on the Secondary Site Access Road route. Route 8 is presently an all weather highway with the maximum of 62,500 kg Gross Vehicle Weight (GVW). Route 107 between Route 8 and the Secondary Site Access Road is limited to 43,500 kg GVW and is subject to spring weight restriction, typically at 80%. Most of the service 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 Trans Canada Highway.

No construction materials or equipment will be transported to the CN Rail siding for transhipment 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 busses will not exceed the 43,500 kg GVW limits of Route 107.

Given that:

- the increase in traffic on the Provincial highways in the Project area from traffic generated by the Project during construction is 80 ADT on what will be the most travelled segment, on Route 107 between Napadogan and the Secondary Site Access Road, and
- that most of the traffic generated by the Project will be workers passenger vehicles, and
- that the construction materials and equipment will be transported from the Trans Canada Highway to the Project site via Route 105 and Route 605, and the maximum allowable weight limits of these Provincial highway segments permit all truck configurations permitted on the provincial highway system, and
- that only busses and miscellaneous maintenance service trucks will travel on the Route 107 Project access routes,

the increase in total traffic from trucks, busses and passenger vehicles traffic generated by the Project during construction would not be expected to result in damage to the Provincial highway infrastructure that is substantive and beyond normal wear.

The Primary Site Access Road and the Secondary Site Access Road will serve all trucks, busses and passenger vehicles going to and from the Project site. They are comprised of gravel forest roads built to serve the forest product industry. With the exception of the Napadogan Road segments of the Primary Site Access Road, between Route 605 at the Nackawic mill and Route 104, and the lower section of the segment north of Route 104, most of these two routes are in fair to poor condition. The forest roads are typically maintained only where the forest industry is active and the roads are in use. Current plans are for these site access roads to be the maintained as part of the Project construction activities. For this reason these roads will be in better condition during Project construction than they are at present.

The additional traffic generated during the Construction phase of the Project along the principal Project access routes is not expected to adversely affect the road infrastructure.

4.2.2 Traffic Level of Service – Construction Phase

The LOS analysis along various potential highway routes within the Project Area was evaluated under projected Construction phase volumes and is summarized in **Table 4.1**. For comparison purposes, **Table 4.1** also includes the LOS under existing volumes without the Project.

Table 4.1 – LOS Analysis under Existing and Project Construction Phase Traffic Volumes

Location			LOS Criteria and Results for Potential Access Routes					
			Existing Condition			Construction Phase		
			AADT (2010)	Roadway LOS (2010)	PTSF (2010)	AADT (After)	Roadway LOS (After)	PTSF (After)
Roadway Segment	Route 8	City Limits to Route 107	3500-5340	D	58.1-61.8%	3520-5360	D	58.9-62.1%
	Route 104	Route 130 to Primary Site Access road	330-1070	A	28.6-36.9%	355-1095	A	33.5 - 39.0%
	Route 104	Primary Site Access road to Route 105	780-2540	A-B	33.4-50.1%	806-2566	A-B	36.2-51.4%
	Route 105	Route 620 to Route 104	4500-8700	C-D	57.5-70.9%	4514-8714	C-D	57.9-71.1%
	Route 105	Route 2 to Route 610	1360-3480	A-B	35.5-54.4%	1360-3511	A-C	35.5-56.4%
	Route 105	Route 107 to Route 130	6000	C	63.50%	6038	C	63.9%
	Route 107	Route 8 to Secondary Site Access road	290-1280	A	23.3-34.6%	370-1356	A	36.4-39.9%
	Route 107	Secondary Site Access road to Route 105	300-1200	A	23.5-33.8%	375-1275	A	37.2-39.3%
	Route 130	Route 105 to Route 104	2800	B	45.70%	*No Change*		
	Route 605	Route 105 to Mill Entrance	2430	B	53.40%	2461	C	55.6%
	Route 605	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	1240	A	38.20%	1258	A	39.7%

As a result of the relatively low increases in traffic volumes associated with the Construction phase, most of the roadway segments will see no change in the roadway LOS. The only exceptions are the segments of Route 105, from Route 2 to Route 605 and Route 605 from Route 105 to the Mill entrance road, which would experience a drop in level of service 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, the Percentage Time Spent Following. When the actual change in PTSF on these segments of Route 105 and Route 605 are examined, the increases of only about 2% 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 level of service on these highway segments of Route 105 and Route 605 will be relatively minor. All other highway segments would not experience a discernible change in level of service during Project construction.

In addition to the level of service along the Provincial highway network route segments, level of service has been estimated at the three intersections leading into the Project site:

- The Route 105 / Route 605 intersection that leads to the PSA road;
- The Route 104 / PSA road intersection, and
- The Route 107 / SSA road intersection.

The traffic volumes generated by the Project in the AM and PM work trip hours have been allocated to the key intersections within the Project area and added to the existing peak hour traffic volumes. It has been assumed that all site traffic will be split between the morning (AM Peak Hour) and afternoon peak periods (PM Peak Hour). This is a conservative assumption, as the actual morning peak period for traffic generated by the Project will be prior to the morning peak period of the adjacent Provincial highway traffic. Similarly, the afternoon peak period for Project generated traffic will actually follow the afternoon peak period of the adjacent Provincial highway traffic.

The level of service analysis results of existing traffic and total traffic with the additional traffic volumes generated during Project construction at the three key intersections are presented in **Table 4.2**. The results of the level of service analysis indicate that all three intersections would continue to operate at an excellent overall LOS A. All individual turning movements would operate at very good LOS B, or better, during the peak periods.

Table 4.2 – Level of Service at Key Intersections: Construction Phase

Intersection	Type	Period	Overall Intersection Level of Service (LOS)	
			Existing Condition	Construction Phase
Route 105 / Route 605 (to PSA)	3-Way Stop Controlled on Route 605	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A
Route 104 / PSA (Napadogan Road)	4-Way Stop Controlled on PSA	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A
Route 107 / SSA (Four Mile Brook Road)	3-Way Stop Controlled on SSA	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A

In summary, the results of the analyses comparing the existing traffic levels of service with levels of service that will be experienced during the Construction phase of the Project indicate:

- The additional traffic that will be generated by the Project during construction will have a very minor environmental effect on the levels of service and will not create any traffic operational deficiencies along the principal routes or feeder route segments of the Provincial highways within the Project area.

- The additional traffic that will be generated by the Project during construction will not reduce the LOS at the three intersections of the Project site road access roads with Provincial highways, nor will it create any traffic operational deficiencies along the intersected Provincial highway routes.

4.2.3 Road Traffic Safety – Construction Phase

Average annual vehicle collision rates and collision severity breakdowns along the Provincial highway route segments during the 5-year period from 2006 to 2010 were presented in **Table 2.6**.

The Provincial average collision rate for undivided arterial highways is 0.843 Col/MVK. The existing collision rate for the segment of Provincial arterial highway Route 8 between Fredericton and Route 107 was 0.568 Col/MVK.

The Province-wide average of all collector highways, such as Route 107, Route 105 and Route 104, is 1.24 Col/MVK. The collision rates for the segments of the Provincial collector highway routes within the Project area (Route 104, Route 105, Route 107, and Route 130) ranged from 0.410 to 1.038 Col/MVK. The collision rates for the segments of the Provincial local highway Route 605, Route 610, Route 617, and Route 620 within the Project area ranged from 0.564 Col/MVK to 0.956 Col/MVK.

The vehicle collision rates of the Provincial highways that lead to the Project site access roads are all below the Provincial average rates for rural two-lane arterial, collector and local highways. This indicates that there are no abnormally high vehicle safety risk areas along the Provincial highways that lead to the Project site.

Although the Project will generate additional traffic during the Construction phase that will travel over the Provincial highways that lead to the Project site, the additional traffic volumes will be a small percentage of the existing traffic. The mix of trucks and passenger vehicles that will comprise the additional construction traffic is not unlike the existing traffic mix within the Project area. Since no changes are planned to the Provincial highways, there is no expectation that the collision rates, or the severity of collisions, will change.

There are no collision data available for the Napadogan Road, Fire Road and Four Mile Brook Road, gravel forest roads that comprise the Primary and Secondary Site Access roads that lead to the Project site. Stop signs and stop warning signs are posted at the approaches of these forest roads to the Provincial highways. Although the traffic volumes are very low, the risk of collision may be higher along these hilly and winding roads than a properly designed highway. The generally narrow widths over much of these roads require stoppage of one vehicle to allow the other passage. To reduce the potential traffic safety risks the forest industry currently requires the use of CB radio systems for communicating vehicle locations among drivers using the forest roads.

The traffic generated by the Project construction will be exposed to the same potential safety risks as experienced by the existing forest industry users of the forest roads. It is expected that compliance with the safety standards and best practices set by the forest industry, by the Project Construction phase truckers, bus drivers and workers that will travel to the Project site along these forest roads, will be sufficient to retain safety risk at existing levels.

4.3 Road Transportation – Operation Phase

The potential environmental effects during the Operation phase of the Project have been predicted based on the estimated volumes of additional vehicle traffic generated at the highest month of activity when the full level of the mining operations, which according to current Project plans, is expected to occur in month 30. The additional traffic that will be generated by the Project operations will continue at the month 30 level for the duration of the Project operation, currently planned to cover a period of from 20 to 30 years. Project operation traffic will be comprised of truck traffic generated from inbound process input materials, outbound product and various maintenance services, as well as mining workers going to and from work in busses or their own vehicles.

The current Project Operation phase plans designate all of the trucks and bus traffic to be distributed among three principal routings to the Project site, which include:

- Route 2 (Trans Canada Highway) to Route 105 and Route 605 to the site on the Primary Site Access Road;
- Route 107 from Route 8 to the site on the Secondary Site Access Road, and
- Route 107 from the CN Rail siding site in Napadogan to the Project site on the Secondary Site Access Road.

4.3.1 Road Infrastructure – Operation Phase

Most of the inbound shipments of materials and equipment will be transported to the Project site from the Trans Canada Highway via the Route 105, Route 605 and Primary Site Access Road route. Most of the various maintenance service trucks will also use this 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 Gross Vehicle Weight (GVW). These route segments are all weather highways with no spring weight restrictions. These allowable truck dimensions and weight limits are the highest permitted on highways in the Province of New Brunswick.

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 Route 107 and the Secondary Site Access Road. The Provincial collector highway Route 107 segment of this route is allowed truck loadings up to a maximum of 43,500 kg GVW, and is typically subject to an 80% spring weight restriction. These shipments will largely be transported on flatbed or van trailers, and will be paletted loads that offer flexibility in distributing axel loadings, which should not restrict the planned 20 t 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 Route 107 from Route 8 to the site on the Secondary Site Access Road route. Route 8 is presently an all weather highway with the maximum of 62,500 kg GVW. Route 107 between Route 8 and the Secondary Site Access Road is limited to 43,500 kg GVW and is subject to spring weight restriction, typically at 80%. Most of 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, then they will travel to the site from the Trans Canada Highway.

