

# 14.0 TRANSPORTATION

# 14.1 SCOPE OF THE REVIEW

Transportation, as defined for this CER, refers to the quality of road transportation networks and infrastructure and their capacity to provide safe and efficient service for movement of vehicles on provincial highways. The scope of the review considers the arterial, collector and local highways, and bridges and interchanges between Nackawic and Fredericton.

### 14.1.1 Why Transportation is a Valued Component

The Station provides an important transportation link between Route 102 (south of the Saint John River) and Route 105 (north of the Saint John River). This link, known locally as Mactaquac Road, traverses the

river. It crosses over the earthen dam and diversion sluiceway before crossing the left bank approach channel to the powerhouse via a bridge. This road is a primary commuter route between communities surrounding the Station on either side of the Saint John River.

Each of the Options will affect the transportation link between Routes 102 and 105, will result in changes to local traffic and circulation patterns near the Station, and will result in increased traffic (passenger vehicles and heavy trucks) on local roads as a result of the transport of workers, materials and equipment to and from the area of the Station. If unmitigated, the removal of this transportation link and the resulting changes to traffic patterns and increased use would result in traffic disruptions during the Project. Traffic will need to use an alternative river crossing.



### 14.1.2 Regulations and Policies Relevant to Transportation

The management of road transportation on provincial arterial and collector highways, including transportation network infrastructure condition and traffic management, is the responsibility of the New Brunswick Department of Transportation and Infrastructure (NBDTI), under the authority of the New Brunswick *Highway Act*. The New Brunswick Department of Public Safety administers the New Brunswick *Motor Vehicle Act* by enforcing traffic rules (e.g., speed limits, seasonal weight restrictions).

### 14.1.3 Area of Review

The area of review for transportation extends approximately 40 km upstream of the Station to the Hawkshaw Bridge in Pokiok (near Nackawic), and approximately 22 km downstream of the Station to the Princess Margaret Bridge in Fredericton. The area includes arterial, collector and local highways, and associated interchanges and bridges that are directly connected to the transportation network at Mactaquac (Figure 14.1). This includes Routes 2 and 3 south of the Station; Routes 101, 635, and 640 from the communities of Harvey, Hanwell and Fredericton; and Routes 104, 105, 610, 615, 616, and 620 from the communities of Upper Caverhill, Upper Keswick and Fredericton. The area of review is consistent with the area considered in the Transportation Study of Mactaquac Project Options (exp Services Inc. 2015).



# Stantec

#### Transportation Network near the Mactaquac Generating Station

Figure 14.1



# 14.1.4 Key Issue

The transportation of workers, materials, goods, services and equipment to the Project site will add to traffic on the transportation network in the vicinity of the Station, and may affect the condition of this infrastructure. This could affect traffic flow for the duration of construction. Additionally, all Options will result in the removal of Mactaquac Road between Routes 102 and Route 105. This will change traffic flow and patterns between Nackawic and Fredericton. Traffic changes outside this area as a result of the Project are not likely to be distinguishable from current levels.

The key issue of concern for transportation is outlined in Table 14.1.

Table 14.1	Description of Key Issue for Transportation

Key Issue	Description
Potential change in transportation	<ul> <li>Changes in network infrastructure (i.e., quality and condition of the existing transportation network).</li> <li>Changes in traffic volume, measured by annual average daily traffic (AADT), as a result of: <ul> <li>the removal of Mactaquac Road during construction;</li> <li>the transportation of workers, goods, materials, services and equipment to the Project site; and</li> </ul> </li> </ul>
	<ul> <li>changes in traffic patterns (e.g., temporary intersections, bypasses and alignments).</li> </ul>

### 14.2 EXISTING CONDITIONS

### 14.2.1 Sources of Information

NB Power retained exp Services Inc. to prepare a transportation study (exp Services Inc. 2015) in support of its decision-making regarding the Options. The City of Fredericton engineering and planning staff were consulted as part of that study to determine where residential and commercial growth will occur and to make traffic predictions. The transportation study provides the basis for defining existing transportation conditions. It identifies the historical, current and predicted future traffic volumes on the transportation network in the Mactaquac area, and alternative alignments for the transportation link across the Saint John River at Mactaquac.

### 14.2.2 Description of Existing Conditions

#### 14.2.2.1 Transportation Network

Roadways within the Mactaquac area are described below.

Route 2, an arterial highway, is a four-lane divided highway. It is part of the Trans-Canada Highway system. It provides a main route through New Brunswick, and is the principal link between Fredericton, Nackawic and Woodstock.



Route 3, an arterial highway, is a two-lane undivided highway. It begins at Route 2 south of Longs Creek and extends south towards St. Stephen. It provides a link from the south of the province to Longs Creek, where drivers can travel to Mactaquac via Route 102.