The CN Rail siding site will also be used for a parking lot for workers bussed in to the Project site throughout the operation period. These busses will not exceed the 43,500 kg GVW limits of Route 107.

Given that:

- the increase in traffic on the Provincial highways in the Project area from traffic generated by the Project operations is 62 ADT on what will be the most travelled segment, on Route 107 between Napadogan and the Secondary Site Access Road, and
- that most of the traffic generated by the Project will be workers passenger vehicles, and
- that most of truck shipments will be the inbound process input materials and equipment that will be transported from the Trans Canada Highway to the Project site via Route 105 and Route 605, where the maximum allowable weight limits of these Provincial highway segments permit all truck configurations permitted on the provincial highway system, and
- that the outbound product truck shipments, and a small portion of the inbound freight trucks, that will interline with rail at the CN Rail siding in Napadogan should be able to comply with the 43,500 kg GVW limits on Route 107 without reducing their loads, and
- that only a small portion of the miscellaneous maintenance service trucks will travel on Route 107 east of Napadogan, and
- the busses travelling between the Project site and the parking lot in Napadogan will not exceed the 43,500 kg GVW limits of Route 107,

the increase in total traffic from trucks, busses and passenger vehicles traffic generated by the Project during the Operation phase would not be expected to result in damage to the Provincial highway infrastructure that is substantive and beyond normal wear.

The Primary Site Access Road and the Secondary Site Access Road will serve all trucks, busses and passenger vehicles going to and from the Project site. These gravel forest roads were built to serve the forest product industry, which are typically maintained only where the forest industry is active and the roads are in use. Although most of these two routes are currently in fair to poor condition, they will be used and maintained during the Construction phase of the project, and current plans are for these site access roads to be the maintained as part of the Project operation activities. For this reason these roads will be in better condition during the 20 to 30 years of the Project operation than they are at present.

The additional traffic generated throughout the Operation phase of the Project along the Project access routes is not expected to adversely affect the road infrastructure.

4.3.2 Road Traffic Level of Service – Operation Phase

Table 4.3 presents the results of the level of service analyses completed for the segments of the Provincial highway routes within the Project area using the traffic volumes during Project operation based on the currently planned operations. For comparison purposes, **Table 4.3** also includes the level of service of the existing traffic volumes.

As a result of the relatively low increases in traffic volumes associated with the Operation phase of the Project, most of the roadway segments will experience a discernible change in the roadway level of service. Route 105 from Route 2 to Route 605 and Route 605 from Route 105 to the 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, the Percentage Time Spent Following. When the actual change in PTSF on these segments of Route 105 and Route 605 are examined, the increases of only about 2% 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. The additional traffic generated by the Project operations will not create any traffic operational deficiencies on these Provincial highway segments.

Table 4.3 – LOS Analysis under Existing and Projected Operations Phase Traffic Volumes

Location			LOS Criteria and Results for Potential Access Routes					
			Existing Condition			Operation Phase		
			AADT (2010)	Roadway LOS (2010)	PTSF (2010)	AADT (After)	Roadway LOS (After)	PTSF (After)
Roadway Segment	Route 8	City Limits to Route 107	3500-5340	D	58.1-61.8%	15	D	58.7-62.0%
	Route 104	Route 130 to Primary Site Access road	330-1070	A	28.6-36.9%	13	A	31.3-37.9%
	Route 104	Primary Site Access road 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	4500-8700	C-D	57.5-70.9%	7	C-D	57.7-71.0%
	Route 105	Route 2 to Route 610	1360-3480	A-B	35.5-54.4%	25	A-C	35.5-56.0%
	Route 105	Route 107 to Route 130	6000	C	63.50%	26	C	63.8%
	Route 107	Route 8 to Secondary Site Access road	290-1280	A	23.3-34.6%	52-62	A	33.3-38.5%
	Route 107	Secondary Site Access road to Route 105	300-1200	A	23.5-33.8%	51	A	34.3-37.6%
	Route 130	Route 105 to Route 104	2800	B	45.70%	*No Change*		
	Route 605	Route 105 to Mill Entrance	2430	B	53.40%	25	C	55.2%
	Route 605	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	1240	A	38.20%	12	A	39.3%

The AM and PM work trip hours traffic volumes generated by the Project during the Operation phase were allocated to three intersections within the Project Area, where the Primary and Secondary Site Access roads intersect Provincial highways. The Project generated traffic volumes during the Operation phase were added to the existing peak hour traffic volumes. The results of the intersection level of service analyses of the existing traffic versus the volumes with the additional Project operations traffic are presented in **Table 4.4**.

The level of service analysis indicates that all three intersections would continue to operate under an excellent LOS A overall with the additional Project operations traffic during the peak periods. All individual turning movements would operate at a very good LOS B, or better.

Table 4.4 – Level of Service at Key Intersections: Operation Phase

Intersection	Type	Period	Overall Intersection Level of Service (LOS)	
			Existing Condition	Operation Phase
Route 105 / Route 605 (to PSA)	3-Way Stop Controlled on Route 605	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A
Route 104 / PSA (Napadogan Road)	4-Way Stop Controlled on PSA	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A
Route 107 / SSA **(**Four Mile Brook Road)	3-Way Stop Controlled on SSA	AM Peak Hour	LOS A	LOS A
		PM Peak Hour	LOS A	LOS A

In summary, the results of the analyses comparing the existing traffic levels of service with levels of service that will be experienced during the Operation phase of the Project indicate:

- The additional traffic that will be generated by the Project operations will not have a substantive environmental effect on the levels of service and will not create any traffic operational deficiencies along the principal route or feeder route segments of the Provincial highways within the Project area.
- The additional traffic that will be generated during the Project Operation phase will not reduce the level of service at the three intersections where the Project site road access roads intersect with Provincial highways, nor will there be any traffic operational deficiencies created along the intersected Provincial highway routes.

4.3.3 Road Traffic Safety – Operation Phase

The Provincial average collision rate for undivided arterial highways is 0.843 Col/MVK. The existing collision rate for the segment of Provincial arterial highway Route 8 between Fredericton and Route 107 was 0.568 Col/MVK.

The Province-wide average of all collector highways, such as Route 107, Route 105 and Route 104, is 1.24 Col/MVK. The collision rates for the segments of the Provincial collector highway routes within the Project area (Route 104, Route 105, Route 107, and Route 130) ranged from 0.410 to 1.038 Col/MVK. The collision rates for the Provincial local highways within the Project area, Route 605, Route 610, Route 617, and Route 620, ranged from 0.564 Col/MVK to 0.956 Col/MVK.

The vehicle collision rates of the Provincial highways that lead to the Project site access roads are all below the Provincial average rates for rural two-lane arterial, collector and local highways. This indicates that there are no abnormally high vehicle safety risk areas along the Provincial highways that lead to the Project site.

Although the Project will generate additional traffic during its operation that will travel over the Provincial highways that lead to the Project site, the additional traffic volumes will be a small percentage of the existing traffic. The mix of trucks and passenger vehicles that will comprise the additional traffic during the Project operation is consistent with existing traffic mix within the Project area. Since no changes are planned to the Provincial highways, there is no expectation that the collision rates, or the severity of collisions, will change.

There are no collision data available for the Napadogan Road, Fire Road and Four Mile Brook Road, the gravel forest roads that comprise the Primary and Secondary Site Access roads that lead to the Project site. Although the traffic volumes are very low, the risk of collision may be higher along these hilly and winding roads than a properly designed highway. The generally narrow widths over much of these roads require stoppage of one vehicle to allow the other passage. To reduce the potential traffic safety risks the forest industry currently requires the use of CB radio systems for communicating vehicle locations among drivers using the forest roads. Warning signs requiring the use of CB radios are posted at entry points to the forest roads from the Provincial highways. Stop signs and stop warning signs are posted at the approaches of these forest roads to the Provincial highways.

The traffic generated by the Project operations will be exposed to the same potential safety risks as experienced by the existing forest industry users of the forest roads. It is expected that compliance with the safety standards set by the forest industry, by the Project Operation phase truckers, bus drivers and workers that will travel to the Project site along these forest roads, will be sufficient to retain safety risk at existing levels.

4.4 Road Transportation – Decommissioning Phase

The Decommissioning, Reclamation and Closure phase Referred to as the Decommissioning phase hereafter) of the Project will involve the decommissioning, land reclamation and closure of the Project mining site; *i.e*., all mining facilities will be decommissioned at the end of the Project operation, and the mine site will be restored to near natural conditions.

Although specific details of the Decommissioning phase and associated transportation requirements are not known at this time, it is expected project activities and requirements during the Decommissioning phase would be similar to or less than those during the Construction phase. Thus, the environmental effects of the Project on Road Transportation during the Decommissioning phase would be roughly the same as, or less than, during the Construction phase.

4.5 Mitigation

4.5.1 Project Planned Mitigation

There are a number of Project elements that have been incorporated into the current Project plans to reduce the traffic volumes generated by the Project, as well as to distribute traffic to preferable highway routes. These traffic reduction and distribution elements of the Project plan implicitly mitigate the extent of potential environmental effects which the Project may otherwise have on the components of Road Transportation, the road network infrastructure, traffic level of service and traffic safety. They include the following:

- The use of rail transportation for the export of the concentrate products will limit the distribution of truck traffic on Provincial highways within the Project area during the Project Operation phase.

- The provision of off-site parking lots in Nackawic and Napadogan to bus construction workers during the Construction phase, and mine workers during the Operation phase, to and from the Project site will reduce passenger vehicle traffic on the forest roads that will be used as the Primary and Secondary Site Access roads to the site.

- The designation of principal truck routes to the Project site during the Construction and Operation phases of the Project will limit truck traffic to the following three preferred Provincial arterial and collector highway truck routes:
    - Route 2 (Trans Canada Highway) to Route 105 and Route 605 to the Project site on the Primary Site Access Road;
    - Route 107 to the CN Rail siding in Napadogan from the Project site on the Secondary Site Access Road, and
    - Route 107 from Route 8 to the Project site on the Secondary Site Access Road.

4.5.2 Recommended Mitigation Measures

Other mitigation measures are recommended that will reduce any potential environmental effects of the Project on Road Transportation, include:

- Maintenance of the roadway and roadside warning signs will reduce traffic safety risks along the forest roads that will serve as the Primary and Secondary Site Access. Once the forest roads are in use for the Project construction and operation activities, the appropriateness of the existing signage should be reviewed.

- Bush clearing to improve sight distance at the intersection approaches of the intersections of the Primary and Secondary Site Access roads at Provincial highways will reduce traffic safety risks.

- Compliance with the existing forest roads best practices that require use of CB radio systems for communicating the location of vehicles among drivers will reduce traffic safety risks along the Primary and Secondary Site Access roads.

- The development and application of a Project Occupational Health and Safety Plan to specifically identify roadway hazards along the Primary and Secondary Site Access roads, and that includes a communications and best practices training, monitoring and reporting program, will reduce traffic safety risks along the Primary and Secondary Site Access roads.

5 References

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Appendix A –

Highway Condition Windshield Survey

A. Description of Existing Roadway Network in Sisson Project Area

A.1 Appendix Overview

This Appendix provides a summary report of the current conditions of the existing highway network that could potentially be used as access routes to the Sisson Project site. This current highway network information was collected through windshield inspection surveys completed by exp Services Inc. in October, 2012 . The purpose of the surveys were to acquire first hand up to date information to supplement the infrastructure condition and operational characteristics data of the Sisson Project area highway network.

To facilitate the survey and information reporting, the highways were divided into the following highway segments:

- Primary Site Access Road
  - Route 105 / Route 605 to Route 104
  - Primary Site Access Road Intersection at Route 104
  - Route 104 to Project Site
- Secondary Site Access Road
  - Route 107 to Project Site
- Route 107
  - Route 8 to Secondary Site Access Road
  - Secondary Site Access Road to Route 105 (Bristol)
- Route 8
  - Route 107 to Route 2 (Fredericton)
- Route 104
  - Route 130 (Hartland) to Primary Site Access Road
  - Primary Site Access Road to Route 105 (Keswick)
- Route 105
  - Route 107 (Bristol) to Route 130 (Florenceville)
  - Route 605 (Nackawic) to Route 102 / Route 2
- Route 130
  - Route 105 Florenceville to Route 104 (Hartland)
- Route 605
  - Route 105 to Nackawic Mill Woodyard Road
  - Nackawic Mill Woodyard Road to Route 104 (Millville)

- Route 610
    - Route 105 (Upper Caverhill) to Route 104 (Hainesville)

- Route 617
    - Route 104 (Burtts Corner) to Route 620 (Hamtown Corner)

- Route 620
    - Route 105 (Fredericton) to Route 107 (Stanley)

A.2 Primary Site Access Road

The Primary Site Access Road is comprised of forest roads that extend from Route 105 and Route 605 at the Nackawic Mill Woodyard Road to the Sisson Project site. It has been designated by Northcliff Resources Ltd. as the principal route of access to the Project from the Provincial Highway network.

Napadogan Road: Route 105 / Route 605 (Nackawic) to Route 104

The southern segment of the Primary Site Access Road, known both as the Napadogan Road and the Valley Forest Products Road, begins at Route 605, approximately 2 km north of Route 105 and extends approximately 10 km to Route 104.

The southern end of Napadogan Road is called the Mill Woodyard Road, as it provides truck access to the Nackawic Mill. The Mill Woodyard Road is gravel surfaced, but is paved at its approach to Route 605. It is stop controlled at its approach to Route 605. Heading north from the Mill entrance a warning sign reads: “CAUTION - ACTIVE LOGGING OPERATIONS ON ROAD – Use CB Channel # 1”. Distance markers are posted roadside at each kilometer of its length.

The southern segment of the Napadogan Road is a gravel surfaced 12 m wide roadway ditch to ditch with an apparent two-lane cross-section of 3.5 m travel lane widths. The road is well maintained and generally in good to very good condition. Stream culverts have concrete headwalls.

Although there is no posted speed limit on this segment of the Napadogan Road, yellow turn warning signs are posted at sharp curves and other forest roads intersecting it are stop signed. A stop warning sign is posted approximately 150 m before the Route 104 intersection, where it is stop controlled for entry and crossing Route 104.

Napadogan Road Intersection at Route 104

The Napadogan Road segment of the Primary Site Access Road intersects Route 104, approximately 2 km east of Millville in the Upper Hainesville area. This intersection provides an alternate access point from the Provincial highway network. The Napadogan Road / Route 104 intersection is 4-legged with stop control on both the southern and the northern Napadogan Road approaches.

The stop sign on the southbound approach is positioned quite low to the ground, and if raised, would improve visibility. Sightlines appeared to be ok for vehicles turning from the Napadogan Road or crossing directly over Route 104, although if bush and small trees were cleared from the sight triangles sightlines would be improved and the intersection would be more clearly identified to drivers on Route 104. There are advanced yellow trucks entering warning signs posted on Route 104 in each direction approaching the intersection.

Napadogan Road and Fire Road: Route 104 to to Project Site

The northern segment of the Primary Site Access Road is comprised of two existing forest roads, the Napadogan Road (Valley Forest Products Road) and the Fire Road (Irving Road), and is approximately 35 km in length. The Napadogan Road portion of the northern segment begins at Route 104 and extends 28 km to the Fire Road. From there the Fire Road continues for about another 7 km to the Project site. Distance markers are posted roadside at each kilometer of its length that continue in sequence from the southern segment at Route 104 on up to the Fire Road.

Like the southern entrance to the Napadogan Road, there is a warning sign for trucks entering the northern segment of Napadogan Road at Route 104 end indicating that the road is an active trucking route and that all drivers must use CB radios. The first 15 km of Napadogan Road north of Route 104 is a gravel surfaced road, generally with a 10 m roadbed ditch to ditch and up to 7 m of functional two-lane travel width. This is not as wide as the segment of Napadogan Road south of Route 104, but is generally sufficiently wide to allow two-way passage at low speeds. During winter when snow banks encroach the travel lanes passage may be reduced to one lane only where vehicle passage would require one vehicle to pull aside and stop to allow the other space for passage at low speed. A one-lane only bridge is located at about the 9 km point; a warning sign is posted to alert drivers to be prepared to stop. This segment of Napadogan Road is generally more hilly and winding than the segment south of Route 104 and is generally rougher and less well maintained.

Two-way passing only with one vehicle giving way to the other is required for the remaining 13 km of Napadogan Road (from approximately 15 km north of Route 104) to the Fire Road. The wood superstructures of the bridges in this northern segment of the Primary Site Access Road are one-lane only, about 3.9 to 4.3 m in width. Through this section of Napadogan Road continues further north the roadbed width narrows to about 8 m with about 6 m of functional travel lanes. Very steep grades and sharp turns with poor to very poor road surface conditions prevail through this northern end of Napadogan Road.

The Fire Road section of the Primary Site Access Road begins at the 38 km marker of Napadogan Road and continues about 7 km to the Project site. It is a one-lane road with a roadbed of about 6 m and about 4 to 4.5 m of travel lane width. The Fire Road passes through mountainous terrain and is generally in poor condition. Two-way passing maneuvers are achieved only by one vehicle stopping to give way to the other.

A.3 Secondary Site Access Road

The Secondary Site Access Road is comprised of two existing forest roads that extend from Route 107 to the Sisson Project site, a length of approximately 17 km. It has been designated by Northcliff Resources Ltd. as an alternative route of access from the Provincial Highway network north of the Project. The Secondary Site Access Road intersects Route 107 at the Four Mile Brook Road located west of Napadogan.

Four Mile Brook Road and Fire Road: Route 107 to Project Site

The Secondary Site Access Road is comprised of two forest roads that that extends south from Route 107 a distance of approximately 17 km. Four Mile Brook Road is located approximately 5 km west of Napadogan and extends south approximately 14 km from Route 107 to the Fire Road, which for a distance of about another 3 km connects to the Project site area.

The Four Mile Brook Road intersects Route 107 on a small downgrade from east to west. It is located approximately 400 m west of a horizontal curve on Route 107. Sightlines appear to be good at this location; however, brush clearing undertaken within the sight triangles on the approach to the Four Mile Brook Road would improve sightlines and better define the turnoff to vehicles on Route 107. There is a civic address of 3959 posted on the Secondary Access Approach and a moose warning sign on Route 107 just west of the Four Mile Brook Road.

The Secondary Site Access Road has a gravel surface, which is in fair to poor condition. It is generally hilly and winding with an apparent travel lane centered within the roadway between the side slopes. There are no speed limit signs posted, but yellow curve warning signs are posted at a couple of sharp curve locations. Other forest roads that intersect the Four Mile Brook Road and Fire Road are stop controlled.

The Secondary Site Access Road is in the range of 4.5 to 6 m in width, and the bridge structures are constructed with a single lane, 4.5 m in width. Although there has been some lateral clearing in some places, in general there are trees overhanging the ditches and bush growth within the ditches that reduce visibility on curves. The narrow road width allows passage only by one vehicle pulling aside to allow the other room to proceed by at low speed. Forest industry trucks using forest roads in this area are equipped with CB radios, which they use to communicate among each other of their locations along the road to avoid potential risk of collisions.

A.4 Route 107

Route 107 was travelled in its entirety from Route 8 at Nashwaak Bridge to Route 105 in Bristol. Route 107 is a provincially designated collector highway. The Secondary Site Access Road to the Sisson Project development is located on Route 107, just west of Napadogan, so development traffic may be generated from either direction on this highway.

Route 107: Route 8 (Nashwaak Bridge) to Four Mile Brook Road (Secondary Site Access Road)

The segment of Route 107 from Route 8 to the designated Secondary Site Access Road at Four Mile Brook Road is 42.8 km in length. At its intersection with Route 8, Route 107 is stop controlled. Once the Route 8 Marysville By-Pass is complete, a new 4th leg (eastern) will be added to this this intersection as a new connector road to the realigned Route 8.

Between Route 8 and Nashwaak Road, approximately 1 km, Route 107 is in very good condition with a narrow paved shoulder and a wider gravel shoulder. There is residential development along the length of this section. The posted speed limit is 50 km/h.

Between Nashwaak Road and the Village of Stanley, approximately 15 km, the posted speed begins at 70 km/h, rises to 80 km/h and then drops to 50 km/h as you enter Stanley. There is very little development on this stretch of roadway outside of the Village. On the Stanley side of this section, the roadway is in good to excellent condition with wide gravel shoulders in good condition. On the Nashwaak Road end of this section, the roadway is in fair to good condition and the shoulders are in fair condition. There are very few passing opportunities between Nashwaak Road and Stanley. There is stop control on the through movement on Route 107 westbound within the Village.

Route 107 between Stanley and Cross Creek, approximately 10 km, is in very good condition and the gravel shoulders are in good condition. There are few passing opportunities on this section of roadway as it features rolling hills. The posted speed limit outside Stanley is 80 km/h; however, it

drops to 60 km/h in Cross Creek, as there is more roadside development on the Cross Creek end. To continue on Route 107 westbound in Cross Creek, vehicles must make a 90 degree left turn (no left turn lane is provided). Route 107 eastbound is stop-controlled at its intersection with Route 107 westbound. On the eastbound approach of Route 107 approaching Route 620, there is a steep downgrade that is signed with a warning sign for trucks.

The approximately 17 km section of Route 107 between Cross Creek and Four Mile Brook Road, the designated Secondary Site Access Road, has a posted 80 km/h speed limit (with the exception of a short 60 km/h section through Napadogan) and is generally undeveloped with the exception of some roadside residential and light industrial developments in the Williamsburg area and some residential streets in Napadogan. The road condition is generally fair to good with gravel shoulders in fair condition. Several kilometers east of Napadogan, the roadway condition deteriorates with lots of patching, which continues as such to the Four Mile Brook Road.

This section of Route 107 between Cross Creek and Four Mile Brook Road is very straight at the Cross Creek end, but is more winding with steeper hills at the Napadogan end. There appear to be adequate passing opportunities. Although not many vehicles were observed on this stretch of highway, a high percentage of the vehicles observed were trucks.