There are three collector highways in the Mactaquac area; they are all two-lane undivided highways.

- Route 102 was part of the Trans-Canada Highway system and is locally referred to as the "Old Trans-Canada Highway", originating at Pokiok (near Nackawic) and terminating at Grand Bay-Westfield, along the south side of the Saint John River. It provides access from the south side of the Station, and is the primary route used by travellers between the south side of Fredericton and Mactaquac.
- Route 104 linking Hartland, Burtts Corner, and Keswick, and terminating at Route 105 at Mouth of Keswick.
- Route 105 linking Nackawic to Mactaquac and points downstream of Fredericton, beginning at Grand Falls and terminating at Youngs Cove, along the north side of the Saint John River. It provides access from the north side of the Station, and is the primary route used by travellers between the north side of Fredericton and Mactaquac.

There are also six local highways in the general Mactaquac area:

- Route 605;
- Route 610;
- Route 615;
- Route 616;
- Route 620; and
- Route 635.

There are four river crossings within the area of review:

- the Westmorland Street Bridge in Fredericton, which is the closest crossing downstream of the Station;
- the Princess Margaret Bridge in Fredericton;
- the crossing at the Station, on Mactaquac Road; and
- the Hawkshaw Bridge in Nackawic, which is the closest crossing upstream of the Station.





#### 14.2.2.2 Traffic Volumes

Annual average daily traffic (AADT) volumes for the roadways within the Mactaquac area are presented in Table 14.2. They include the most recent AADT data collected by the NBDTI in 2013 and extrapolated to 2014 volumes by exp Services Inc., and one-time traffic counts at the Route 102 and Mactaquac Road interchange carried out by exp Services Inc. in September 2014 (exp Services Inc. 2015).

Location	Annual Average Daily Traffic (AADT, number of vehicles)		
Local Highways			
Route 2 at Mazerolle Settlement	8,440		
Route 102 4 km east of Hawkshaw Bridge	620		
Route 102 between Kellys Creek and Longs Creek	1,770		
Route 102 at the exit to the Station	5,460ª		
Route 102 near Springhill Road	10,150		
Route 105 south of Hawkshaw Bridge	2,320		
Route 105 at Scotch Lake Road east of Nackawic	260		
Route 105 at Mactaquac Marina Road	920		
Route 105 at the Mactaquac Causeway	2,590		
Route 105 near the Mouth of Keswick	4,570		
Route 105 (Ring Road) in Douglas	9,030		
Route 105 (Ring Road) Maple Street to Brookside Drive	21,110		
Route 605 at Caverhill Siding Road	530		
Route 610 south of Route 615	370		
Route 615 at South Mactaquac River #1 Bridge	270		
Route 616 north of Rocky Road	1,660		
River Crossings on the Saint John River			
Hawkshaw Bridge in Nackawic	3,150		
Mactaquac Road at the Mactaquac Generating Station	4,410		
Westmorland Street Bridge in Fredericton	51,970		
Princess Margaret Bridge in Fredericton	21,520		
Source: exp Services Inc. (2015)			

#### Table 14.2 Annual Average Daily Traffic, 2014

In 2014, the Mactaquac Road over the Station had the third highest AADT of the four river crossings between Fredericton and Nackawic (4,410 vehicles) (Table 14.2). Westmorland Street Bridge had the highest AADT (51,970), followed by the Princess Margaret Bridge (21,520). Hawkshaw Bridge in Nackawic had the lowest AADT (3,150).

The primary arterial highway in the Mactaquac area is the Trans-Canada Highway, Route 2, which bypasses the Station. In 2014, Route 2 had an AADT of 8,440 vehicles at Mazerolle Settlement, approximately 7 km southwest of the Station (Table 14.2).





The highest AADT on Route 102 (10,150 vehicles) was recorded at Springhill Road, approximately 9 km east of the Station (Table 14.2). The AADT on this route declined sharply farther west of the Fredericton city limits: Route 102 interchange with Mactaquac Road (5,460 vehicles), Longs Creek (1,770) and 4 km east of the Hawkshaw Bridge (620). The decline in traffic volumes is a reflection of the number of commuters that travel this route from Nackawic and Fredericton (exp Services Inc. 2015).