Route 107: Four Mile Brook Road (Secondary Site Access Road) to Route 105 (Bristol)

The segment of Route 107 west of the designated Secondary Site Access Road at Four Mile Brook Road through to Bristol is 56.8 km in length.

Over the section of Route 107 from Four Mile Brook Road to Juniper, approximately 28 km, the posted speed limit is 80 km/h and there is very little in the way of roadside development with the exception of an industrial development in Deersdale and several gravel pits. The roadway condition is fair to good between the Secondary Access and Deersdale with lots of patching and the gravel shoulders are in fair condition. Between Deersdale and the York / Carleton county line the roadway condition is excellent condition. West of the county line, there is more patching but the roadway is still in good condition. There are lots of passing opportunities between the Access Road and Juniper. The speed limit drops to 50 km/h in Juniper and there is stop control on the Route 107 west approach to the Route 107 west / Lewis Road intersection in Juniper. There is commercial and residential development along Route 107 through Juniper.

West of Juniper to Glassville, approximately 16 km, the speed limit of Route 107 increases to 80 km/h. The roadway is in fair condition with lots of patching. Generally the roadway condition is worse west of Juniper than it is east of Juniper. There are gravel shoulders in fair condition. Some clearing was observed along the edge of the roadway to improve sightlines. The roadway condition improves through Glassville. The speed limit drops to 50 km/h entering Glassville and there are back to back very sharp curves through the Town. The posted advisory speed is 30 km/h. Route 107 is free flow through Glassville even through there are back-to-back sharp curves. There are lots of passing opportunities between Juniper and Glassville.

The remaining segment of Route 107 from Glassville to Bristol is approximately 13 km in length. The first 3 km section west of Glassville begins with a speed limit at 80 km/h and the roadway is in excellent condition with good condition gravel shoulders. After this short section of roadway the roadway condition returns to fair condition with patching. There are some passing opportunities although not as many as other segments of Route 107. There is roadside development for most of the Glassville to Bristol segment, mostly rural residential and farming developments. West of Route 570, the road improves to good condition with gravel shoulders.

Within Bristol Route 107 is in good condition and the speed limit of drops to 50 km/h. There is higher density roadside development and Route 107 has a more urban cross-section, with painted edgelines and a marked crosswalk. There is a stop sign at the western end of Route 107 at its intersection with Route 105.

A.5 Route 8

Route 8 was travelled between Route 107 in Nashwaak Bridge to the beginning of the 4-lane divided section of highway in Fredericton. Route 8 is a provincially designated arterial highway.

Route 8: Route 107 to Route 2 (Fredericton)

The segment of Route 8 from Route 107 at Nashwaak Bridge to Route 2 is approximately 50 km in length. Construction is underway to build a controlled access by-pass around Marysville and part of the existing winding alignment of Route 8 through Penniac, Nashwaak Village, Durham Bridge, and Taymouth. This by-pass will link the existing Route 8 just east of Marysville to the South Portage Area.

The 22 km section of Route 8 from Route 107 to the City of Fredericton Limits begins with a posted speed of 90 km/h to Taymouth. The roadway surface is in very good condition and there are pained edgelines. There is a narrow gravel shoulder in good condition. The posted speed limit drops to 50 km/h through Taymouth and there is a sharp horizontal curve at the intersection with Nashwaak Road. The speed limit increases to 80 km/h south of Taymouth. There is some rural residential development along Route 8 along it is fairly low density. This section of Route 8 is very winding and has rolling terrain, which limits the availability of passing zones and makes passing slower moving vehicles very difficult. Some sections of Route 8 have been upgrades with narrow paved shoulders, but most sections between Nashwaak Village and City Limits have only a narrow gravel shoulder.

Upon entering the 28 km developed portion of Route 8 within the City of Fredericton the posted speed limit drops to 50 km/h. There is high density roadside development within the City and a 90 degree turn at traffic signals in Marysville. The roadway surface of Route 8 is in good condition through this part of the City and there is curb, gutter, and sidewalk within Marysville. There is a steep hill and another sharp horizontal curve (posted advisory speed of 30 km/h) at the eastern end of Marysville.

Once outside the developed area the speed limit increases to 80 km/h. The Marysville Bypass section of Route 8 has a rural highway cross section with two-lane paved roadway surface, painted edgelines, and narrow paved and wide gravel shoulders, all in good condition. There are passing opportunities along the Route 8 Marysville Bypass, which continues straight through the signalized intersection with Greenwood Drive / Route 10 to Riverside Drive.

The speed limit drops to 50 km/h at the signalized intersection with Riverside Drive. The roadway surface continues to be in good condition with a narrow paved shoulder and wide gravel shoulder, also in good condition. Vehicles continuing on Route 8 turn left at the Riverside Drive and are stop controlled when entering the Princess Margaret Bridge from the southbound ramp. The speed limit drops to 70 km/h on the Bridge.

Once south of the bridge, the speed limit is raised to 90 km/h and the roadway changes to a 4-lane divided highway cross section. There is grade separated access from Route 8 onto both Route 7 and Route 2.

A.6 Route 104

Route 104 was driven from Hartland at its western end to Route 105 in Keswick, a length of 83.7 km. This route is a provincially designated collector highway. Napadogan Road, a segment of the designated Primary Site Access Road to the Sisson mine development, crosses Route 104 just east of Millville, so development traffic may be generated from either direction on this highway.

Route 104: Route 130 (Hartland) to Napadogan Road (Primary Site Access Road)

Route 104 from Route 130 at Hartland to the Napadogan Road is approximately 49 km in length. At the Hartland end Route 104 is stop controlled at the Route 130 / Route 104 intersection and there is a left turn auxiliary lane for left turn movements from Route 130 onto Route 104.

Between Harland and the intersection with Route 580 in Lower Winslow the roadway surface of Route 104 is in fair condition, but its edges are broken up in places and the shoulders are in poor condition. It has an 80 km/h speed limit. Within this section of roadway, there are several sharp horizontal curves and the road is generally quite winding. There are some passing opportunities along this section, but they are limited due to the winding nature of this section. The posted speed limit drops to 50 km/h for a short section through Coldstream and drops to 70 km/h. There is some residential and farming development along the roadside within the section of roadway, but it is mainly centered in the Cold Stream area. There is a sharp horizontal curve on Route 104 at the intersection with Route 580; however, through movements on Route 104 are free flow.

Between Route 580 and Route 585 in Hawkins Corner, the posted speed limit of Route 104 continues at 80 km/h. The road surface is in fair to good condition and the shoulders are overgrown and in poor condition. There is very low density roadside development within this section, generally rural roadside residential and farming developments. There are 3 horizontal curves with posted advisory speeds of 50 km/h one-after-another through the Carlisle area. There are limited passing opportunities between Route 580 and Cloverdale due to the horizon curvature of the roadway, but south of Cloverdale there are more passing opportunities as the roadway profile straightens out. Crews were observed clearing the road edge of vegetation on this section of Route 104 to improve sightlines. There is a stop sign on the Route 104 southern approach to the Route 104 / Route 575 intersection.

East of Route 585, the paved road surface and the gravel shoulders are in very good condition and appeared to be recently paved. There are some passing opportunities between Route 585 and Millville. The posted speed limit drops to 50 km/h within Millville. There is higher density residential and commercial development through Millville and Route 104 passes through a school zone in the Village of Millville. Within the Village Route 104 features a paved shoulder (with painted edgelines), curb and sidewalk. The curb and sidewalk ends at Route 605. East of Route 605 the speed limit increases to 80 km/h. There was some construction in progress; however, outside of the construction zone, the roadway and gravel shoulders are in good condition. There are p[lenty of passing opportunities.

Route 104: Napadogan Road (Primary Site Access Road) to Route 105 (Keswick)

Route 104 from Napadogan Road, the Primary Site Access Road, to Route 105 in Keswick is approximately 35 km in length.

Immediately east of Napadogan Road, the posted speed limit is 80 km/h and the paved roadway and wide gravel shoulders are in very good condition. There is no roadside development between the Napadogan Road and Route 610 in Upper Hainesville, and there are lots of passing opportunities.

Through the Upper Hainesville area, where Crabbe Mountain is accessed off Route 104 and there is more roadside development, the posted speed limit is decreased to 60 km/h. The road surface condition is in very good condition with gravel shoulders in good condition.

Between Upper Hainesville and the outskirts of Burtts Corner, the paved road surface and wide gravel shoulders of Route 104 are in good condition. The speed limit is 80 km/h. There is more roadside residential development in the Zealand area and traffic volumes were higher on this section of Route 104 than other sections travelled. There are plenty of passing opportunities through the stretch of roadway from Upper Hainesville to Burtts Corner. Through Burtts Corner, the posted speed limit drops to 50 km/h with increased roadside development.

From Burtts Corner to Keswick the speed limit of Route 104 is increased and continues at 80 km/h to its approach to Route 105. The paved road surface and wide gravel shoulders are in fair to good condition. The roadside development through this section is generally more dense with a mixture of residential, farm and industrial (a chick hatchery) developments. There are passing opportunities along this section of roadway and traffic volumes are higher, influenced by the proximity to the Fredericton area.

A.7 Route 105

The windshield survey included two segments of Route 105 that provide highway network connections, one between Route 107 and Route 104 in Bristol/Florenceville, and the other between Route 610, Route 605 and Route 2 in Nackawic. Route 105 is a provincially designated collector highway.

Route 107 (Bristol) to Route 130 (Florenceville)

The segment of Route 105 between Route 107 in Bristol and Route 130 in Florenceville is about 4 km in length. The speed limit of the km section of Route 105 at Route 107 is 50 km/h and the roadway surface is in very good condition with painted shoulders. There is curb and sidewalk within the developed areas. The speed limit increases to 80 km/h in the less developed section of Route 105 between Bristol and Florenceville. In the 80 km/h zone, Route 105 features a paved shoulder and a gravel shoulder both in good condition. Upon entering Florenceville, the speed limit drops to 50 km/h and there is curb and sidewalk. There is a grade separated interchange connecting Route 105 with Route 130.

Route 605 (Nackawic) to Route 2

The segment of Route 105 between Route 605 in Nackawic and Route 2 is 7.3 km in length. This segment of Provincial highway is designated as the principal route to the Primary Site Access Road.

In order to describe the existing roadway network, the approximately 3 km roadway section connecting Route 105 at the Hawkshaw Bridge Road and Route 2 is referred to as the Route 2 connector. There is full grade separation connecting the Route 2 connector with Route 2 and Route 102. The posted speed limit is 70 km/h along the section that includes the Hawkshaw Bridge between Route 2 and the Route 105. The roadway surface is in excellent condition with a 0.5 m paved shoulder and a wide gravel shoulder.

Route 105 between the Route 2 connector at Hawkshaw Bridge Road and Route 605 is in excellent condition with a narrow paved shoulder and wide gravel shoulders in very good condition. The posted speed limit is 80 km/h at the southern end and drops to 70 km/h just north of Landegger Drive and increases to 80 km/h again just east of Route 605. There are auxiliary left turn lanes at the intersections with Landegger Drive, Otis Drive and Route 605. There are climbing lanes constructed in both directions of travel along this section of Route 105 where there is a fairly steep vertical grade. There is a fairly high volume of trucks along this section of roadway likely due to the proximity to the Nackawic Mill. Route 605 is stop controlled on its approach to Route 105.

East of Route 605, the roadway surface is in fair to good condition and the gravel shoulders are in fair condition. The posted speed limit increases to 80 km/h on the outskirts of the Town. There is an RV Camping Park located on the river side of Route 105 just outside the Town limits. There has been some recent roadside clearing completed on the east side of Route 105 between Route 605 and Route 610 to improve sightlines.

A.8 Route 130

Route 130 was travelled between Route 105 in Florenceville to Route 104 in Hartland. This segment of Route 130 is 19 km in length and is a provincially designated collector highway.

Route 105 (Florenceville) to Route 104 (Hartland)

This section of Route 130 from Route 105 to Route 104 is built to a very high design standard given the observed existing volumes on the roadway. It was formerly part of the Trans-Canada Highway.

The posted speed limit of Route 130 is 100 km/h. The roadway surface is paved in excellent condition and there is a 2.0 to 3.0 meter paved shoulder along its length. There are ample passing opportunities and climbing lanes located on steep grades. There are few at grade accesses along this segment, most of which are farm field access roads.

A.9 Route 605

Route 605 was travelled over its entire 14.9 km length between Route 105 in Nackawic and Route 104 in Millville. This route is a provincially designated local highway.

Route 105 to Nackawic Mill Woodyard Road

Truck access to the Nackawic Mill is provided off Route 605 at the Mill Woodyard Road, about 2 km north of Route 105. This segment of Provincial highway Route 605 from Route 105 to the Mill Woodyard Road is designated as part of the principal route to the Primary Site Access Road. Route 605 is stop controlled on its approach to Route 105. There is a separate left turn lane on Route 105 for eastbound vehicles turning onto Route 605. The intersection is illuminated. The posted speed limit along the segment of Route 605 is 80 km/h and the roadway surface is in good condition with gravel shoulders in good condition between Route 105 and the truck entrance to the Mill (Mill Woodyard Road). There are no auxiliary turning lanes at the Route 605 / Mill Woodyard Road intersection.

Nackawic Mill Woodyard Road to Route 104 (Millville)

North of the Mill Woodyard Road, the 80 km/h posted speed limit continues for approximately 1 km/h where it then drops to 70 km/h. There is increased residential development and a sharp 90 degree

turn on Route 605 in Pinder with stop control on the Route 605 westbound approach. There are a few passing opportunities located north of the Mill entrance. North of Pinder the roadway surface is in fair to good condition with gravel shoulders in poor condition. There is a moderate amount of roadside residential development along Route 605 between Pinder and Millville. There are several steep vertical grades on this section of roadway which make passing difficult. Closer to Millville, there has been some roadside clearing of bushes and trees to improve sightlines. Approaching Millville, the posted speed limit drops to 50 km/h. Route 605 is stop controlled on its approach to Route 104. This section of Route 605, north of the Mill Woodyard Road, does not appear very suitable for truck routing.

A.10 Route 610

Route 610 was travelled in its entirety between Route 104 in Upper Hainesville and Route 105 in the Upper Caverhill area on the outskirts of Nackawic. This route is a provincially designated local highway.

Route 105 (Upper Caverhill) to Route 104 (Hainesville)

The posted speed limit on Route 610 is 80 km/h. At the norhern end of Route 610, a thin asphalt layer was added to the roadway surface. The next 2 to 3 km section is in poor condition with lots of patching. The southern end of Route 610 is in fair to good condition. Shoulders are in poor condition along the entire 12.4 km length of Route 610. There is some residential roadside development on the southern end of Route 610, particularly in the Upper Caverhill area, but there is very little roadside development at the northern end. Although Route 610 follows a fairly straight alignment, it has some steep grades. There are not many passing opportunities on Route 610. There is a posted 60 km/h advisory speed as vehicles approach Route 105. There is also a steep vertical downgrade on the approach to Route 105. This curve would be difficult for trucks to maneuver through. This route does not appear very suitable for truck routing.

A.11 Route 617

Route 617 was travelled in its entirety between Route 104 in Burtts Corner to Route 620 in Hamtown Corner. This route is a provincially designated local highway, 11.5 km in length.

Route 104 (Burtts Corner) to Route 620 (Hamtown Corner)

At the Burtts Corner end of Route 617, there is a school and a steep upgrade within a posted 50 km/h zone. The posted speed limit increases to 80 km/h on the outskirts of Burrts Corner. Overall, the roadway surface of Route 617 is in poor to fair condition with narrow lanes and crumbling pavement edges. The gravel shoulders range from fair to good condition. Route 617 has a very winding and rolling profile, which limits passing opportunities. There is a sharp horizontal curve located in Birdton. There is some low density residential development between Burtts Corner and Birdton, but there is very little development between Birdton and Hamtown Corner. This route does not appear very suitable for truck routing.

A.12 Route 620

Route 620 was travelled over its entire 18.6 km length from Route 105 in Fredericton to Route 107 in Stanley. This route is a provincially designated local highway.

Route 105 (Fredericton) to Route 107 (Stanley)

Within the City of Fredericton limits, Route 620 is in good condition with curb and sidewalk for the first 500m. A wide paved shoulder is provided for an additional 500m. The speed limit increases to 60 km/h at the end of the wide paved shoulder area (with painted edgelines) then to 80 km/h as you get further from the City. Once further from the City, the shoulder is gravel with no painted edgelines. The shoulder ranges in condition from fair to poor but generally is in fair condition. The pavement surface ranges from fair to good condition between the City Limits and Boyd's Corner. This route is very winding and has steep vertical curves particularly as a 90 degree curve is approached in Fredericksburg.

Generally there is rural residential development which decreases in density as the distance from Fredericton increases. There is increased density and associated speed limit drops through Estey's Bridge (speed drops to 60 km/h) and Tay Creek (70 km/h). A bridge weight limit of 30 t GVW is posted at the Tay Creek Bridge. There are few passing opportunities between the City and Estey's Bridge; however, there appears to be ample passing opportunities between Estey's Bridge and Boyd's Corner.

There is free flow on Route 620 through the 3 legged Route 620 / Currieburg Road intersection at Boyd's Corner. This is a non-standard configuration given that Route 620 makes up the southern and eastern approaches to the intersection. Between Boyd's Corner and the outskirts of Stanley, the speed limit is 80 km/h. The roadway surface is in good condition and the gravel shoulders are in poor to fair condition. The shoulders are sloped and very steep in some locations. There are very few passing opportunities.

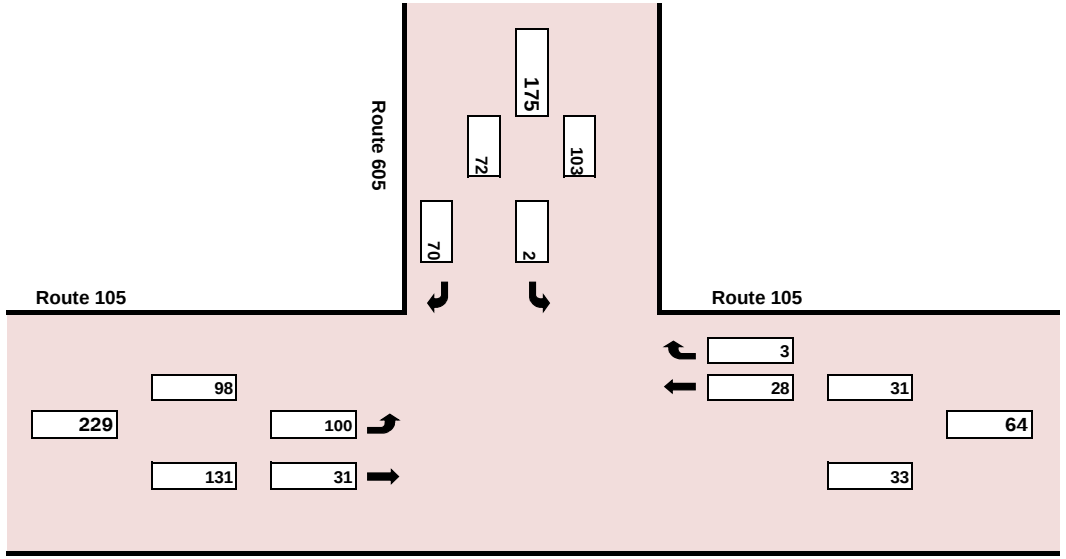
Entering Stanley, the speed limit drops to 50 km/h and development increases. There is a stop-controlled turn onto Main Street and a very steep hill into the Village. In the heart of Stanley there is curb and gutter, the pavement is in good condition, and there are sidewalks and crosswalks. At the northern end, Route 620 is free flow onto both Route 107 east and Route 107 west. There is an overhead flashing amber/red light at the Route 620 / Route 107 intersection.

Due to the 30 t weight restriction on the Tay Creek Bridge and the steep grade into the centre of the Village of Stanley, this route does not appear very suitable for truck routing.

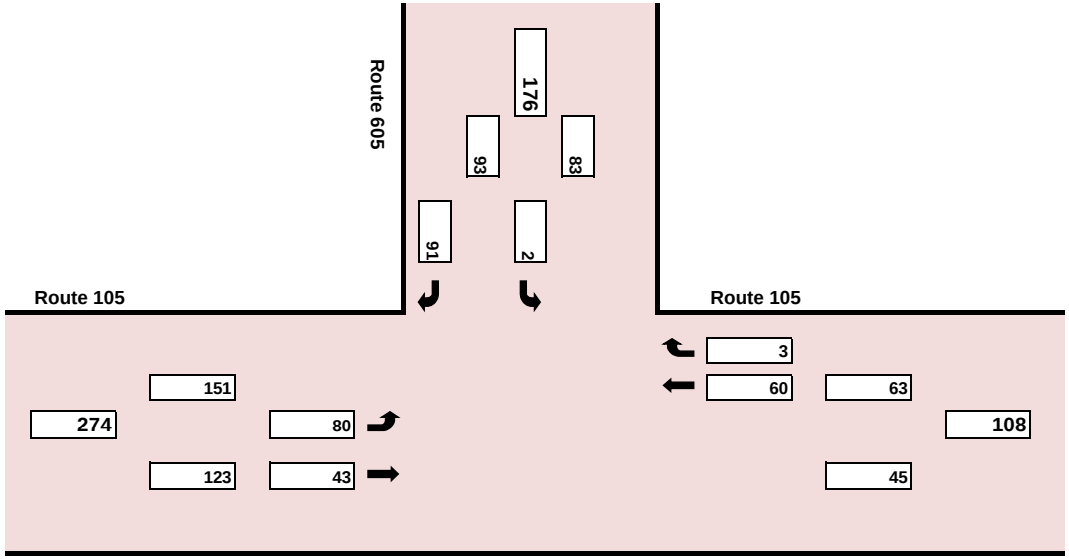
Appendix B –

Intersection Traffic Count Surveys

Sisson Brook Project Transportation Study
Route 105 / Route 605 Traffic Count Summary
AM and PM Peak Hour Volumes