Traffic volumes on other routes west of the Fredericton city limits also showed a downward trend, indicative of the commuter traffic travelling to Fredericton from the surrounding communities of Burtts Corner (via Route 104), Keswick (via Routes 615 and 616) and the McLeod Hill area north of Fredericton (via Route 620). On Route 105, the highest AADT (21,110 vehicles) was recorded at Ring Road in the Fredericton city limits (exp Services Inc. 2015). The AADTs on Route 105 west of the Station ranged from 2,320 to 2,590 vehicles on the approach roads leading to the Hawkshaw Bridge and Mactaquac Causeway, respectively (Table 14.2). However, the AADTs on Route 105 between the approaches were substantially lower. They ranged from 260 vehicles east of Nackawic to 920 west of the Mactaquac Provincial Park (exp Services Inc. 2015).

# 14.3 SUMMARY OF STANDARD MITIGATION FOR TRANSPORTATION

Standard mitigation and best management practices for transportation will be implemented during construction and operation. They are based on normal operating procedures and regulatory requirements, as outlined in Section 2.6. The primary measure to mitigate the disruption/loss of the current river crossing at the dam will be planning and implementation of an alternative transportation link across the Saint John River.

### 14.4 POTENTIAL INTERACTIONS BETWEEN TRANSPORTATION AND THE OPTIONS

Table 14.3 provides an overview of how the Options might interact with transportation.

	Option 1	Option 2	Option 3
Phases	Potential Change in Transportation	Potential Change in Transportation	Potential Change in Transportation
Construction (New facilities, Option 1 or Option 2)	✓	~	
Demolition (Existing structures, Option 1 or Option 2)	✓	✓	
Operation (Option 1 or 2)	NI	NI	
Decommissioning (Option 3 only)			1
Notes: ✓ = Potential interactions. NI = No interaction. Shaded cells are not applicable to th	ne particular Option and phase.		

#### Table 14.3 Potential Interactions between Transportation and the Options



The Project will result in a change in transportation network infrastructure at the Station and associated changes in traffic volumes and traffic patterns within the local communities. These changes will occur during construction and demolition under Options 1 or 2, or during decommissioning under Option 3.

Under Options 1 or 2, the change in traffic as a result of employees travelling to and from the site during operation of each Option is expected to be minimal. Under Option 1, the peak labour force during operation will number only 30 employees. Therefore, no changes in transportation are anticipated as a result of operation, and the operation phase of each Option is therefore not discussed further in this CER.

Potential interactions for Options 1, 2 and 3 during construction and demolition activities are discussed below.

# 14.4.1 Potential Change in Transportation

The potential interactions of all the Options with transportation are discussed together because there is little distinction between the nature and magnitude of those interactions. Construction of Options 1, 2 or 3 will result in a temporary or permanent disruption to traffic on Mactaquac Road as the existing structures at the Station are demolished and either replaced or restored, will affect local traffic patterns



in the transportation network leading to and from the Station and surrounding area, and will result in increased passenger vehicles and heavy trucks transporting workers, materials and equipment to and from the site. Therefore, the discussion below considers the potential changes to transportation irrespective of which Option is ultimately selected.

Mactaquac Road provides an important transportation link between Routes 102 and 105 over the Saint John River. Under Options 1 or 2, the Mactaquac Road between Route 102 and the earthen dam would be closed and this transportation link would be removed as the new right bank approach and discharge channel is excavated and new components are developed—a temporary road would be developed along the river bank to the west of the approach and discharge channel, over the rock plug to be maintained until the new facilities are ready for commissioning, to facilitate Project-related traffic and some passenger traffic if an alternative

transportation link is not available at that time. Option 3 would cause the permanent closure and abandonment of Mactaquac Road as it currently exists between Routes 102 and 105 as a result of the removal of the structures associated with the existing Station. Therefore, regardless of the Option selected, the existing transportation link between Routes 102 and 105 at the south end of Mactaquac Road will be severed either temporarily (*i.e.*, during construction) or permanently. Maintaining a river crossing at Mactaquac regardless of Option selected (Section 2.6.3), including the possible implementation of a new transportation link as described in Section 2.6.3 and development of a temporary road along the shoreline during construction (for Option 1 or 2), would allow vehicle movements to continue across the Saint John River at or near Mactaquac. Several routes and locations for a new transportation link are being considered (Section 2.6.3). Consequently, with this mitigation, the environmental interactions of the Options with transportation arising from the temporary or permanent disruption to traffic on Mactaquac Road due to the removal of structures associated with the Station will be minimal.

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The construction of the Options is expected to generate different volumes of traffic in the area near the Station because different numbers of workers will be required under each Option. Preliminary estimates of the labour force requirements for each Option have been developed, and resulting vehicle movements of workers travelling to and from the site on the transportation network have been approximated (exp Services Inc. 2015). However, these estimates are preliminary and subject to change as engineering design is conducted; the estimates herein are intended to be "order-of-magnitude" estimates only, for preliminary planning and evaluation purposes.