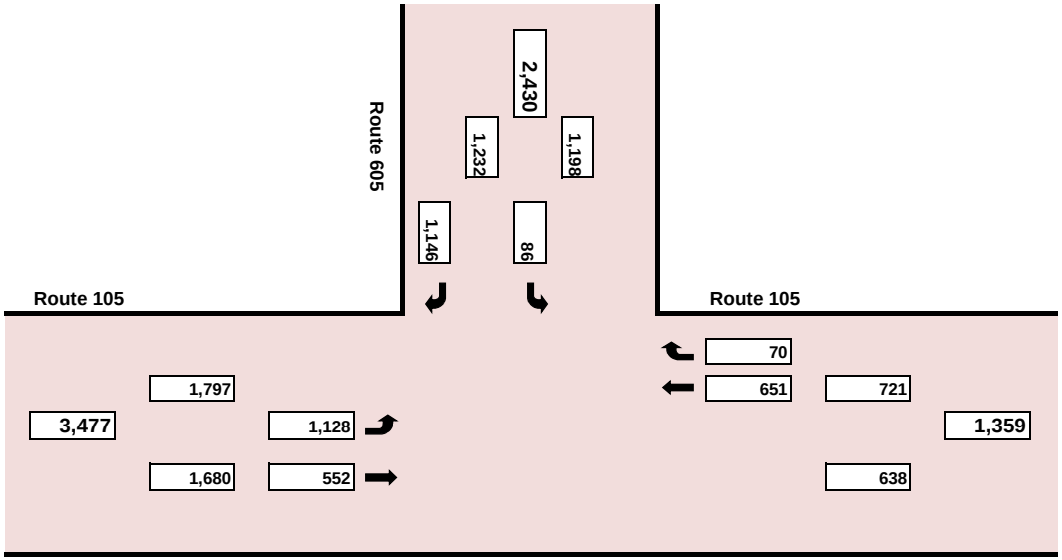


AM Peak Hour 0700-0800

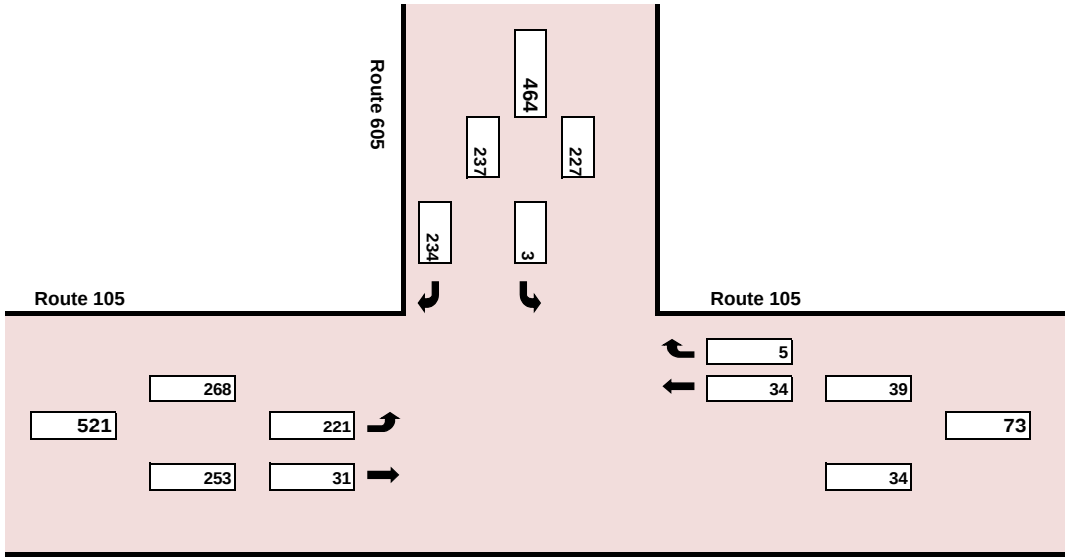


PM Peak Hour 1630-1730

Sisson Brook Project Transportation Study
Route 105 / Route 605 Traffic Count Summary
Estimated Daily Total and Truck Volumes

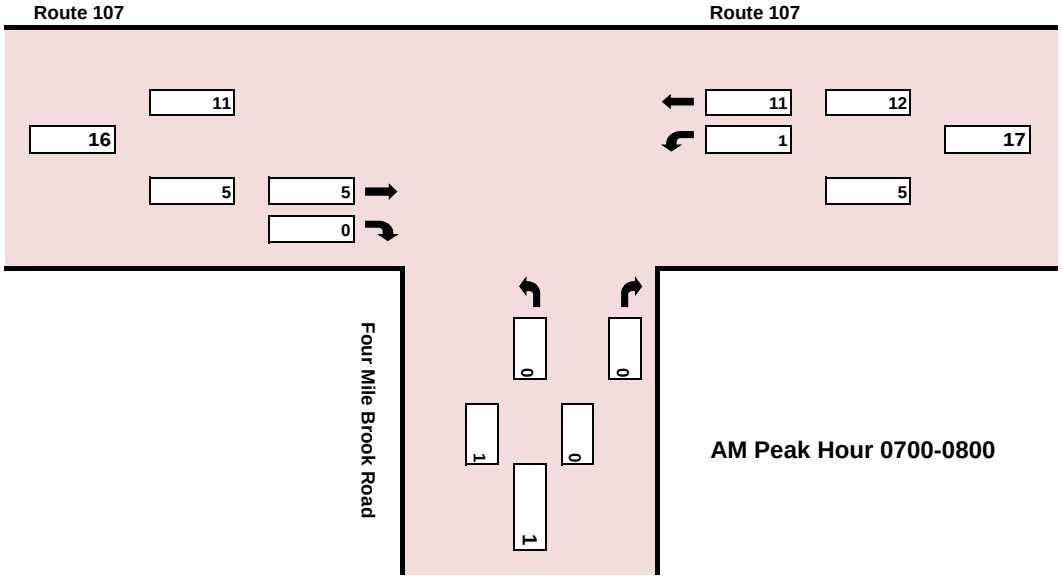


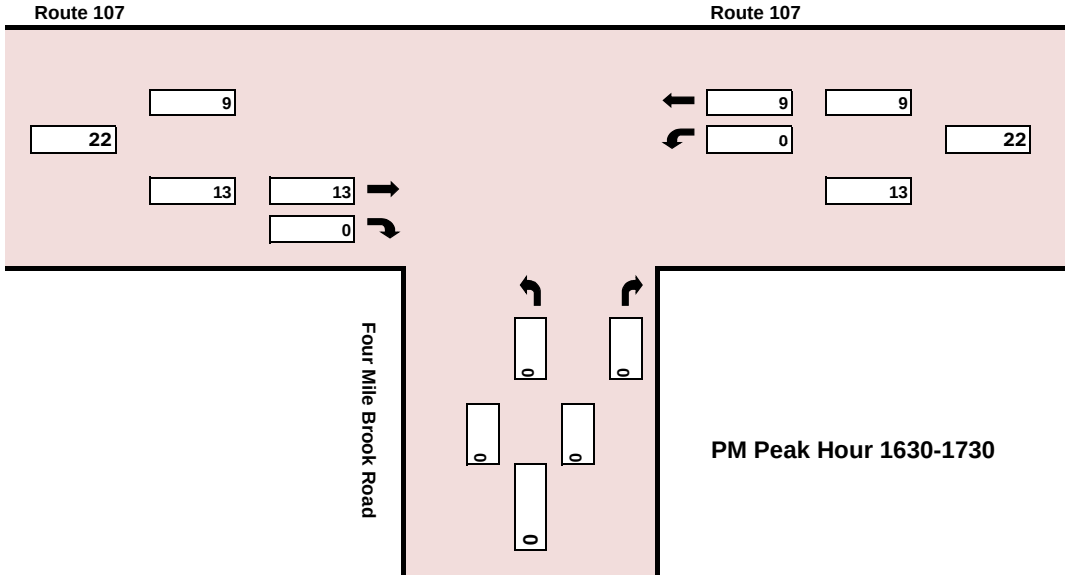
AADT
All Vehicles



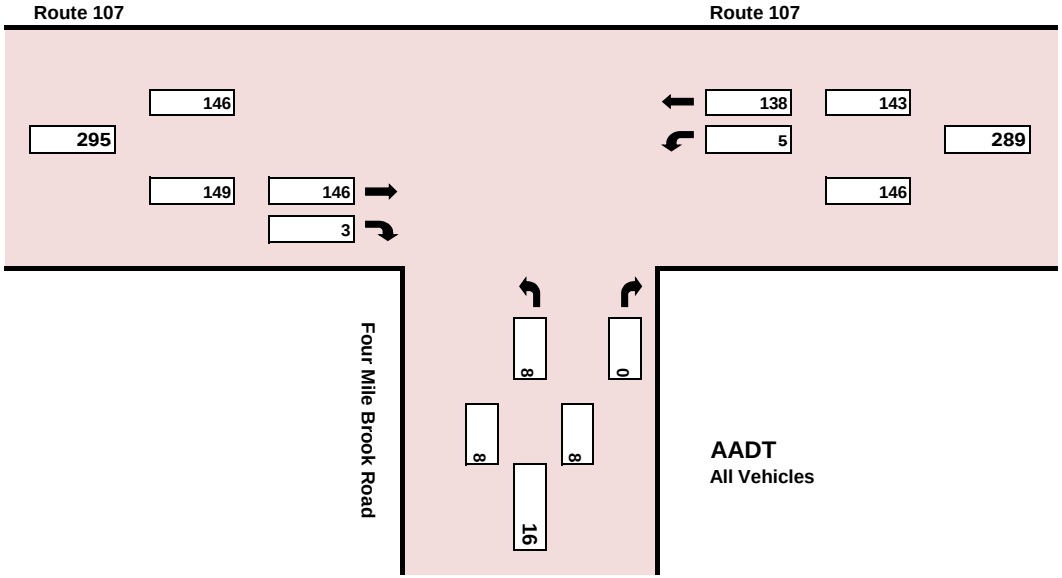
AADTT
Trucks Only

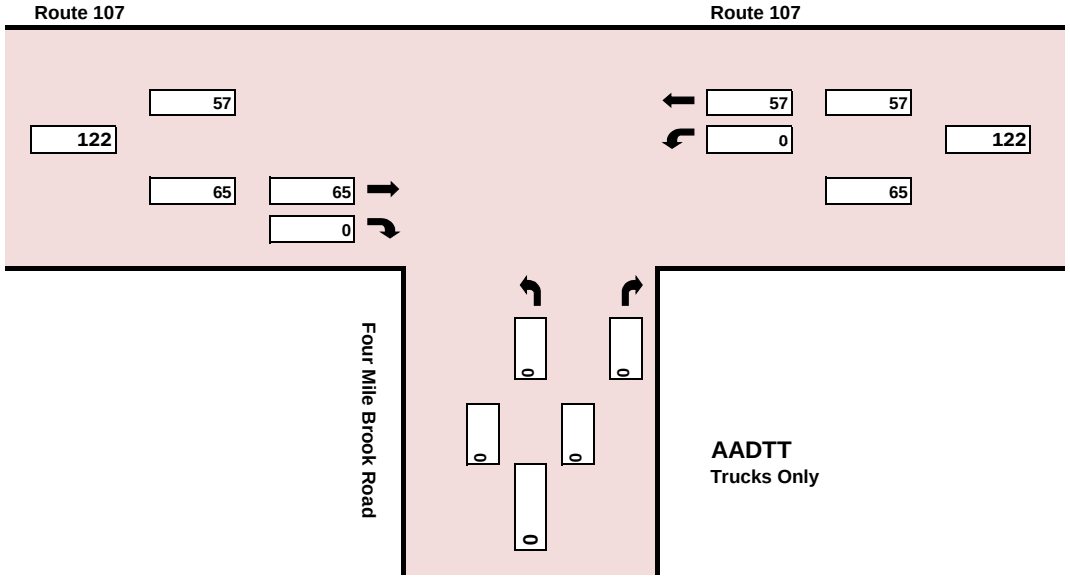
Sisson Brook Project Transportation Study
Route 107 / Four Mile Brook Road Traffic Count Summary
AM and PM Peak Hour Volumes



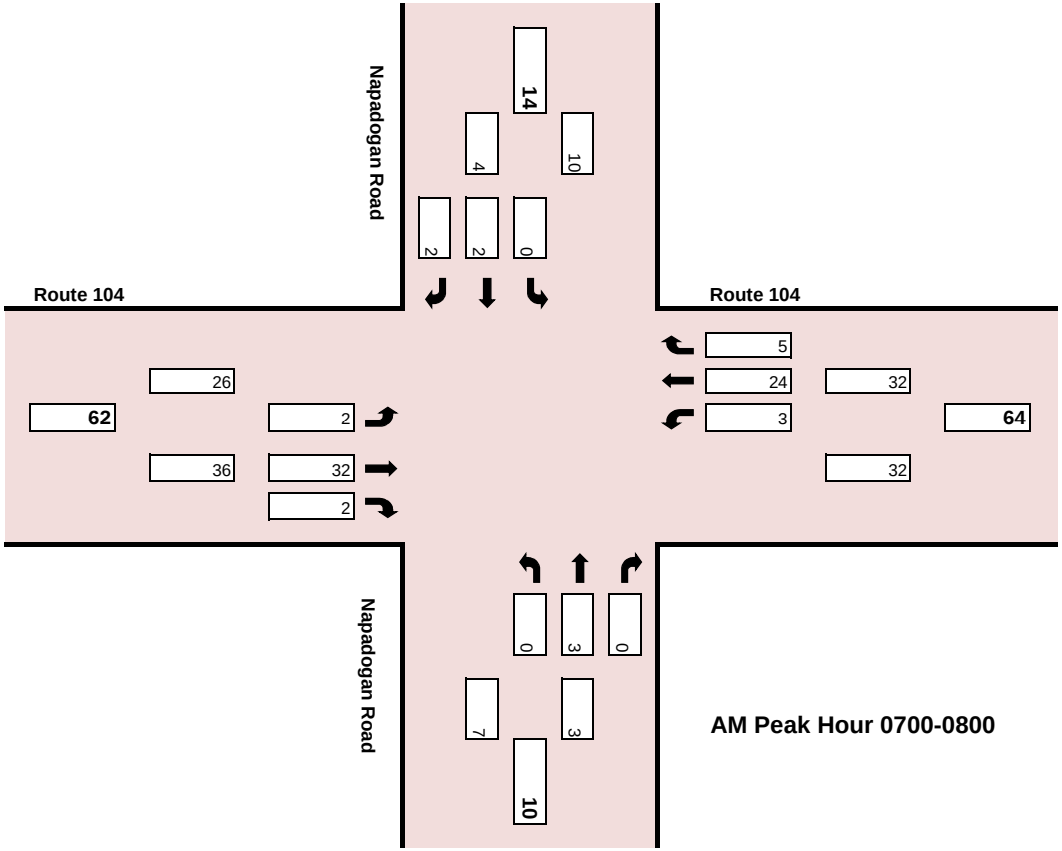


Sisson Brook Project EIA
Traffic Count Summary
Estimated Daily Total and Truck Volumes

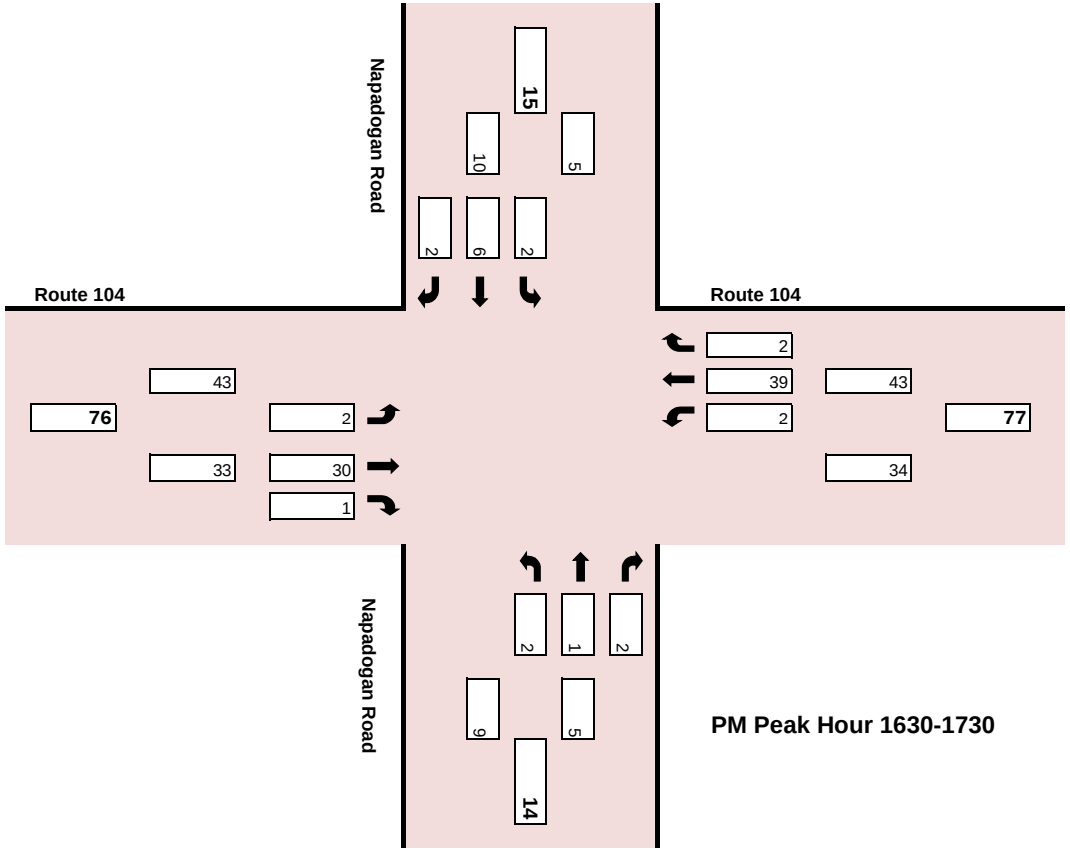




Sisson Brook Project Transportation Study
Route 104 / Napadogan Road Traffic Count Summary
AM and PM Peak Hour Volumes