Estimated passenger vehicle movements under each Option are provided in Table 14.4. It was assumed that 50% of trips would originate from the south side of Fredericton, 30% from the north side of Fredericton, and 20% from the Nackawic to Woodstock area.

	Project-related vehicles added to the transportation network (AADT)			
	Passenger vehicles			
Option	Route 102 between Fredericton and Mactaquac	Route 105 between Fredericton and Mactaquac	Route 102 between Mactaquac and Communities to the West	
Option 1: Construction, demolition and operation	750–1,000	450–600	300–400	
Option 2: Construction, demolition and operation	375–625	225–375	150–250	
Option 3: Decommissioning	50–75	30–45	20–30	
Source: Adapted from exp Services Inc. (2015) based on revised labour estimates from engineering studies.				

 Table 14.4
 Passenger Vehicle Movements Generated by the Options

In addition to passenger vehicle movements, each Option would involve movements of trucks and other construction vehicles and equipment. Estimated truck movements for carrying equipment, materials and supplies to and from the site under each Option are provided in Table 14.5.

Option	Approximate Total Number of Truck Loads for Duration of Option	Approximate Duration of Option (Years)	Estimated Average Daily Truck Traffic (trucks/day)*
Option 1: Construction, demolition and operation	37,500-77,500	11	22-47
Option 2: Construction, demolition and operation	27,500-57,000	10	18-38
Option 3: Decommissioning	not available	7	not available
Note:			

\* Assumes a simple linear interpolation of anticipated truck traffic over an approximate 150 day per year construction period. **Source:** Sparkes, J., pers. comm., 2015.

Option 1 would generate the highest passenger traffic volumes; Option 3 would generate the lowest (Tables 14.4 and 14.5). Estimated truck loads to and from the site are also highest for Option 1 or decrease with Option 2. Estimates of truck loads are currently not available for Option 3, but are expected to be a fraction of those estimated for either Option 1 or Option 2.





Both Route 102 and Route 105 are collector highways. Historically, they have had large traffic volumes, particularly Route 102, which formerly was part of the Trans-Canada Highway.

Changes in transportation patterns will depend on whether a new cross-river transportation link is selected and the origin and destination of the vehicles. When a Preferred Option is selected, the means by which a transportation link will be maintained at Mactaquac will be determined by NBDTI, and further studies and

modelling will be conducted to predict specifically how transportation will be affected by the Project. However, regardless of the Option ultimately selected, with a cross-river transportation link between Routes 102 and 105 being maintained or a new one being developed as mitigation for the environmental interactions of the Options with transportation, no unacceptable interactions are expected with respect to traffic flows or road infrastructure.

NB Power will develop a plan to manage transportation issues associated with Project-related traffic. This plan will include measures to reduce adverse interactions with the transportation network as a result of increased traffic volumes associated with the Project; including but not necessarily limited to consideration of:

- encouraging workers to carpool;
- providing shuttles from accommodation centres;
- establishing park-and-ride lots; and
- staggering the start and end of shifts to spread traffic over a longer period.

The transportation of personnel, equipment, materials and services to and from the Station during the implementation of the Preferred Option (once selected) could also damage existing road infrastructure as a result of increased traffic volume or transport of heavy, oversized loads. NB Power will seek all the necessary permits for extremely heavy or oversized loads from the Province, transportation routes will be planned, and the public will be notified (e.g., by NB Power and NBDTI websites, social media, local newspapers and radio advertisements) about long delays or disruptions to the transportation network. Alternative trucking routes, including a possible temporary haul route linking Route 2 to Mactaquac, will be explored and implemented as feasible.



During the implementation of the Preferred Option (once selected), traffic control personnel and/or equipment (e.g., lighted temporary signs, pylons or temporary barriers) will be used, when necessary, to direct motorists within the transportation network and maintain traffic flows and safety. Traffic control will be implemented in accordance with NBDTI standards and policies.

Offsetting the peak hour of new traffic from typical morning and evening peak hours would help reduce traffic issues.





As described above, the review has identified the potential requirement for additional mitigation measures and requirements for further study, as highlighted in Table 14.6.

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Option	Additional Potential Mitigation	Additional Information Requirements
Option 1: Construction, demolition and operation	<ul> <li>Communication of long traffic delays or disruptions to the public</li> </ul>	<ul> <li>Selection of an alternative transportation link.</li> </ul>
Option 2: Construction, demolition and operation	<ul><li>and stakeholders.</li><li>Development and</li></ul>	<ul> <li>Modelling to predict transportation effects with the</li> </ul>
Option 3: Decommissioning	implementation of a transportation plan to manage traffic.	alternative transportation link.

 Table 14.6
 Summary of Additional Potential Mitigation and Information Requirements