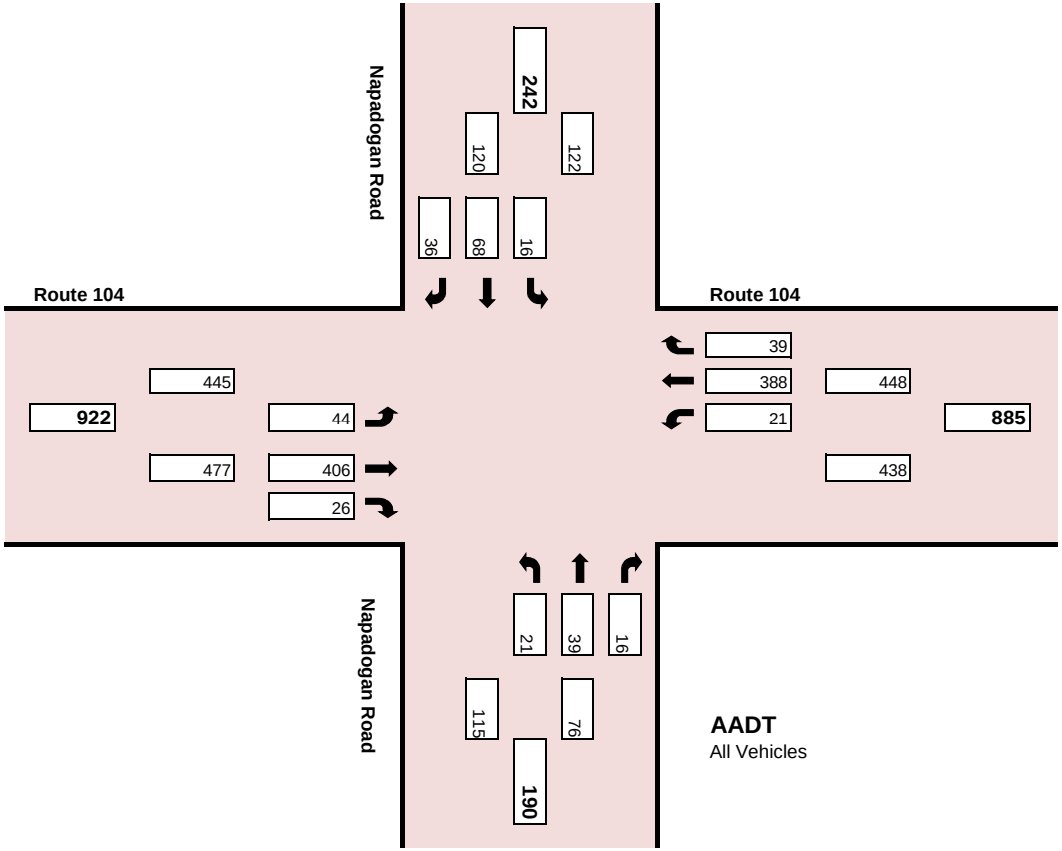


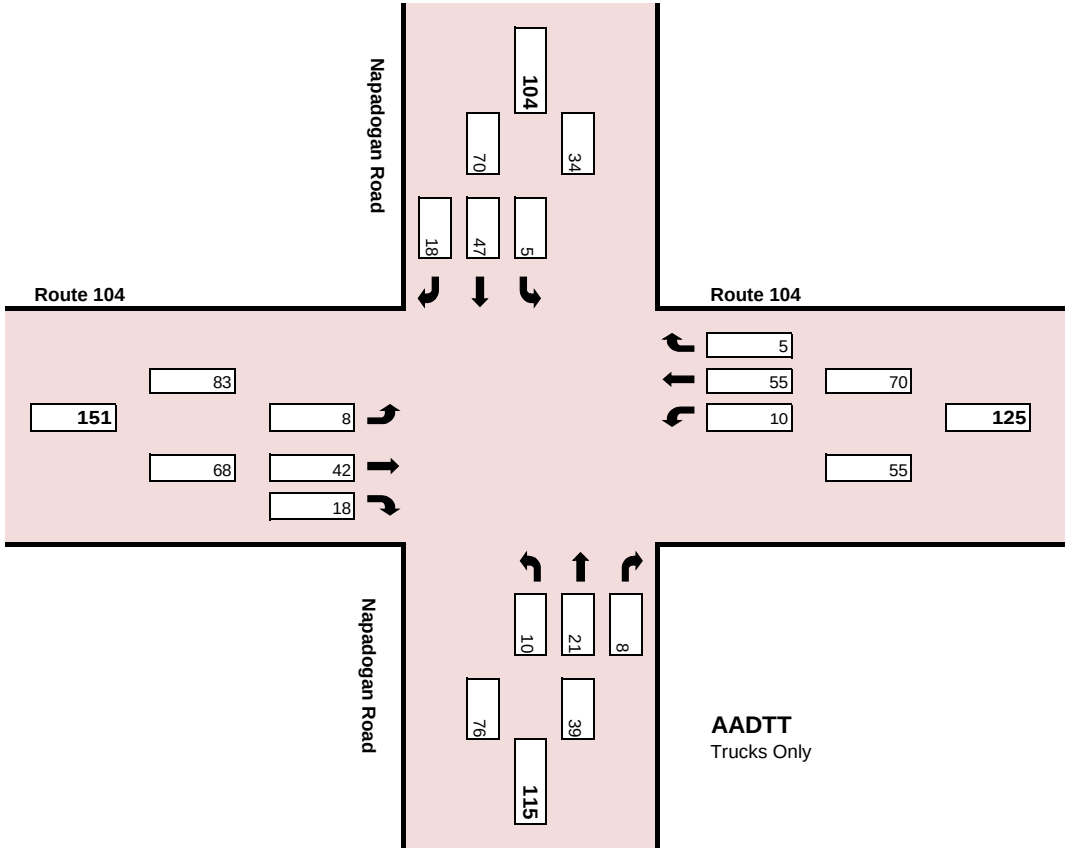
AM Peak Hour 0700-0800



PM Peak Hour 1630-1730

Sisson Brook Project Transportation Study
Route 104 / Napadogan Road Traffic Count Summary
Estimated Daily Total and Truck Volumes





Appendix C –

Project Traffic Generation – Construction and Operation Phase

It should be noted that the Project is at a feasibility study stage, and detailed engineering design of the specific elements and configurations of the Project has not yet been completed. Consequently, the Project as described in this document is based on current knowledge and the professional experience of Northcliff and its design consultants in developing an open pit mine and mill. As such, while Northcliff and its team have made considerable efforts at defining the envelopes of the Project and associated requirements to support the EIA in a conservative manner, it must be recognized that the actual nature, processes, configuration, capacities, and associated facility requirements for the Project as will ultimately be built and operated may vary from those described herein. As such, though based on the best available information at the time of writing, the Project details as described in this report are subject to change as the Project unfolds and as more detailed construction and operations planning is carried out.

Sisson Truck Traffic Forecast by Month

	PRE-PRODUCTION																					STARTUP									
Milestone ====>	Begin Mass Earthwork			Begin Concrete											Pwr Line Comp					Conc Mech Compl		APT Mech Compl	Steady State Ops								
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Construction:																															
Sisson Concentrator			31	43	71	111	90	94	79	143	136	171	161	125	125	75	64	52	36												1,607
Sisson APT Plant					10	14	24	37	30	32	27	48	46	57	54	42	42	25	21	18	12										539
Add for Earthwork	15	25	10	10	10																										70
Add Cement Delivery				24	32	46	38	26	21	30	39	29	26	35	18	18	11	6													399
Add for Fuel Trucks	26	26	26	26	26	9	9	9	9	9	9	9	9	9	9	8	8	8	8	8											260
Add for Powerline										18	18	17	17	17	17																104
Add for TSF				30	30	30	30	30	30	30	30	30	30	30	30	30															390
Initial Fills:																															
Grinding Media															14	14	13														41
Reagents																		10	10												20
HFO																	37	37	37												110
APT Plant																					22										
Construction & Startup Total	41	51	67	133	179	210	191	196	169	262	259	304	289	273	267	187	175	137	111	26	34	0	0	0	0	0	0	0	0	0	3540
Plant Operations (Concentrator):																															
Grinding Media																				13	13	13	13	13	13	13	13	13	13	13	143
Liners																								2						2	4
Reagents																				212	212	212	212	212	212	212	212	212	212	212	2,332
Plant Operations (APT):																															
Reagents																				32	32	32	32	32	32	32	32	32	32	32	352
Plant Operations Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	257	257	257	257	259	257	257	257	257	257	259	2479
																															-
Mining:																				Pre-Stripping			Mining								-
Fleet Assembly																	20	20	20	4	4	4	0	0	0	0	0	0	1	1	75
Fuel																				43	43	43	43	43	43	43	43	43	43	43	477
Bulk Explosives																				5	5	5	5	5	5	5	5	5	5	5	59
Tires																			2	1	1	1	1	1	1	1	1	1	1	1	12
Parts, Majors, Others																			5	3	3	3	3	3	3	3	3	3	3	3	38
Mining Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20	27	57	57	57	53	53	53	53	53	53	54	54	661
NCF OWNERS																															
Buses	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	120	120	120	120	120	120	120	120	120	120	120	120	4,032
Road Maintenance Fleet	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	1,350
Product shipment																							43	43	43	43	43	43	43	43	344
Misc (Garbage, Sewage, Maint, Etc)	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	240
NCF OWNERS TOTAL	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	173	173	173	173	216	216	216	216	216	216	216	216	5966
Total Monthly Truck Traffic:	**238**	**248**	**264**	**330**	**376**	**407**	**388**	**393**	**366**	**459**	**456**	**501**	**486**	**470**	**464**	**384**	**392**	**354**	**311**	**513**	**521**	**487**	**526**	**528**	**526**	**526**	**526**	**526**	**527**	**529**	**12646**

Construction :	Project Construction Phase Traffic Generated	Principal Routes Assignment			Alternate Routes Assignment		
		R 1 (PSA>Rte605>Rte105>Rte2)	R 2 (SSA>Rte 107>CN)	R 3 (SSA>Rte107>Rte 8)	R 4 (PSA>Rte 104>Rte 617)	R 5 (SSA>Rte 107>Rte 105)	R 6 (PSA>Rte 104>Rte 620)
Trucks	**Trks/mo**	**% R 1**	**% R 2**	**% R 3**	**% R 4**	**% R 5**	**% R 6**
Sisson Concentrator	171	100%	0%	0%	0%	0%	0%
Sisson APT Plant	48	100%	0%	0%	0%	0%	0%
Cement	29	100%	0%	0%	0%	0%	0%
Fuel Trucks	9	100%	0%	0%	0%	0%	0%
Powerline Materials	17	75%	0%	0%	25%	0%	0%
TSF	30	100%	0%	0%	0%	0%	0%
Road Maintenance Fleet	45	75%	0%	25%	0%	0%	0%
Misc *(Garbage, Sewage, Maint, etc)*	8	70%	0%	30%	0%	0%	0%
Total Trucks	**357**						
Buses*	**Buses/mo**	**% R 1**	**% R 2**	**% R 3**	**% R 4**	**% R 5**	**% R 6**
	144	66.7%	33.3%	0.0%	0%	0.0%	0%
Passenger Vehicles*	**PVs/day**	**% R 1**	**% R 2**	**% R 3**	**% R 4**	**% R 5**	**% R 6**
to Site	50	0%	0%	25%	25%	25%	25%
to off- site parking	150	66.7%	16.7%	0.0%	0%	16.7%	0%
Total PVs	200						
Total Trucks and Buses **	**T&Bs/mo**	**% R 1**	**% R 2**	**% R 3**	**% R 4**	**% R 5**	**% R 6**
	501						

**** Based on Northcliff Resources*** **Sisson Project - Traffic Estimates -** ***Memo, Nov 29/12 and Revised by Teleconference on Dec 4/12***

***** Based on Maximum Month (Month 12 = 501) as given in Northcliff Resources*** **Sisson Truck Forecast by Month -** ***Table, Nov 29/12***

Operation :	Project Operation Phase Traffic Generated	Principal Routes Assignment			Alternate Routes Assignment		
		R 1 (PSA>Rte605>Rte105>Rte2)	R 2 (SSA>Rte 107>CN)	R 3 (SSA>Rte107>Rte 8)	R 4 (PSA>Rte 104>Rte 617)	R 5 (SSA>Rte 107>Rte 105)	R 6 (PSA>Rte 104>Rte 620)
Trucks	**Trks/mo**	**% R 1**	**% R 2**	**% R 3**	**% R 4**	**% R 5**	**% R 6**
Reagents and Grinding Media	257	85%	15%	0%	0%	0%	0%
Fuel Trucks	43	100%	0%	0%	0%	0%	0%
Bulk Explosives	5	100%	0%	0%	0%	0%	0%
Equipment and Materials *(Liners, Fleet Assembly, Tires & Parts,Majors, Others)*	8	85%	15%	0%	0%	0%	0%
Product *(Concentrate & APT)*	43	0%	100%	0%	0%	0%	0%
Road Maintenance Fleet	45	75%	0%	25%	0%	0%	0%
Misc *(Garbage, Sewage, Maint, etc)*	8	70%	0%	30%	0%	0%	0%
Total Trucks	**409**						
Buses*	**Buses/mo**	**% R 1**	**% R 2**	**% R 3**	**% R 4**	**% R 5**	**% R 6**
	120	50%	50%	0%	0%	0%	0%
Passenger Vehicles*	**PVs/day**	**% R 1**	**% R 2**	**% R 3**	**% R 4**	**% R 5**	**% R 6**
to Site	25	0%	0%	25%	25%	25%	25%
to off- site parking	75	50%	25%	0%	0%	25%	0%
Total PVs	100						
Total Trucks and Buses*	**T&Bs/mo**	**% R 1**	**% R 2**	**% R 3**	**% R 4**	**% R 5**	**% R 6**
	529						

**** Based on Northcliff Resources*** **Sisson Project - Traffic Estimates** ***- Memo, Nov 29/12 and Revised by Teleconference on Dec 4/12***

***** Based on Maximum Month (Month 30 = 529) as given in Northcliff Resources*** **Sisson Truck Forecast by Month** ***- Table, Nov 29/12***